【図１０５】

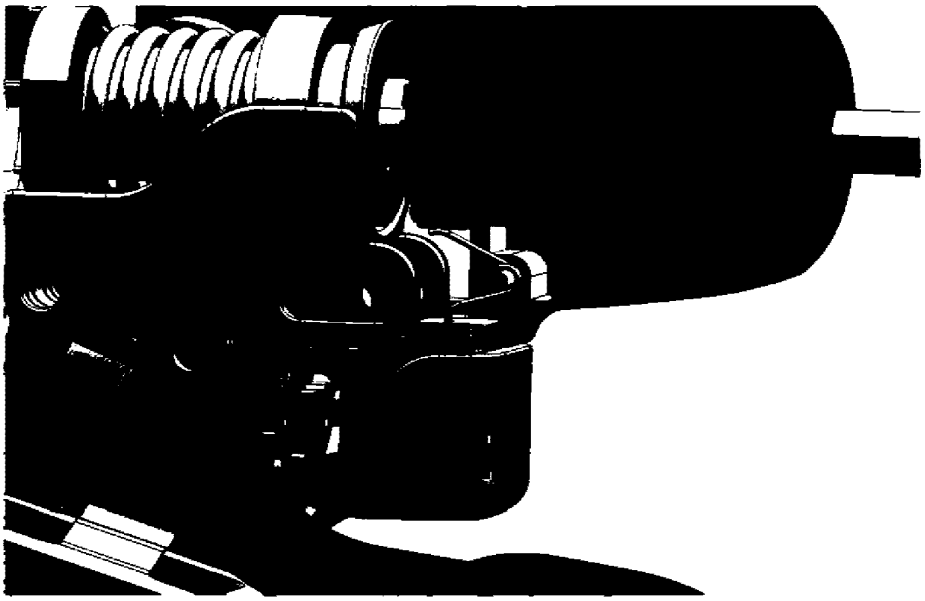


図１０５

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【図１０６】

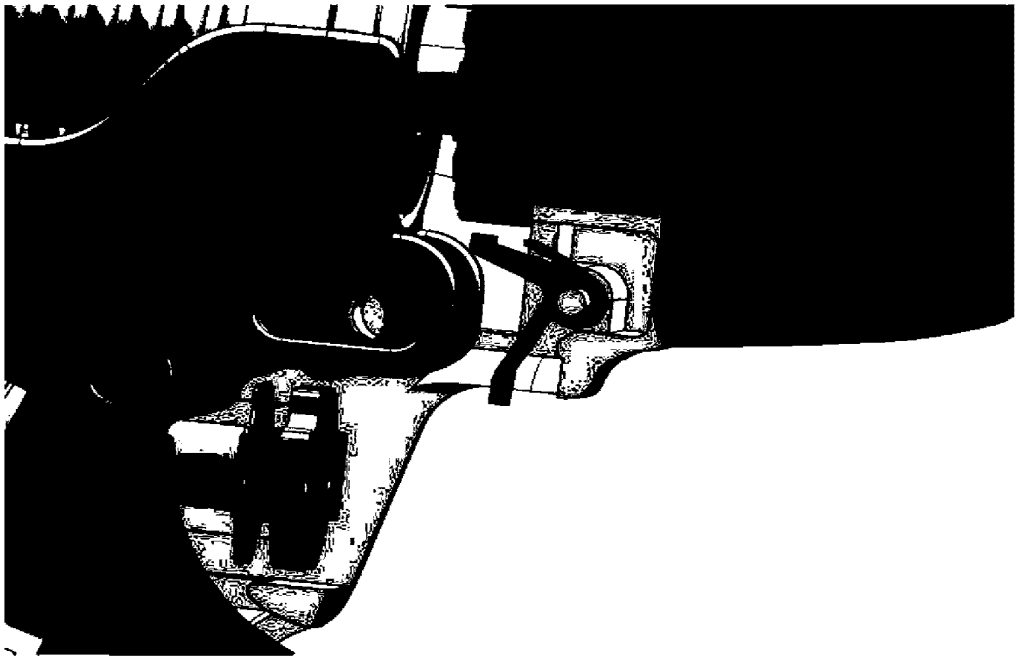


図１０６

【図１０９】

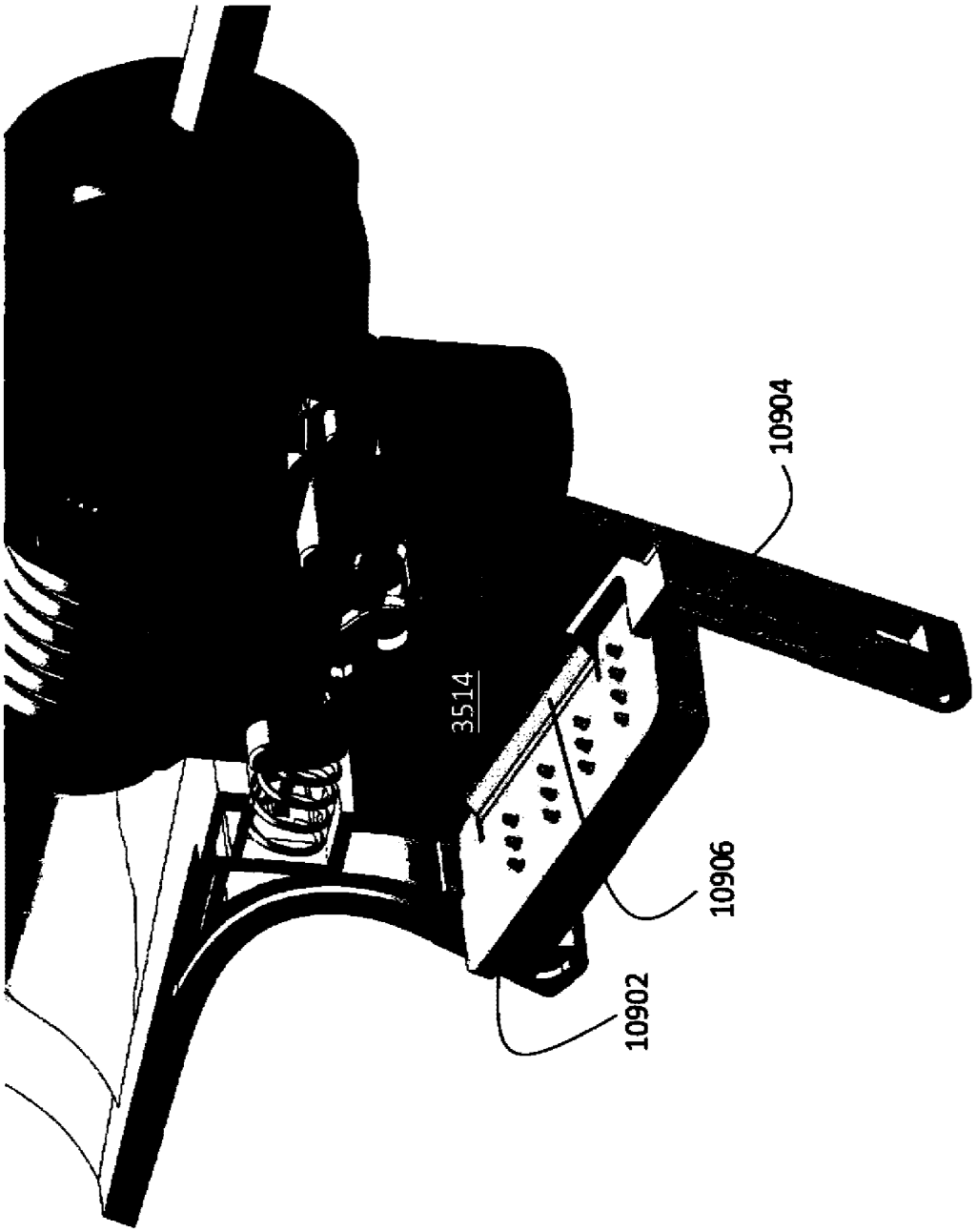


図１０９

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【図１１０】



図１１０

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特開２００７－２２２６１５（ＪＰ，Ａ）
特表２００４－５２５７１８（ＪＰ，Ａ）
特開２００３－０５２７１７（ＪＰ，Ａ）
特開２００２－２００９４（ＪＰ，Ａ）
特開２０００－１８５０５２（ＪＰ，Ａ）

(58)調査した分野(Int.Cl., ＤＢ名)
Ａ６１Ｂ １８／００

(19)中华人民共和国国家知识产权局

(12)实用新型专利

(10)授权公告号 CN 202459196 U
(45)授权公告日 2012.10.03

(21)申请号 201220054067.X

(22)申请日 2012.02.20

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(51)Int.Cl.
A61H 7/00(2006.01)
A61N 2/08(2006.01)

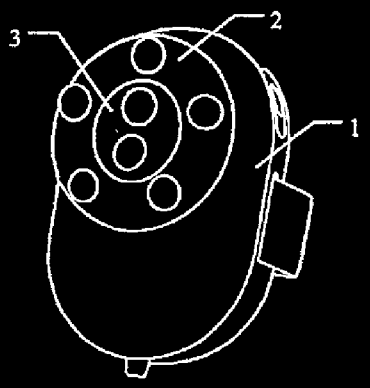
权利要求书 1 页 说明书 3 页 附图 2 页

(54)实用新型名称

一种瘦身按摩器

(57)摘要

本实用新型公开了一种瘦身按摩器，包括按摩器主机，用于供电、且通过导线与所述按摩器主机电连接的电源，以及用于通电时按摩、且配合安装在所述按摩器主机上的对旋式按摩头。本实用新型所述瘦身按摩器，可以克服现有技术中结构复杂、使用携带不方便、健身效果不佳与使用成本高等缺陷，以实现结构简单合理、使用携带方便、健身效果好与使用成本低的优点。



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1. 一种瘦身按摩器，其特征在于，包括按摩器主机，用于供电、且通过导线与所述按摩器主机电连接的电源，以及用于通电时按摩、且配合安装在所述按摩器主机上的对旋式按摩头。

2. 根据权利要求 1 所述的瘦身按摩器，其特征在于，所述电源包括蓄电池、或用于将 220V 交流电转换为 12V 直流电的变压器调节模块。

3. 根据权利要求 1 所述的瘦身按摩器，其特征在于，所述对旋式按摩头包括相互独立设置、且对旋工作的内部旋转圆盘与外部旋转圆盘；所述内部旋转圆盘与外盘旋转圆盘，均包括由自身可自由旋转的若干个磁性嵌入式钢珠构成的按摩球。

4. 根据权利要求 1 所述的瘦身按摩器，其特征在于，所述按摩器主机，包括内置的 15000 转高速微电机，以及配合设置在所述 15000 转高速微电机与对旋式按摩头之间的减速齿轮组。

5. 根据权利要求 1-4 中任一项所述的瘦身按摩器，其特征在于，还包括可拆装式把手，所述可拆卸式把手与按摩器主机卡扣式连接。

6. 根据权利要求 5 所述的瘦身按摩器，其特征在于，还包括卡扣内锁装置；所述可拆卸式把手，通过卡扣内锁装置，与按摩器主机连接；

需用可拆卸式把手时，将按可拆卸式把手，对准按摩器主机尾部的卡槽，挤压进去，直到卡扣内锁装置的锁扣翘起，即可牢固固定；

不需用可拆卸式把手时，只需轻轻拽下卡扣内锁装置的锁扣摁钮，摁钮嵌入内部卡扣松开，则可取下把手。

7. 根据权利要求 6 所述的瘦身按摩器，其特征在于，当所述可拆卸式把手连接按摩器主机时，在可拆卸式把手上方，还设有用于埋置变压器电线并避免缠绕线的线槽。

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一种瘦身按摩器

技术领域

[0001] 本实用新型涉及健身器材，具体地，涉及一种瘦身按摩器。

背景技术

[0002] 随着社会的发展和进步，人们的生活质量也不断提高，但亚健康及肥胖的人群却越来越多，其原因是由于工作紧张缺少健身运动，而现有的健身锻炼场地多为露天场地，受天气因素影响大，使健身运动难以坚持。为了满足广大消费者健身锻炼的需要，室内的健身器材应运而生，种类也越来越多，深受广大消费者的青睐。

[0003] 但是，现有的健身器材也存在不足，比如：结构复杂、体积庞大，真用空间大，需专业人员辅导使用，适宜健身房使用，家庭不适宜使用；价格昂贵，普通家庭难以承受；功能单一。

[0004] 在实现本实用新型的过程中，发明人发现现有技术中至少存在结构复杂、使用携带不方便、健身效果不佳与使用成本高等缺陷。

发明内容

[0005] 本实用新型的目的在于，针对上述问题，提出一种瘦身按摩器，以实现结构简单合理、使用携带方便、健身效果好与使用成本低的优点。

[0006] 为实现上述目的，本实用新型采用的技术方案是：一种瘦身按摩器，包括按摩器主机，用于供电、且通过导线与所述按摩器主机电连接的电源，以及用于通电时按摩、且配合安装在所述按摩器主机上的对旋式按摩头。

[0007] 进一步地，所述电源包括蓄电池、或用于将 220V 交流电转换为 12V 直流电的变压器调节模块。

[0008] 进一步地，所述对旋式按摩头包括相互独立设置、且对旋工作的内部旋转圆盘与外部旋转圆盘；所述内部旋转圆盘与外盘旋转圆盘，均包括由自身可自由旋转的若干个磁性嵌入式钢珠构成的按摩球。

[0009] 进一步地，所述按摩器主机，包括内置的 15000 转高速微电机，以及配合设置在所述 15000 转高速微电机与对旋式按摩头之间的减速齿轮组。

[0010] 进一步地，以上所述的瘦身按摩器，还包括可拆装式把手，所述可拆卸式把手与按摩器主机卡扣式连接。

[0011] 进一步地，以上所述的瘦身按摩器，还包括卡扣内锁装置；所述可拆卸式把手，通过卡扣内锁装置，与按摩器主机连接；

[0012] 需用可拆卸式把手时，将按可拆卸式把手，对准按摩器主机尾部的卡槽，挤压进去，直到卡扣内锁装置的锁扣翘起，即可牢固固定；

[0013] 不需用可拆卸式把手时，只需轻轻拽下卡扣内锁装置的锁扣摁钮，摁钮嵌入内部卡扣松开，则可取下把手。

[0014] 进一步地，当所述可拆卸式把手连接按摩器主机时，在可拆卸式把手上方，还设有

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用于埋置变压器电线并避免缠绕线的线槽。

[0015] 本实用新型各实施例的瘦身按摩器，由于包括瘦身按摩器，包括按摩器主机，用于供电、且通过导线与按摩器主机电连接的电源，以及用于通电时按摩、且配合安装在按摩器主机上的对旋式按摩头；可以对人体表面积累多年的赘肉进行挤压、按摩，达到很好的细微的局部按摩的作用；从而可以克服现有技术中结构复杂、使用携带不方便、健身效果不佳与使用成本高的缺陷，以实现结构简单合理、使用携带方便、健身效果好与使用成本低的优点。

[0016] 本实用新型的其它特征和优点将在随后的说明书中阐述，并且，部分地从说明书中变得显而易见，或者通过实施本实用新型而了解。本实用新型的目的和其他优点可通过在所写的说明书、权利要求书、以及附图中所特别指出的结构来实现和获得。

[0017] 下面通过附图和实施例，对本实用新型的技术方案做进一步的详细描述。

附图说明

[0018] 附图用来提供对本实用新型的进一步理解，并且构成说明书的一部分，与本实用新型的实施例一起用于解释本实用新型，并不构成对本实用新型的限制。在附图中：

[0019] 图 1 和图 2 为根据本实用新型瘦身按摩器实施例一的结构示意图；

[0020] 图 3 为根据本实用新型瘦身按摩器实施例二的结构示意图；

[0021] 图 4 为根据本实用新型瘦身按摩器实施例一与实施例二的工作原理示意图。

[0022] 结合附图，本实用新型实施例中附图标记如下：

[0023] 1- 按摩器主机；2- 外部旋转圆盘；3- 内部旋转圆盘；4- 可拆卸式把手。

具体实施方式

[0024] 以下结合附图对本实用新型的优选实施例进行说明，应当理解，此处所描述的优选实施例仅用于说明和解释本实用新型，并不用于限定本实用新型。

[0025] 实施例一

[0026] 根据本实用新型实施例，提供了一种瘦身按摩器。如图 1、图 2 和图 4 所示，本实施例包括按摩器主机 1，用于供电、且通过导线与按摩器主机 1 电连接的电源，以及用于通电时按摩、且配合安装在按摩器主机 1 上的对旋式按摩头。

[0027] 在上述实施例中，电源包括蓄电池、或用于将 220V 交流电转换为 12V 直流电的变压器调节模块。对旋式按摩头包括相互独立设置、且对旋工作的内部旋转圆盘 3 与外部旋转圆盘 2；内部旋转圆盘 3 与外盘旋转圆盘，均包括由自身可自由旋转的若干个磁性嵌入式钢珠构成的按摩球。按摩器主机 1，包括内置的 15000 转高速微电机，以及配合设置在 15000 转高速微电机与对旋式按摩头之间的减速齿轮组。

[0028] 上述实施例的瘦身按摩器，通过变压器调节将 220V 电压转换到 12V，用于按摩器上；该瘦身按摩器对旋式按摩头的设计巧妙，由 2 组独立的旋转圆盘组成；每个圆盘由若干个磁性嵌入式铁珠构成按摩球，内外 2 组圆球在按摩器工作的时候以相反的方向旋转，造成对转效果，即一个顺时针高速旋转，一个逆时针高速旋转；而每个圆盘上的磁性钢珠本身也是可以自由旋转的，这样可以增大摩擦力度和效果。

[0029] 上述实施例的瘦身按摩器，内置 15000 转高速微电机，通过一系列齿轮组的减速

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作用，使最终作用于对旋式按摩头（即两个对旋式按摩头上的圆盘）的速度减慢，用于保证安全操作，但力度却很大，有深层按摩的作用。此外，通过内部按摩组的精巧设计，可以制造出两个按圆盘向相反的两个方向对转。这样，圆盘上的磁性钢珠在对转的过程中，会对人体表面积累多年的赘肉进行挤压，按摩，达到很好的细微的局部按摩的作用。

[0030] 实施例二

[0031] 与上述实施例不同的是，如图 3 所示，本实施例的瘦身按摩器还包括可拆装式把手与卡扣内锁装置，可拆卸式把手 4 与按摩器主机 1 卡扣式连接；可拆卸式把手 4，通过卡扣内锁装置，与按摩器主机 1 连接；需用可拆卸式把手 4 时，将按可拆卸式把手 4，对准按摩器主机 1 尾部的卡槽，挤压进去，直到卡扣内锁装置的锁扣翘起，即可牢固固定；不需用可拆卸式把手 4 时，只需轻轻拽下卡扣内锁装置的锁扣摁钮，摁钮嵌入内部卡扣松开，则可取下把手。

[0032] 在上述实施例中，当可拆卸式把手 4 连接按摩器主机 1 时，在可拆卸式把手 4 上方，还设有用于埋置变压器电线并避免缠绕线的线槽。

[0033] 上述实施例的瘦身按摩器，带有一个可拆装式把手，通过卡扣内锁装置与按摩器主机 1 相连，需要用把手时，将此按摩器把手对准主机尾部的卡槽，挤压进去，直到锁扣翘起即可牢固固定；若不需要把手，只需轻轻拽下锁扣摁钮，摁钮嵌入内部卡扣松开，则可取下把手；当把手连接按摩器主机 1 时，在手柄上方还设有线槽，用于埋置变压器电线，避免缠绕线，使用不便。

[0034] 综上所述，本实用新型各实施例的瘦身按摩器，设计轻巧、便携，作用人体表面广泛，不受限制，由于该按摩器内置充电电池，该瘦身按摩器可在任何地方随时随地使用，并不受制于有无电源供应；该瘦身按摩器转速不快，但力度很大，使用安全，感觉舒适，适用于人们放松身体，减缓疲劳和病痛不可多得的良好“伴侣”；该瘦身按摩器也可通过局部深度按摩，促进人体血液循环，对人体健康有很大的促进作用。

[0035] 最后应说明的是：以上所述仅为本实用新型的优选实施例而已，并不用于限制本实用新型，尽管参照前述实施例对本实用新型进行了详细的说明，对于本领域的技术人员来说，其依然可以对前述各实施例所记载的技术方案进行修改，或者对其中部分技术特征进行等同替换。凡在本实用新型的精神和原则之内，所作的任何修改、等同替换、改进等，均应包含在本实用新型的保护范围之内。

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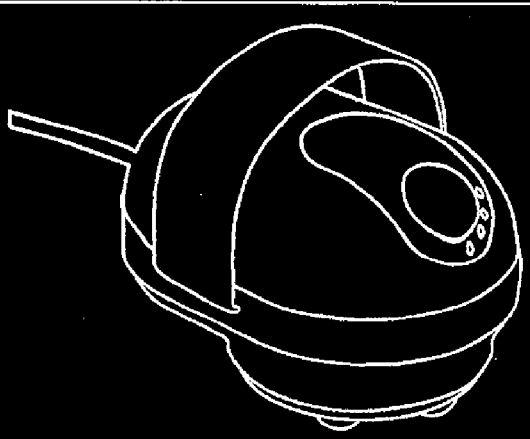


图 1

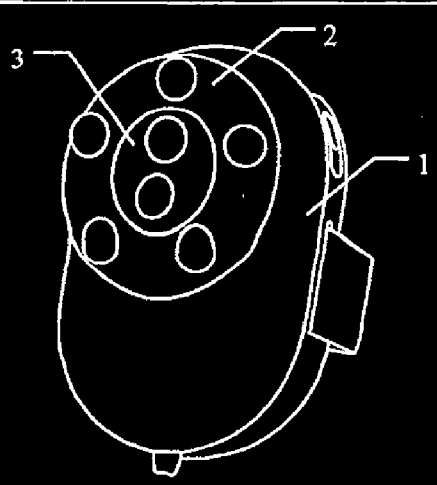


图 2

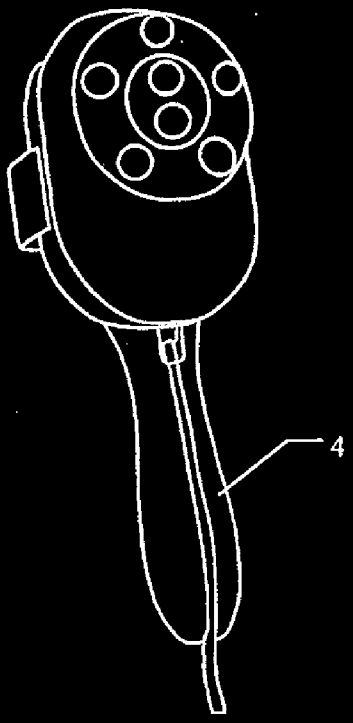


图 3

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图 4

Petitioner Therabody Ex-1004, 1203

English translation of CN202459196U

Abstract

The utility model discloses a slimming massager, comprising: a massager main body, a power source electrically connected to the massager main body by a wire to supply power, and a counter-rotating massaging head fitted on the massager main body to massage when energized. The slimming massager disclosed by the utility model can overcome the defects of complex structure, inconvenient use and carrying, poor fitness effect and high cost in the prior art, and has the advantages of simple and reasonable structure, convenient use and carrying, good fitness effect and low cost.

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Slimming Massager

Technical field

[0001] The present utility model relates to fitness equipment, in particular to a slimming massager.

Background art

[0002] With the development and progress of the society, people's quality of life has been constantly improving, but there are more and more people suffering from sub-health and obesity, due to busy working schedules and lack of fitness exercise. The existing fitness venues are mostly open-air ones and greatly affected by the weather, making it difficult for people to exercise regularly. In order to meet the consumers' needs for fitness exercise, indoor fitness equipment were developed. There are more and more types of indoor fitness equipment, which are well-received by consumers.

[0003] However, the existing fitness equipment have drawbacks, such as: complex structure, large volume, taking up a large space, requiring professional guidance, suitable for gym use, not suitable for use at home; too expensive for ordinary households; and single function.

[0004] In the process of realizing the present utility model, the inventor found that the prior art has at least the defects of complex structure, inconvenient use and carrying, poor fitness effect and high cost.

Summary of the utility model

[0005] The purpose of the present utility model is to provide, in view of the above problems, a slimming massager that has a simple and reasonable structure, is easy to use and carry, and has good fitness effect and low cost.

[0006] In order to achieve the above object, the technical solution adopted by the present utility model is: a slimming massager, comprising a massager main body, a power source electrically connected to the massager main body by a wire to supply power, and a counter-rotating massaging head fitted on the massager main body to massage when energized.

[0007] Further, the power source comprises a battery or a transformer regulation module for converting 220V AC power to 12V DC power.

[0008] Further, the counter-rotating massage head comprises an inner rotating disc and an outer rotating disc that are independently provided and rotate in opposite directions; both the inner rotating disc and the outer disc rotating disc include massage balls formed by several magnetic, embedded steel balls which can rotate freely themselves.

[0009] Further, the massager main body includes a built-in 15000-rpm high-speed micromotor, and a reduction gear set fitted between the 15000-rpm high-speed micromotor and the counter-rotating massage head.

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[0010] Further, the above-mentioned slimming massager further includes a detachable handle, which is snap-fittedly connected to the massager main body.

[0011] Further, the above-mentioned slimming massager further includes a snap-fit internal locking device, through which the detachable handle is connected with the massager main body.

[0012] When the detachable handle is needed, press the detachable handle, align it with a snap-fit slot at the rear of the massager main body, and squeeze it into the slot until a latch of the snap-fit internal locking device cocks, whereby the detachable handle is firmly fixed.

[0013] When the detachable handle is not needed, softly pull down a latch button of the snap-fit internal locking device. The snap fit is released when the button is embedded inside, then the handle can be removed.

[0014] Further, when the detachable handle is connected to the massager main body, a wire groove for embedding the transformer wire and avoiding wire entanglement is provided above the detachable handle.

[0015] For comprising a massager main body, a power source electrically connected to the main body by a wire to supply power, and a counter-rotating massaging head fitted on the massager main body to massage when energized, the slimming massager of each embodiment of the present utility model can squeeze and massage the flab that has built up on a human body surface over years, and achieve excellent, fine, local massage, to thereby overcome the defects in the prior art such as complex structure, inconvenient use and carrying, poor fitness effect and high cost, and realize the advantages of simple and reasonable structure, convenient use and carrying, good fitness effect and low cost.

[0016] Other features and advantages of the present utility model will be described below, and be in part apparent from the description, or understood by implementing the present utility model. The purpose and other advantages of the present utility model can be achieved and obtained through the structures specifically set out in the description, claims, and drawings.

[0017] The technical solutions of the present utility model will be further described in detail below through the accompanying drawings and embodiments.

Brief description of the drawings

[0018] The accompanying drawings are intended to provide a further understanding of the utility model, and form a part of the description. They are used to explain the utility model together with the embodiments, and do not constitute a limitation on the utility model. In the drawings:

[0019] FIGS. 1 and 2 are schematic structural views of Embodiment 1 of the slimming massager according to the present utility model;

[0020] FIG. 3 is a schematic structural view of Embodiment 2 of the slimming massager according to the present utility model;

[0021] FIG. 4 is a diagram of the working principles of Embodiment 1 and Embodiment 2 of the slimming massager according to the present utility model.

[0022] With reference to the drawings, reference numbers in the embodiments of the

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present utility model are as follows:

[0023] 1: Massager main body; 2: Outer rotating disc; 3: Inner rotating disc; 4: Detachable handle

Detailed description of the preferred embodiments

[0024] The following is a description of the preferred embodiments of the present utility model with reference to the drawings. It should be understood that the preferred embodiments described herein are only for illustrating and explaining the present utility model, and are not intended to limit the present utility model.

[0025] Embodiment 1

[0026] According to an embodiment of the present utility model, a slimming massager is provided. As shown in FIGS. 1, 2 and 4, the embodiment includes a massager main body 1, a power source electrically connected to the massager main body 1 by a wire to supply power, and a counter-rotating massaging head fitted on the massager main body 1 to massage when energized.

[0027] In the embodiment, the power source includes a battery or a transformer regulation module for converting 220V AC power to 12V DC power. The counter-rotating massage head comprises an inner rotating disc 3 and an outer rotating disc 2 which are provided independently and rotate in opposite directions; the inner rotating disc 3 and the outer rotating disc 2 both include massage balls formed by several magnetic, embedded steel balls which can rotate freely themselves. The massager main body 1 includes a built-in 15000-rpm high-speed micromotor, and a reduction gear set fitted between the 15000-rpm high-speed micromotor and the counter-rotating massage head.

[0028] The slimming massager of the embodiment converts the 220V voltage to 12V through transformer adjustment for use on the massager. The slimming massager has an ingenious design of counter-rotating massage head consisting of 2 independent rotating discs, each disc including massage balls formed by several magnetic, embedded iron balls. The inner and outer groups of balls rotate in opposite directions when the massager is working, producing a counter-rotating effect, that is, a clockwise high-speed rotation and a counterclockwise high-speed rotation. The magnetic steel balls on each disc can also rotate freely themselves, which can enhance the friction force and effect.

[0029] The slimming massager of the embodiment includes a built-in 15000-rpm high-speed micromotor. Through deceleration by a series of gear sets, the speed of the final action on the counter-rotating massage head (that is, the two discs on the counter-rotating massage head) is reduced to ensure safe operation. However, the action force is very large, and has an effect of deep massage. In addition, through the ingenious design of the interior massage groups, two discs can rotate in opposite directions. In this way, the magnetic steel balls on the discs will squeeze and massage the flab that has accumulated on the surface of a human body over years in the process of rotation in opposite directions, achieving an excellent, fine, local massage effect.

[0030] Embodiment 2

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[0031] Different from Embodiment 1, as shown in FIG. 3 the slimming massager of Embodiment 2 further includes a detachable handle and a snap-fit internal locking device. The detachable handle 4 is snap-fittingly connected with the massager main body 1. The detachable handle 4 is connected with the massager main body 1 through the snap-fit internal locking device. When the detachable handle 4 is needed, press the detachable handle 4, align it with a snap-fit slot at the rear of the massage main body 1, and squeeze it into the slot until a latch of the snap-fit internal locking device cocks, whereby the detachable handle is firmly fixed. When the detachable handle 4 is not needed, softly pull down a latch button of the snap-fit internal locking device. The snap is released when the button is embedded inside, then the handle can be removed.

[0032] In this embodiment, when the detachable handle 4 is connected to the massager main body 1, a wire groove for embedding the transformer wire and avoiding wire entanglement is provided above the detachable handle 4.

[0033] The slimming massager of this embodiment is provided with a detachable handle, which is connected with the massager main body 1 by a snap-fit internal locking device. When the handle is needed, align the handle with the snap-fit slot at the rear of the massage main body, and squeeze it into the slot until the latch cocks, whereby the handle is firmly fixed. When the handle is not needed, softly pull down the latch button. The snap is released when the button is embedded inside, then the handle can be removed. When the handle is connected to the massager main body 1, a wire groove for embedding the transformer wire and avoiding the inconvenience of wire entanglement is provided above the handle.

[0034] In summary, the slimming massager of both embodiments of the present utility model has a lightweight and portable design, and can be used on a wide range of human body surfaces, without restrictions. Since the massager has a built-in rechargeable battery, it can be used anywhere at any time, regardless whether there is a power supply. The slimming massager does not rotate fast, but is very powerful, safe to use, feels comfortable, making a rare, good "partner" for relaxing the body, reducing fatigue and pain. The slimming massager can also promote blood circulation of the human body through local deep massage, which greatly facilitates the health of the human body.

[0035] Finally, it should be noted that the above is only preferred embodiments of the utility model, and does not limit the utility model. Although the utility model is described in detail with reference to the foregoing embodiments, those skilled in the art can still change the technical solutions recited in the foregoing embodiments, or replace some of the technical features with equivalents. Any modification, equivalent replacement, improvement, etc. made within the spirit and principle of the utility model should be included in the protection scope of the utility model.

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Claims

1. A slimming massager, characterized in comprising: a massager main body, a power source electrically connected to the massager main body by a wire to supply power, and a counter-rotating massaging head fitted on the massager main body to massage when energized.

2. The slimming massager according to claim 1, characterized in that: the power source comprises a battery or a transformer regulation module for converting 220V AC power to 12V DC power.

3. The slimming massager according to claim 1, characterized in that: the counter-rotating massage head comprises an inner rotating disc and an outer rotating disc that are independently provided and rotate in opposite directions; both the inner rotating disc and the outer disc rotating disc include massage balls formed by several magnetic, embedded steel balls which can rotate freely themselves.

4. The slimming massager according to claim 1, characterized in that: the massager main body includes a built-in 15000-rpm high-speed micromotor, and a reduction gear set fitted between the 15000-rpm high-speed micromotor and the counter-rotating massage head.

5. The slimming massager according to any one of claims 1 to 4, characterized in further including a detachable handle which is snap-fittedly connected to the massager main body.

6. The slimming massager according to claim 5, characterized in further including a snap-fit internal locking device, through which the detachable handle is connected with the massager main body, wherein
when the detachable handle is needed, press the detachable handle, align it with a snap-fit slot at the rear of the massager main body, and squeeze it into the slot until a latch of the snap-fit internal locking device cocks, whereby the detachable handle is firmly fixed; and
when the detachable handle is not needed, softly pull down a latch button of the snap-fit internal locking device; the snap fit is released when the button is embedded inside, then the handle can be removed.

7. The slimming massager according to claim 6, characterized in that: when the detachable handle is connected to the massager main body, a wire groove for embedding the transformer wire and avoiding wire entanglement is provided above the detachable handle.

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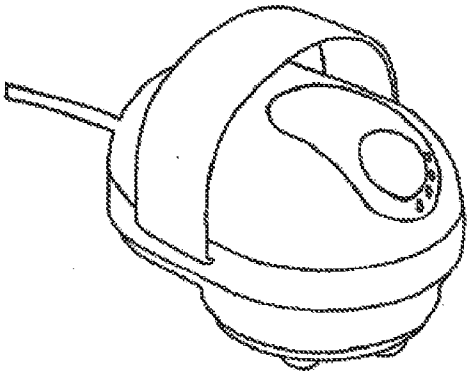


Fig. 1

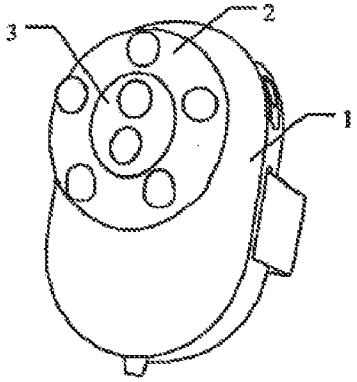


Fig. 2

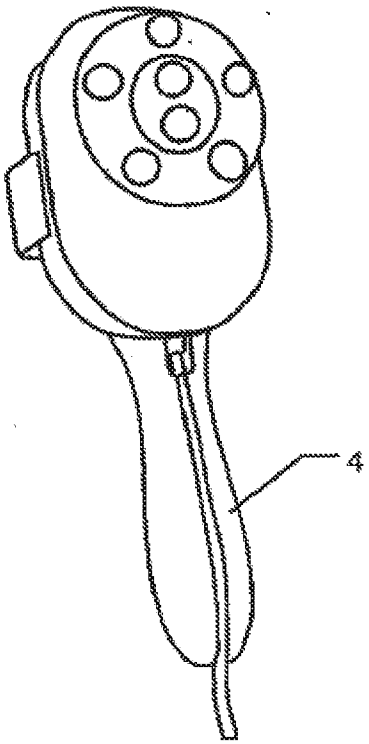
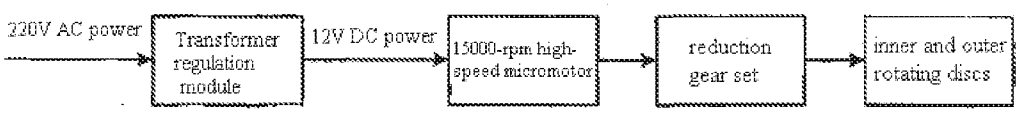


Fig. 3



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Fig. 4

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Espacenet

Bibliographic data: CA188544 (A) — 1919-02-04

SOOT BLOWER FOR BOILERS

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Classification: **- international:**
- cooperative:

Application number: CAD188544 19180927

Priority number (s): CAT188544 19180927

Abstract not available for CA188544 (A)

Petitioner Therabody Ex-1004, 1212

(19) Office de la propriété intellectuelle du Canada / Canadian Intellectual Property Office
Un organisme d'Industrie Canada / An Agency of Industry Canada

(11) Publication number: **CA 188544**
(13) Document type: **A**
(43) Publication date: **04.02.1919**
(51) Int. Cl:

(12)

(21) Application number: **188544D**
(22) Date of filing: **27.09.1918**
(30) Priority:

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(54) **SOOT BLOWER FOR BOILERS**
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To all whom it may concern:

Be it known that we, James C. Bennett and Gordon C. Bennett, residing at Detroit, in the county of Wayne and State of Michigan, United States of America, Inventors, have invented certain new and useful improvements in

Soot Blower for Boilers,

of which the following is a full, clear and exact description as we are able to give, reference being had to the accompanying drawings.

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This invention relates to soot blowers utilizing steam as an agent for removing soot, incrustations and foreign matter from the exterior surfaces of boiler tubes, to increase the efficiency of a boiler as a steam generating apparatus.

Our invention aims to provide soot blowers that can be advantageously used in connection with boilers having staggeredly arranged tubes or parallel rows of tubes in connection with either of which the blowers are disposed to thoroughly cleanse the tubes by subjecting the same to a maximum pressure of steam in the form of jets, which will positively cut and remove soot incrustations and foreign matter from the tubes.

To accomplish the above results in an expeditious and economical manner, we have devised blower units that may be easily installed in a boiler setting and removed or renewed, if occasion so demands, without disturbing the boiler setting. This is a feature of our invention which is characterized by novel blower holders in which the blower arms are reciprocable by rotation and removable at any time.

Another feature of our invention is the construction of a blower arm, per se. The blower arm has internal nozzles so that said arms may be positioned in proximity to tubes and rotated without impinging against the tubes.

In providing a blower arm with internal nozzles, we found that by welding the nozzles in the arm, that said arms were necessarily subjected to a heat treatment that made the arms more indurate and consequently increased the longevity of the same. The advantage of prolonging the life of a blower arm is obvious, however, in providing the blower holders, we made provision whereby the blower arms can be completely removed from a boiler setting should it be necessary to renew a unit.

Another advantage is gained by making the blower arms reciprocal by rotation. We found that the number of nozzles could be materially reduced and when properly disposed could be

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shifted to successively or progressively subject rows of tubes to the action of steam or a similar soot removing agent. By reducing the number of nozzles, it was thus possible to increase the area of each nozzle, consequently a more powerful jet of steam was obtained by constant pressure of steam in a few nozzles instead of in a large number of nozzles.

Other advantages may be derived from the soot blowers to be hereinafter specifically referred to, and reference is had to the drawings, wherein

Fixture 1 is a vertical cross sectional view of a boiler having staggeredly arranged tubes and provided with a blower unit in accordance with our invention;

Fig. 2 is a longitudinal sectional view of the same showing a battery of blowers;

Fig. 3 is a vertical longitudinal sectional view of a boiler having parallel rows of tubes and provided with blower units in accordance with our invention;

Fig. 4 is a front elevation of the same, partly broken away, and in section, on the line IV--IV of Fig. 3;

Fig. 5 is an enlarged longitudinal sectional view of a portion of a blower unit, partly in elevation;

Fig. 6 is a longitudinal sectional view of blower arms showing the internal nozzles thereof and the positions of said arms relative to tubes;

Fig. 7 is a longitudinal sectional view of a portion of a blower arm adapted for a particular type of boiler, and

Fig. 8 is an elevation of a tube bracket adapted as supporting means for a blower arm.

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In describing our invention by reference to the views above referred to we desire to point out that the same are intended as merely illustrative of our soot blowers which are now in use, and we do not wish to confine our invention to any particular type of boiler or steam generator or to the precise construction and arrangement of parts shown. The following description is therefore to be broadly construed as including such equivalent constructions and arrangement of parts which are the obvious equivalents of those to be hereinafter referred to.

A blower unit comprises a holder 1 suitably mounted or anchored in a boiler setting, wall or support 2. The holder 1 may have a peripheral flange or rings 3 intermediate the ends thereof to firmly anchor the holder in the boiler setting, and the outer end of the holder has a face plate or crown head 4. The holder 1 has a longitudinal bore or opening 5 and the walls of this opening, throughout the length thereof, are screwthreaded. The threads are cut and are conveniently either square coarse to machine screw threads, however, the cut screwthreads constitute means for reciprocating a blower arm 6 when said arm is rotated. The blower arm 6 is tubular and has an enlarged externally screwthreaded portion 7 in threaded engagement with the walls of the opening 5.

Encircling the outer end of the blower arm 6 is a detachable steam jacket 8 provided with a stuffing box 9 and opposed ears 10. The ears 10 are connected by nuts 11 to stay bolts or rods 12 carried by the face plate or crown head 4 of the holder 1.

The steam jacket 8 has a steam inlet pipe 13 and on the blower arm, contiguous to the stuffing box 9, is a sprocket wheel 14 over which there is trained an endless sprocket chain 15. The sprocket wheel 14 and sprocket chain 15 constitute means for imparting a rotary movement to the blower arm 6 whereby said arm will be moved longitudinally of the holder 1.

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#4.

The inner end of the blower arm 6 has internal annularly disposed nozzles 16 and as heretofore mentioned, these nozzles have the outer ends welded in the arm so that the blower arm will receive a heat treatment to prolong the life of the same. The outer ends of the nozzles 16 are flush with the outer wall of the blower arm and the inner ends of the nozzles extend in proximity to the inner wall of the arm opposite that wall in which the nozzles are mounted. As shown in Fig. 6, the nozzles 16 may be disposed at such angles as to direct steam in reverse directions, according to the location and type of boiler in connection with which the blower arm is used. As shown in Fig. 7, the nozzles 17 may be disposed at a right angle to the wall of the blower arm and this type of blower arm is intended for a boiler having annular rows of tubes.

Reference will now be had to Figs. 3 and 4 of the drawings, showing an installation of the blower units in connection with a boiler somewhat of the "Sterling" type. The boiler setting includes walls 18 and 19, the former having the holders 1 and the latter having sockets 20 transversely aligning with the holders 1 to receive the inner ends of the blower arms used in connection with the boiler. In the boiler setting are groups of tubes 21 and by reference to Fig. 4, it will be noted that the tubes of each group are disposed in parallel rows, which for the purposes of clearly understanding the arrangement of tubes, may be considered vertical rows with the tubes of each row in common vertical plane. Such an arrangement of tubes provides vertical spaces between the rows of tubes and it is into these spaces that steam is directed by blower arms disposed transversely of the boiler setting and intersecting the rows of tubes. One of the blower arms for this type of boiler is shown in Fig. 7. The nozzles 17 are disposed at right angles to the walls of the blower arm and will direct steam downwardly between the rows of tubes. Since the blower arms may be reciprocated or shifted in the holders

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thereof, it is not necessary to provide nozzles corresponding in number to the spaces between the rows of tubes, as a single nozzle may serve a plurality of spaces and be gradually advanced from one space to another or moved throughout the length of the holder.

Our invention is not necessarily limited to this construction as shown in Fig. 3, but on account of the height of some of the blower units, it is preferable to provide a common steam supply pipe 22 and connect the brackets thereto with controlling valves 23 in proximity to said pipe. The operator of the will be in juxtaposition to the controlling valves 23 whereby a fireman or attendant of a boiler can readily control and manipulate the blower units.

With that type of boiler having staggeredly arranged tubes, it is necessary to use blower arms such as shown in Fig. 6, and by reference to Figs. 1 and 2 of the drawings, it will be noted that a battery of blowers are arranged above tubes 24 beneath superheaters of the boiler, and that each blower unit has the regulating and controlling means thereof disposed for the convenience of the fireman or attendant of a boiler. With that type of blower arm shown in Fig. 6, it is preferable to alternately arrange the blower arms so that the nozzles of certain arms will discharge steam in one direction and the nozzles of the other arms discharge steam in an opposite direction, thereby subjecting all of the staggeredly arranged tubes to the cleaning action of steam. The angularity of the nozzles will cause the steam to impinge upon the surfaces of the tubes at a tangent and said nozzles may be spaced whereby a single nozzle will serve more than one of the spaces between the tubes of a boiler.

In Fig. 8 there is shown a tube bracket adapted to cooperate with a blower holder in supporting a blower arm, said bracket constituting supporting means independent of a wall, for guiding and holding the inner end of a blower arm. The bracket comprising a tube clamp 30 and connected thereto is an adjustable

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upright 31 having an eye or sleeve 32 through which a blower arm 33 is adapted to slide. It is through the medium of the adjustable upright 31 that the blower may be maintained in a desired plane relative to tubes. The tube cleaner may be used in old or new installation, preferably the former, while the socket members 20 are presumable in new boiler settings.

As outlined in the beginning, a consideration is the number of nozzles present for with the blower it can permit more nozzles being of greater size, which is a disadvantage in connection with soot blowers, as steam under pressure may be directed at the most remote tubes of the boiler and be practically as effective a cleaning agent, as the steam emitted at the nozzles.

We attach considerable importance to the fact that the blower arm delivers its cleaning medium directly to a boiler setting or other support and that the blower arm may be readily removed should occasion require. This may be accomplished by removing the bolt 8 from the end of the blower arm. It is then only necessary to rotate the blower arm until the threaded or screw portion thereof becomes clear from the socket 7, when the blower arm may be withdrawn from the boiler. The flange 10 of a new blower arm.

Another important feature of our invention is that of providing a blower arm in connection with a boiler setting and when manipulating the blower arm it is possible to predetermine the distance the blower arm will travel when reciprocated, which is fixed. The stroke of the blower will materially vary when the blower arms may be advanced when the sprocket chains 15 are manually manipulated, consequently a fireman or attendant of the boiler is relieved of any uncertainty as to how fast the blower arms are moving and whether they are effective for the purpose intended. We are aware of a great many blowers which are capable of effective blowing when properly manipulated that are condemned on account of improper manipulation

#7.

by inexperienced or careless firemen, with our heat blower the chances of the arms being improperly handled are reduced to a minimum, and the blowers may be successfully operated by inexperienced firemen.

Referring now in to Fig. 5, it is to be noted that the outer end of the steam jacket 8 has a detachable plug 40 provided with a threaded stem 41. This stem extends into the open end of the blower arm 6 and is in threaded engagement with a nut 42 mounted in the end of the blower arm. The end of the blower arm is perforated or apertured, as at 43, so that steam can enter the arm during its adjustment or in any position of the blower arm. The threads in connection with the stem 41 and the nut 42 are of the same pitch and diameter as the threads in connection with the holder 1 and the threaded portion 7 of the blower arm, and in some instances it may be necessary to dispense with the threaded connection of the holder 1 and expand for longitudinal adjustment in the steam jacket 8. As long as the inner ends of the blower arms are supported relative to the tubes, it is possible to support the outer ends of the blower arms at the steam jackets 8 and reciprocate the blower arms by reason of the connections with the steam jackets, and thereby accomplish practically the same results as though the longitudinal movement of the blower arms was accomplished through the medium of the holders 1.

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What we claim is:

1. In a soot blower, a boiler setting, tubes, generally horizontally extending blower nozzles in said boiler setting, rotary externally screw-threaded tube blowers in said nozzles for projecting steam by the blowers in cone shaped jets between said blowers in rows in generally transverse planes between said tubes, internally recessed guides for said blowers, and means between said guides and blowers for rotating said blowers, being fully withdrawn from said tubes.

2. In a soot blower, an internally screw-threaded casing, and a blower and series of spaced screw-threaded rotors carried by and removable from said casing and having externally screw-threaded ends for engagement with said casing.

3. In a soot blower, a boiler setting, tubes, nozzles, internally screw-threaded blower casings in a wall of said boiler setting, tube blowers adjacent an opposite wall of the boiler setting, rotary tube blowers in screw-threaded engagement with said casings extending transversely of said tubes through the tube spaces and spaced for projection thereby of a plurality of cone-shaped jets of steam between said tubes, and means carried by said blowers and engaging said tubes for rotating said blowers without withdrawing them from said tubes.

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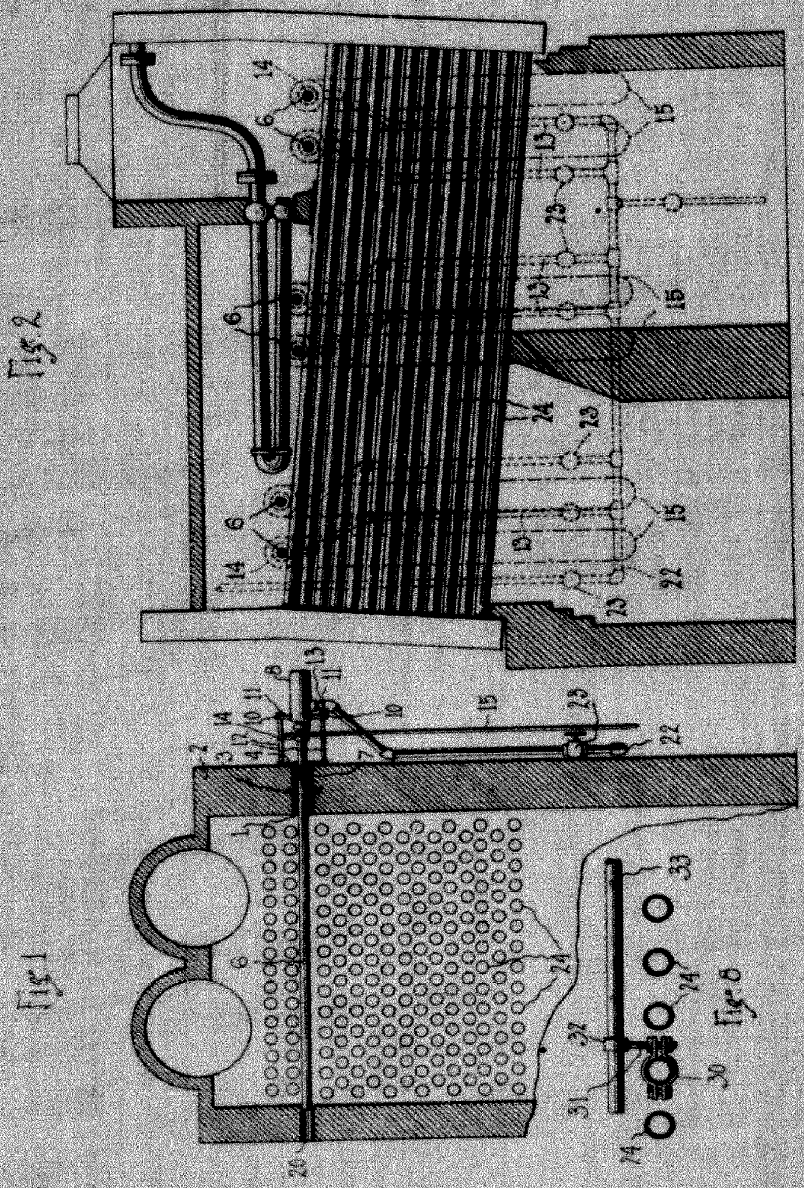


Fig. 2

Fig. 1

Fig. 6

Detroit Mich.

WITNESSES

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Chas. E. Stauffer

Certified to be the drawing referred to in the specification hereunto annexed.

Sept. 1st 1915

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Fig. 4

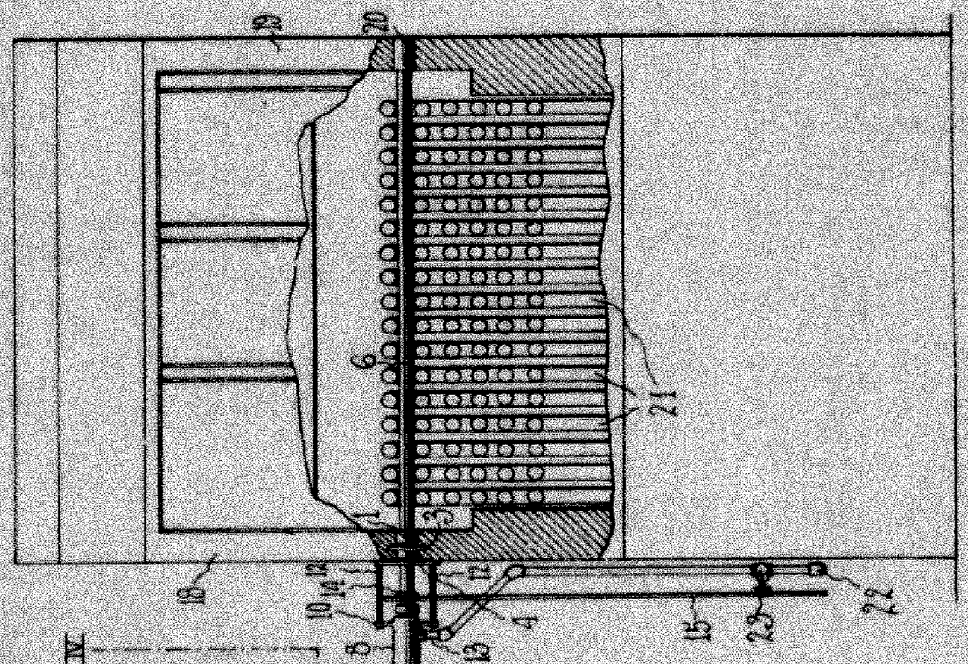
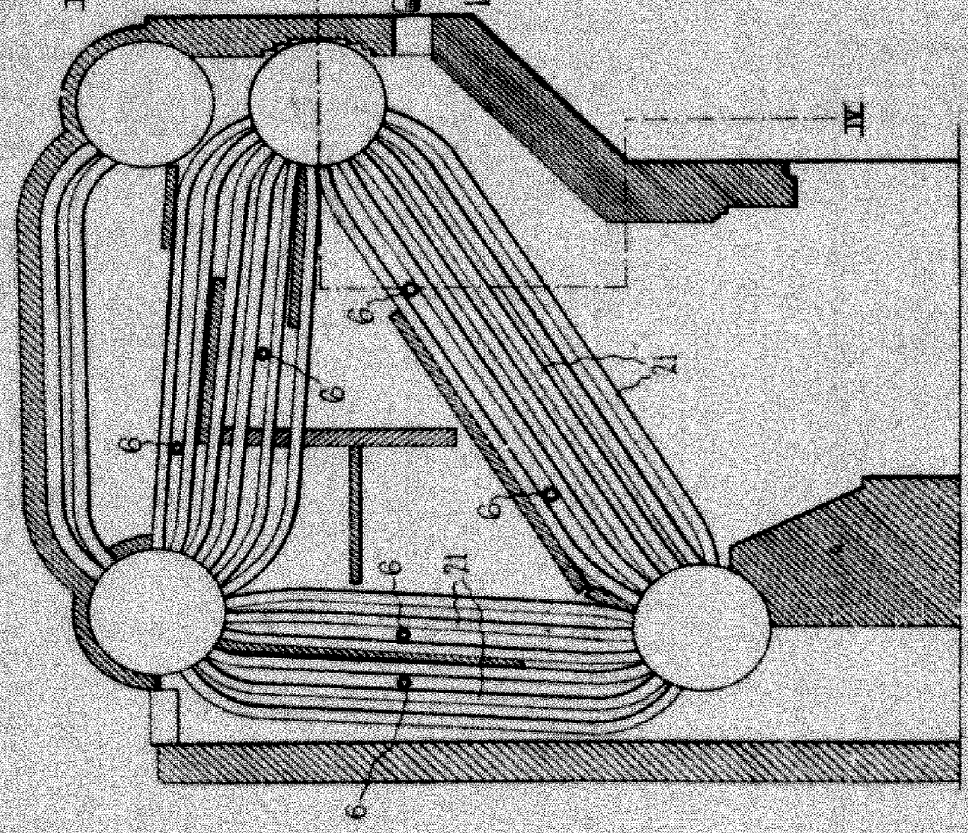


Fig. 3



Detroit Mich

WITNESSES

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Certified to be the drawing referred to in the specification hereunto annexed.

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188544

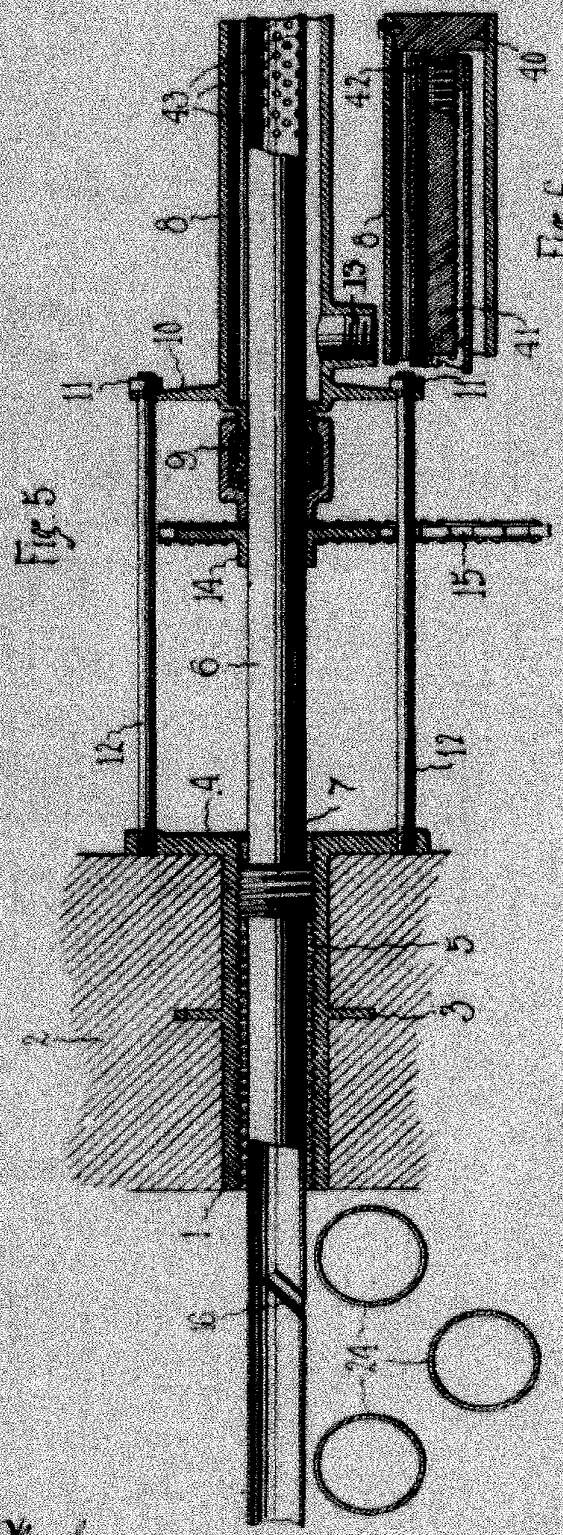


Fig. 5

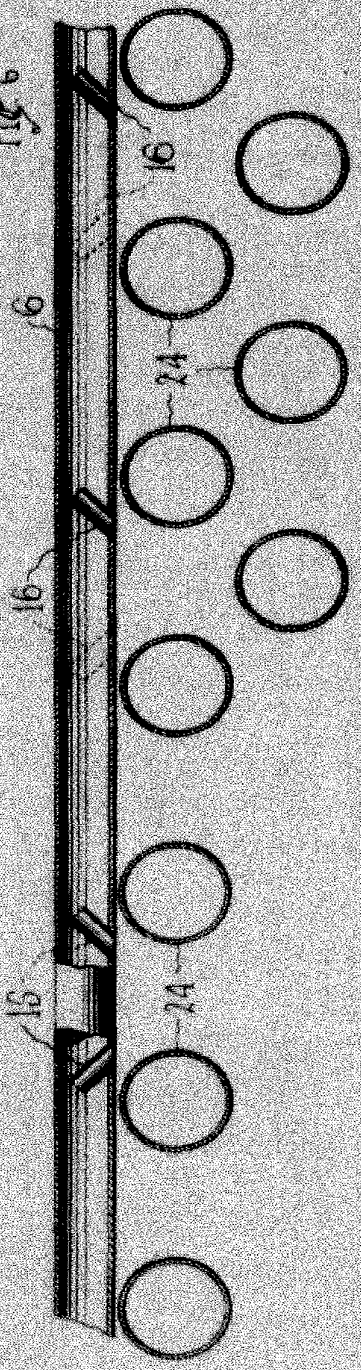


Fig. 6

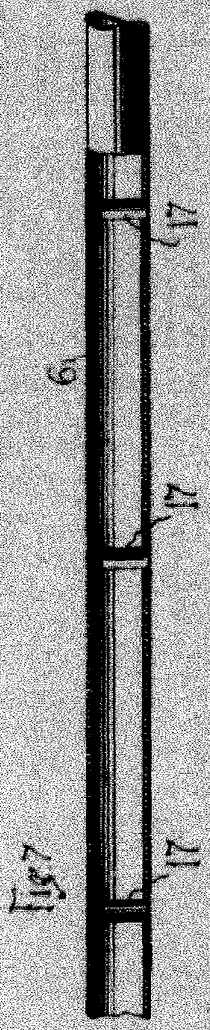


Fig. 7

Witnesses
Anna M. Dorr
Chas. C. Stauffer

Certified to be the drawing referred to in the specification hereunto annexed.
Sept. 1st 1915

Inventor
James L. Bennett
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Petitioner Therabody Ex-1004, 1225

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/515,112	**01/26/2024 03:17:38 PM Z ET**	**HYP-034C5**

Title of Invention

MASSAGE DEVICE HAVING VARIABLE STROKE LENGTH

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2915	FILED BY	Anna Beaulieu
PATENT CENTER #	64095894	AUTHORIZED BY	Hunter Malboeuf
CUSTOMER #	162143	FILING DATE	11/20/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Philip C. Danby

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 1146	**E20241PF19067378**	**Anna Beaulieu**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
			TOTAL AMOUNT:	**$104.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C.

371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

[19]中华人民共和国专利局

[11] 授权公告号 CN 2144503Y

[12]实用新型专利说明书

[21] ZL 专利号 92238705.2

[51]Int.Cl[5]

[45]授权公告日 1993 年 10 月 27 日

A61H 23/02

[22]申请日 92.10.24 [24]颁证日 93.8.8

[21]申请号 92238705.2

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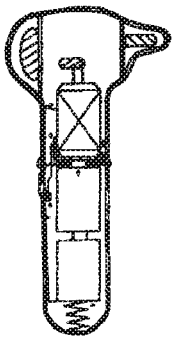
代理人 何润华

说明书页数: 2 附图页数: 2

[54]实用新型名称 全密封式震动按摩器

[57]摘要

一种理疗用震动按摩器，包括手柄和在手柄顶端的锤头，锤头与手柄一体连接，其中央空腔为密封空腔，电池组的线路开关是磁动密封开关，其构造是一极触点固定在手柄空腔壁上，另一极触点设置在弹簧片上，弹簧片上有一永磁块，在手柄外壁对应触点位置上设有滑动槽，槽中嵌有滑动磁块。壳体实现全密封构造，电源开关采用磁动开关,可利用磁作用通过壳体控制电路通断。



(BJ)第 1452 号

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权　利　要　求　书

1. 一种理疗用震动按摩器，包括手柄和在手柄顶端的锤头，在手柄中央空腔设有电机和电池组，锤头中央空腔设有电机驱动的偏震重锤，其特征在于锤头与手柄一体连接，其中央空腔为密封空腔，电池组的线路开关是磁动密封开关，其构造是一极触点固定在手柄空腔壁上，另一极触点设置是弹簧片上，弹簧片上有一永磁块，在手柄外壁对应触点位置上设有滑动槽，槽中嵌有滑动磁块。
2. 如权利要求1所述的按摩器，其特征在于锤头的形状一侧是大头，另一侧是小头。
3. 如权利要求1或2所述的按摩器，其特征在于锤头是弹性材料制做的。

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说　　明　　书

全密封式震动按摩器

本实用新型属于医用理疗器具，特别是震动按摩器。

传统的震动按摩器有一种震动锤，由手柄和锤头构成，在手柄中央空腔有电机和电池组，锤头中央空腔设有由电机驱动的偏震振重锤，接通电源后偏震重锤旋转使锤头震动，击打人体患处或穴位。这种按摩器只是在平时使用。因为其电源、电机部分没有密封，水渗进去会造成短路，在洗浴时无法使用。

本实用新型的目的是提出一种新的震动按摩器技术方案，可在洗浴时使用。

本实用新型的内容包括手柄和在手柄顶端的锤头，在手柄中央空腔设有电机和电池组，锤头中央空腔设有电机驱动的偏震重锤，锤头与手柄一体连接，其中央空腔为密封空腔，电池组的线路开关是磁动密封开关，其构造是一极触点固定在手柄空腔壁上，另一极触点设置是弹簧片上，弹簧片上有一永磁块，在手柄外壁对应触点位置上设有滑动槽，槽中嵌有滑动磁块。锤头的形状可以一侧是大头，另一侧可以是小头。锤头可是弹性材料制做的。

本实用新型的特点是壳体实现全密封构造。电源开关采用磁动开关，可利用磁作用通过壳体控制电路通断。

本实用新型的实施例如附图所示：

图1是本实用新型主视剖面示意图。

图2是本实用新型开关局部结构及动作示意图，图2-1是切断状态的主视图，图2-2是图3-1的侧视剖面图，图2-3是接通状态的主视

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图，图2-4是图2-3的侧视剖面图。

图中标号表示：

1.手柄， 2.锤头， 3.小锤头，4.大锤头，5:电机，6.电池，7.偏震重锤，8.阳极触点磁块，9.阳极触点弹簧片，10.阴极触点，11.滑动磁块，12. 密封胶圈，13.刚性芯体。

结合实施例附图对本实用新型加以具体说明：

图1表示本实用新型的整体构造。手柄1和锤体2一体，其中央空腔中装有电池组5，电机6和偏震重锤7，手柄1尾端盖与手柄体之间的连接处有密封胶圈12。使中央空腔成为一个密封空腔，从而便于在洗浴的湿环境中使用。电机开关结构如图1、图2所示，阴极触点10固设于手柄壳体内壁上，对应的阳极触点8是一个永磁块，或在阳极触点8上装一个永磁块。弹簧片9支撑阳极触点8。 在触点位置的手柄壳外壁上有一个滑槽，滑槽中设有一个永磁滑块11，永磁滑块11是触点开关。其开关形式有两种，一种是永磁滑块11与触点8上的永磁块相对侧极性相异，则弹簧片9自然状态时使触点8与触点10保持间隙，当滑块11处于触点位置时，异性相吸使两触点相接导通电路。或者滑块11与触点8相对侧磁极相同，则弹簧片9自然状态时保持两触点相接电路导通，当滑块11处于触点位置时，同极相斥使两触点相分离电路切断。本例锤体2两侧分别设小锤头3和大锤头4 为使用者提供使用上的方便，小锤头可震击如指部穴位，大锤头可震击腰背穴位，锤头可用如橡胶类弹性材料制做，其内部可以装有刚性芯体13，以增加震击的强度。本实用新型按摩器可放在浴缸中使用。

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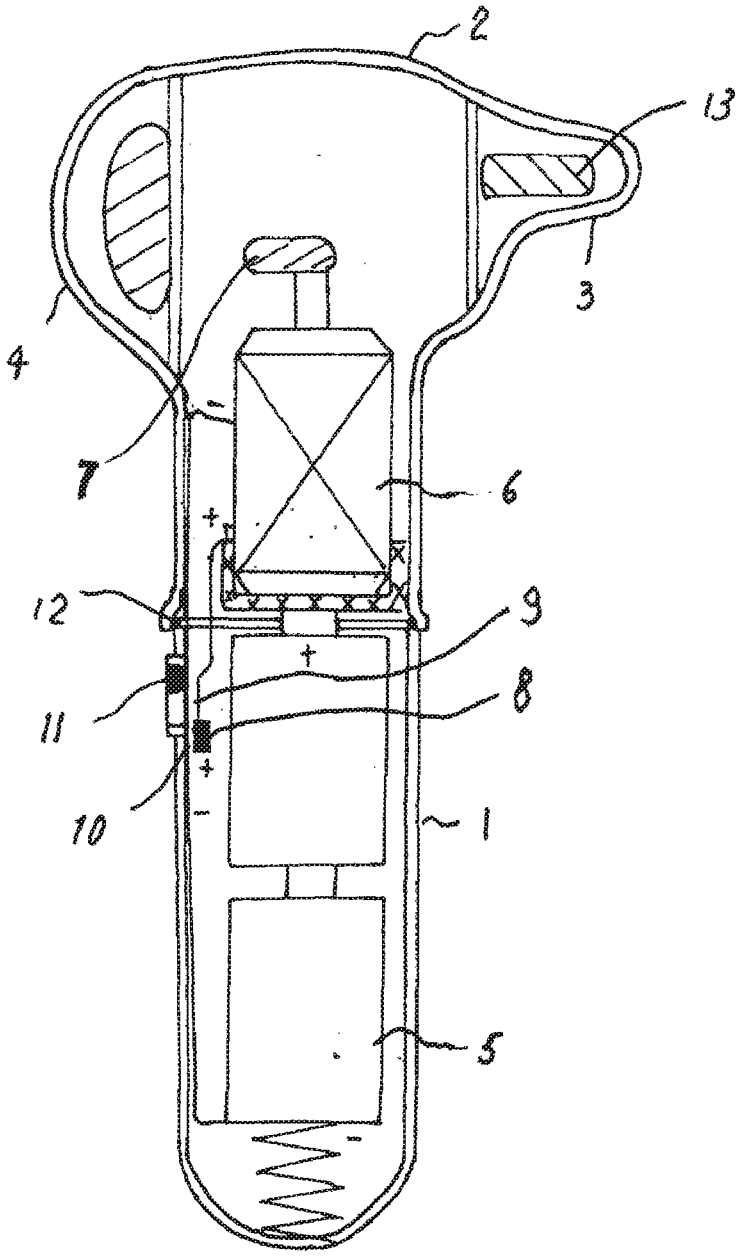
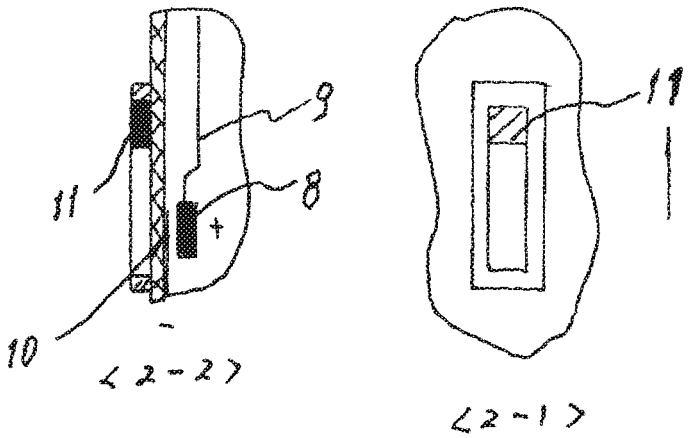


图 1

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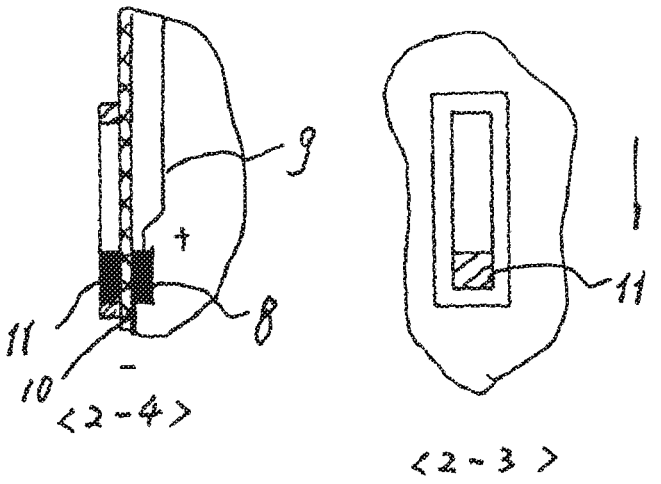


図 2

Petitioner Therabody Ex-1004, 1233

Fully sealed vibration massager

Abstract

The utility model relates to a vibration massager for physical therapy, comprising a handgrip and a hammer head on the top end of the handgrip; the hammer head is integrally connected with the handgrip; the central cavity of the vibration massager is a sealed cavity; the switch of the circuit of the battery pack is a magnetically driven, sealed switch having a structure where one polar contact is fixed on the wall of the cavity of the handgrip, and the other polar contact is arranged on a spring tab, on which a permanent magnetic block is arranged; a slide groove is arranged on the position on the outer wall of the handgrip corresponding to the contact point; a slide magnet block is embedded in the slide groove. The housing is fully sealed; the power switch is a magnetically driven switch; and the opening and closing of the circuit can be controlled through magnetic action via the housing.

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Description

The utility model relates to a medical physiotherapy apparatus, especially a vibration massager.

Traditional vibration massagers have a vibration hammer consisting of a handgrip and a hammer head. In the central cavity of the handgrip are a motor and a battery pack. The central cavity of the hammer head is provided with a polarized weight driven by the motor. When the power supply is switched on, the polarized weight rotates to vibrate the hammer head, which hits the affected part or acupuncture point of the human body. This massager is only used in normal times. Since the power supply and motor part are not sealed, water infiltration will cause a short circuit, so the massager cannot be used during bathing.

The purpose of the utility model is to propose a new technical solution of a vibration massager, which can be used in bathing.

The vibration massager according to the utility model comprises a handgrip and a hammer head on the top end of the handgrip; the central cavity of the handgrip is provided with a motor and a battery pack; the central cavity of the hammer head is provided with a motor-driven polarized weight. The hammer head and the handgrip are integrally connected. The central cavities are sealed cavities. The switch of the circuit of the battery pack is a magnetically driven sealed switch having a structure where one polar contact is fixed on the wall of the handgrip cavity, and the other polar contact is provided on a spring tab, on which a permanent magnet block is arranged. A slide groove is provided on the position on the outer wall of the handgrip corresponding to the contact; and a slide magnet block is embedded in the groove. The hammer head may be shaped in a way to comprise a big head on one side and a small head on the other. The hammer head may be made of an elastic material.

The characteristics of the utility model are that the housing is fully sealed; the power switch is a magnetically driven switch; the opening and closing of the circuit can be controlled through magnetic action via the housing.

An embodiment of the utility model is shown in the drawings.

FIG. 1 is a schematic front cross-sectional view of the utility model.
FIG. 2 is a schematic view of the local structure and operation of the switch of the utility model. FIG. 2-1 is a front view of the off state. FIG. 2-2 is a side sectional view of FIG. 2-1. FIG. 2-3 is a front view of the on state. Figure 2-4 is a side cross-sectional view of Figure 2-3.

The numerals in the figures:
1. Handgrip; 2. Hammer head; 3. Small hammer head; 4. Big hammer head; 5. Motor;

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6. Battery; 7. Polarized weight; 8. Anode contact magnetic block; 9. Anode contact spring tab; 10. Cathode contact; 11. Slide magnetic block; 12. Sealing rubber ring; 13. Rigid core.

The utility model will be described in detail with reference to the accompanying drawings of the embodiment.

FIG. 1 shows the overall structure of the utility model. The handgrip 1 and the hammer body 2 are integrated, and in the central cavity thereof, a battery pack 5, a motor 6 and a polarized weight 7 are installed. A sealing rubber ring 12 is provided at the connection between the end cover of the handgrip 1 and the handgrip body. The central cavity is made to be a sealed cavity, so as to be suitable for use in the wet environment during bathing. The structure of the motor switch is shown in FIG. 1 and FIG. 2. A cathode contact 10 is fixed on the inner wall of the handgrip housing. The corresponding anode contact 8 is a permanent magnet block, or a permanent magnet block is installed on the anode contact 8. The spring tab 9 supports the anode contact 8. A slide groove is arranged on the outer wall of the handgrip housing at the contact position, and a permanent magnetic slide block 11 is arranged in the slide groove, the permanent magnetic slide block 11 being a contact switch. The switch may be configured in two manners. One is that the polarities of the opposed sides of the permanent magnet slide block 11 and the permanent magnet block on the contact 8 are different from each other, then when the spring tab 9 is in a natural state, there is a gap between the contact 8 and the contact 10; when the slide block 11 is in the contact position, the magnets of opposite polarities attract one another and the two contacts are connected, closing the circuit. The other is that the polarities of the opposed sides of the slide block 11 and the contact 8 are the same, then when the spring tab 9 is in a natural state, it keeps the two contacts in contact and closes the circuit; when the slide block 11 is in the contact position, the magnets of the same polarity repel one another and separate the two contacts, opening the circuit. In this example, a small hammer head 3 and a large hammer head 4 are provided on both sides of the hammer body 2, to provide users with convenience. The small hammer head can work on acupuncture points on fingers, and the large hammer head can work on acupuncture points on the waist and the back. The hammer head may be made of an elastic material such as rubber, and a rigid core 13 may be installed inside the hammer head to increase the strength of the impact. The massager of the utility model can be used in a bathtub.

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Claims

1. A vibration massager for physical therapy, comprising a handgrip and a hammer head on the top end of the handgrip, a central cavity of the handgrip being provided with a motor and a battery pack, and a central cavity of the hammer head being provided with a motor-driven polarized weight, characterized in that: the hammer head and the handgrip are integrally connected; the central cavities are sealed cavities; a switch of the circuit of the battery pack is a magnetically driven sealed switch having a structure where one polar contact is fixed on the wall of the handgrip cavity, and the other polar contact is provided on a spring tab, on which a permanent magnet block is arranged; a slide groove is provided on the position on the outer wall of the handgrip corresponding to the contact; and a slide magnet block is embedded in the groove.

2. The massager according to claim 1, characterized in that the hammer head is shaped in a way to comprise a big head on one side and a small head on the other.

3. The massager according to claim 1 or 2, characterized in that the hammer head is made of an elastic material.

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Drawings

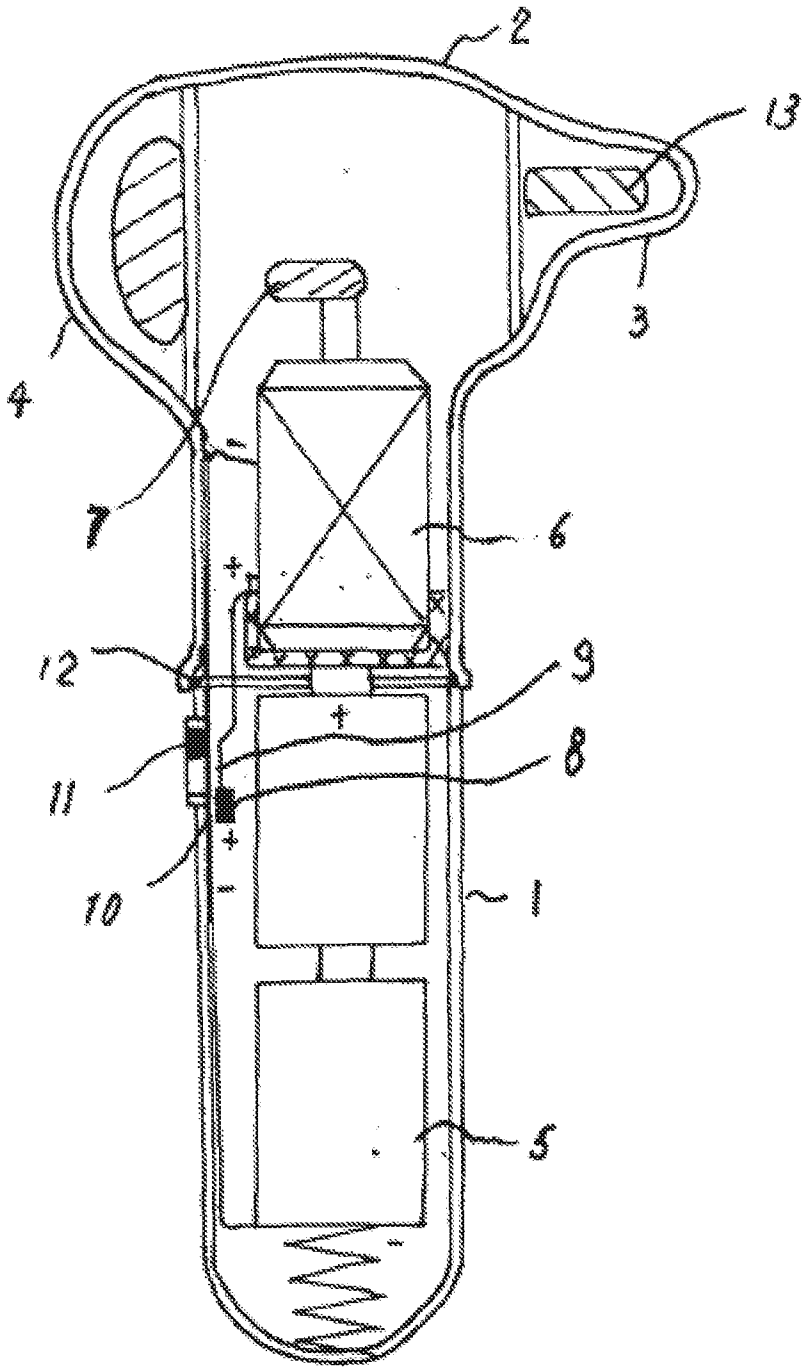


Fig. 1

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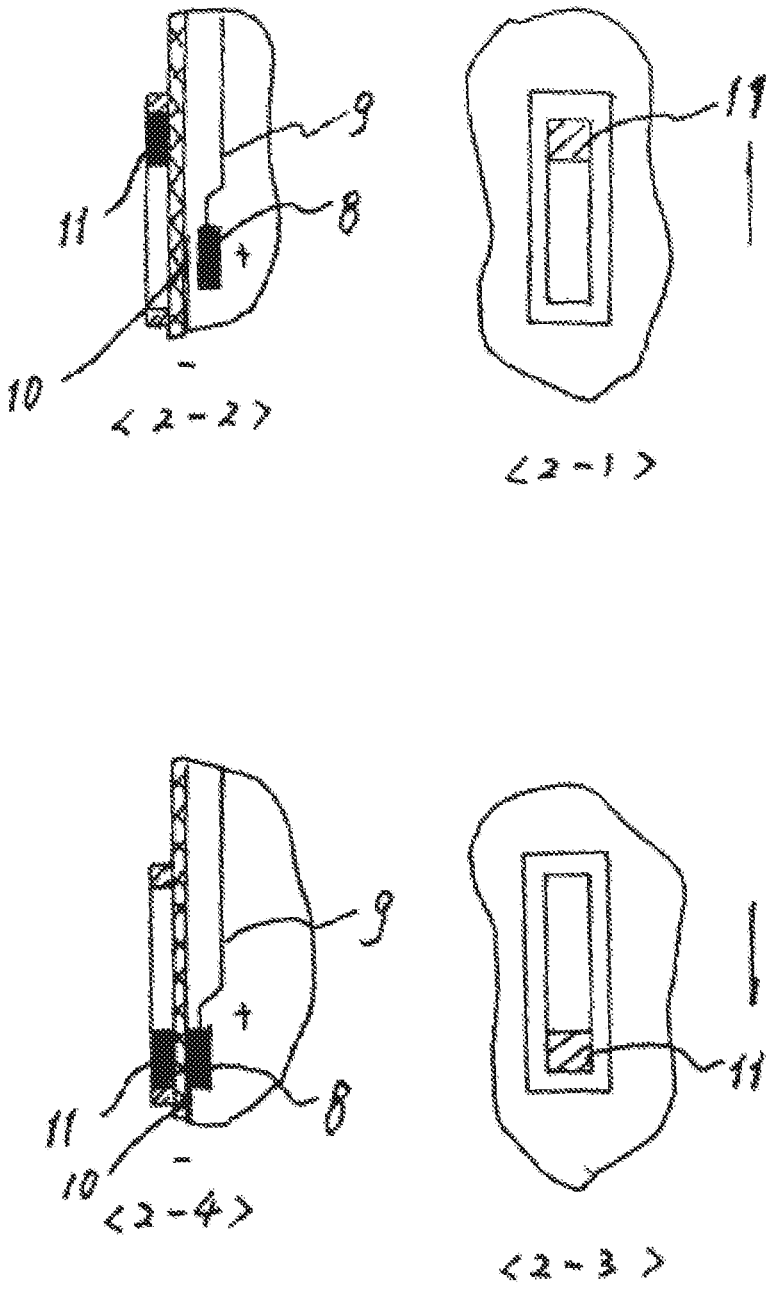


Fig. 2

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1. CN205017429 - 手柄以及连接有该手柄的云台增稳器

National Biblio. Data | Description | Claims | Drawings | Documents

PermaLink Machine translation

Office
China

Application Number
201520695515.8

Application Date
09.09.2015

Publication Number
205017429

Publication Date
03.02.2016

Publication Kind
U

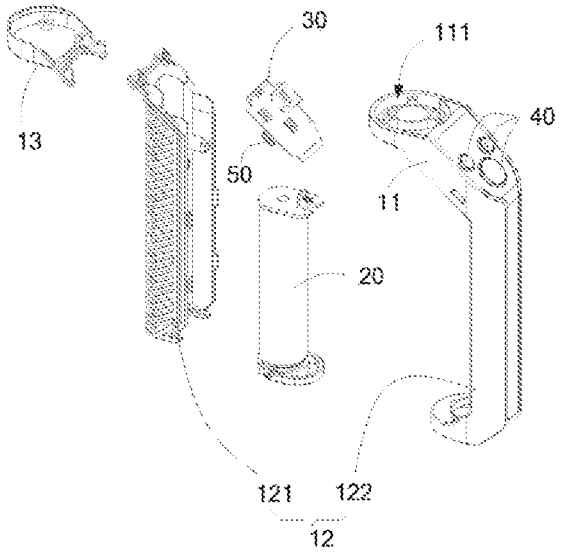
IPC
H04N 5/232 | G03B 17/56

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Title
(ZH) 手柄以及连接有该手柄的云台增稳器



Abstract
(ZH)
本实用新型提供了一种手柄以及连接有该手柄的云台增稳器，其中，该手柄包括与云台增稳器连接的手柄壳体，以及用于给云台增稳器供电的手柄电池，所述手柄壳体内开设有用于容置所述手柄电池的电池仓。本实用新型提供一种手柄以及具有该手柄的云台增稳器，旨在提高云台增稳器的续航时间。

1. CN205017429 - 手柄以及连接有该手柄的云台增稳器

Note: Text based on automatic Optical Character Recognition processes. Please use the PDF version for legal matters

[ZH]

手柄以及连接有该手柄的云台增稳器

技术领域

本实用新型属于摄影/摄像辅助设备领域，尤其涉及便于握持云台增稳器的 手柄以及连接有该手柄的云台增稳器。

背景技术

在运动的过程中进行摄影/摄像需要对摄影/摄像器材进行增稳，且通常通 过云台增稳器来进行增稳，但云台增稳器在使用中是不停运动的，因此，使用 者需要通过手柄来握持云台增稳器。其中，云台增稳器为了增稳而产生的运动 需要云台增稳器内的电池来提供电源，而仅通过云台增稳器内的电池来提供电 源，存在云台增稳器的续航时间短的问题。

实用新型内容

本实用新型的目的在于克服上述现有技术的不足，提供了一种手柄，旨在 提高云台增稳器的续航时间。

为实现上述目的，本实用新型提供一种手柄，包括与云台增稳器连接的手 柄壳体，以及用于给云台增稳器供电的手柄电池，所述手柄壳体内开设有用于 容置所述手柄电池的电池仓。

可选地，该手柄还包括与所述手柄电池电连接的用于切换所述手柄电池供 电模式和/或用于切换云台增稳器工作模式的控制器。

可选地，所述控制器连接有供使用者操控的按钮。

可选地，所述手柄壳体中的一端设有用于与云台增稳器可拆卸连接的云台 装配孔。

可选地，所述手柄壳体包括相互连接的操控部，以及外部供使用者握持、 内部开设有所述电池仓的握持部，所述按钮设置于所述操控部，所述云台装配 孔设置于所述操控部的自由端。

可选地，所述操控部朝前倾斜设置，所述按钮设置于所述操控部后侧。

可选地，所述握持部包括可拆卸连接的握持前面壳和握持后面壳，所述握 持后面壳与所述操控部可拆卸连接。

可选地，所述握持前面壳的外表面包覆握持软胶垫。

可选地，所述控制器连接有用于为所述手柄电池充电和/或让所述手柄电池 给外接的电子产品供电的外接接口。

本实用新型还提供一种云台增稳器，该云台增稳器连接有手柄，该手柄包 括与云台增稳器连接的手柄壳体，以及用于给云台增稳器供电的手柄电池，所 述手柄壳体内开设有用于容置所述手柄电池的电池仓。

对于具有该手柄的云台增稳器，除了云台增稳器自身的电池，还增加了手 柄电池作为电源供应，相对于现有技术，增加了给云台增稳器供应的电源，从 而延长了云台增稳器的续航时间。

附图说明

为了更清楚地说明本发明实施例中的技术方案，下面将对实施例中所需要 使用的附图作简单地介绍，显而易见地，下面描述中的附图仅仅是本发明的一 些实施例，对于本领域普通技术人员来讲，在不付出创造性劳动的前提下，还 可以根据这些附图获得其他的附图。

图1是本实用新型实施例提供的手柄的立体结构示意图；

图2是本实用新型实施例提供的手柄的侧面示意图；

图3是本实用新型实施例提供的手柄的立体分解结构示意图。

附图标号说明：

标号	名称	标号	名称
10	手柄壳体		
11	操控部	111	云台装配孔
12	握持部	121	握持前面壳
122	握持后面壳		
13	装饰件		
20	手柄电池	30	控制器
40	按钮	50	外接接口

具体实施方式

为了使本实用新型的目的、技术方案及优点更加清楚明白，以下结合附图及实施例，对本实用新型进行进一步详细说明。应当理解，此处所描述的具体实施例仅用以解释本实用新型，并不用于限定本实用新型。

需要说明的是，当元件被称为"固定于"或"设置于"另一个元件，它可以直接在另一个元件上或者可能同时存在居中元件。当一个元件被称为是"连接于"另一个元件，它可以是直接连接到另一个元件或者可能同时存在居中元件。

还需要说明的是，本实用新型实施例中，按照图1中所建立的XYZ直角坐标系定义：位于X轴正方向的一侧定义为前方，位于X轴负方向的一侧定义为后方；位于Y轴正方向的一侧定义为左方，位于Y轴负方向的一侧定义为右方；位于Z轴正方向的一侧定义为上方，位于Z轴负方向的一侧定义为下方。其中，前方也即是使用者正常使用时的视觉方向。

如图1至图3所示，本实用新型实施例提供的一种手柄，主要用于辅助使用者握持云台增稳器(图中未示出)，该手柄包括与云台增稳器连接的手柄壳体10。在本实用新型中，该手柄还包括用于给云台增稳器供电的手柄电池20，而手柄壳体10内开设有用于容置手柄电池20的电池仓(图中未标注)。基于此结构，对于具有该手柄的云台增稳器，除了云台增稳器自身的电池，还增加了手柄电池20作为电源供应，相对于现有技术，增加了给云台增稳器供应的电源，从而延长了云台增稳器的续航时间。

在本实用新型中，该手柄还可包括与手柄电池20电连接的用于切换手柄电池20供电模式和用于切换云台增稳器工作模式的控制器30，以拓展该手柄的使用功能；当然，在其他实施中，该控制器30可单纯用于切换手柄电池20供电模式，或单纯用于切换云台增稳器工作模式。其中，云台增稳器的工作模式通常包括锁定模式和跟随模式等，而供电模式通常包括调整手柄电池20的供电电源或切断供电等。

在本实用新型中，参见图1至图3所示，该控制器30连接有供使用者操控的按钮40。基于前述所有结构，在使用时，使用者可通过触控按钮40实现切换手柄电池20供电模式和切换云台增稳器工作模式，操控简单、便捷。在实施中，可设置有多个按钮40，并为每个按钮40上设置相应切换功能；具体地，在本实施中，设置有三个按钮40，其中一个按钮40用于电源的开关，而另两个按钮40则用于切换云台增稳器工作模式。

在本实用新型中，该手柄壳体10可以与云台增稳器固定连接，也可以与云台增稳器可拆卸连接。在本实施中，参见图1和图3所示，手柄壳体10中的一端设有用于与云台增稳器可拆卸连接的云台装配孔111；基于此，在具体使用过程中，当所需使用云台增稳器的时间较短时，可更换为其他不带有电池的手柄，以减轻使用手持的重量，而当所需使用云台增稳器的时间较长时，则可更换为具有手柄电池20的手柄，以提高云台增稳器的续航时间。

在本实用新型中，参见图1至图3所示，手柄壳体10包括相互连接的操控部11，以及外部供使用者握持、内部开设有电池仓的握持部12，其中，将前述的按钮40设置于操控部11，而云台装配孔111设置于操控部11的自由端。基于此结构，在使用时，使用者的一只手握持于握持部12，其中，由于人的手掌的生理结构，并通过按钮40与操控部11之间适当的距离设置，可让使用这于握持该手柄的手的手指通过屈弯而直接触控到设于操控部11的按钮40，无需用另外一只手来触控按钮40。

进一步地，参见图1至图3所示，操控部11相对于抓握持部12朝前倾斜设置，按钮40设置于操控部11后侧，基于此，可让便于使用通过拇指进行操控，从而提高使用操控效率，并提高使用者的舒适

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度。另，在本实施中，为提 高操控部11的美观度，可在操控部11的前端设置有装饰件13，且该装饰件13 采用可拆卸的方式安装至操控部11。

进一步地，握持部12包括可拆卸连接的握持前面壳121和握持后面壳122， 握持后面壳122与操控部11可拆卸连接。基于此结构，可将电池仓打开，方便 更换手柄电池20。

进一步地，握持前面壳121的外表面包覆握持软胶垫，在使用者的手握持 时，该软胶会产生一定的变形，以拟合人手的形状，因此，在提高使用舒适度 时，还可以提高防滑手柄的防滑性能。

本实用新型中，参见图1至图3所示，控制器30还可连接有用于为手柄电 池20充电和让手柄电池20给外接的电子产品供电的外接接口50。基于此，可 通过该外接接口50为手柄电池20充电，从而无需频繁地将手柄电池20取出， 同时，在户外使用时，该手柄也可为其他的电子产品(如：平板电脑、手机、 MP3等)进行充电；在本实施中，该外接接口50为MicroUSB。另，在其他实 施中，该外接接口50可以单纯作为为手柄电池20充电的接口，或者是单纯给 外接的电子产品供电的接口。

本实用新型还提出一种云台增稳器，该云台增稳器连接有上述结构的手柄， 具体结构参照上述实施例，由于本云台增稳器采用了上述所有实施例的全部技 术方案，因此同样具有上述实施例的技术方案所带来的所有有益效果，在此不 再一一赘述。

以上所述仅为本实用新型的较佳实施例而已，并不用以限制本实用新型， 凡在本实用新型的精神和原则之内所作的任何修改、等同替换或改进等，均应 包含在本实用新型的保护范围之内。

1. CN205017429 - 手柄以及连接有该手柄的云台增稳器

Note: Text based on automatic Optical Character Recognition processes. Please use the PDF version for legal matters

[ZH]

权利要求书

1.一种手柄，包括与云台增稳器连接的手柄壳体，其特征在于，还包括用于给云台增稳器供电的手柄电池，所述手柄壳体内开设有用于容置所述手柄电池的电池仓。

2.如权利要求1所述的手柄，其特征在于，所述手柄还包括与所述手柄电池电连接的用于切换所述手柄电池供电模式和/或用于切换云台增稳器工作模式的控制器。

3.如权利要求2所述的手柄，其特征在于，所述控制器连接有供使用者操控的按钮。

4.如权利要求3所述的手柄，其特征在于，所述手柄壳体中的一端设有用于与云台增稳器可拆卸连接的云台装配孔。

5.如权利要求4所述的手柄，其特征在于，所述手柄壳体包括相互连接的操控部，以及外部供使用者握持、内部开设有所述电池仓的握持部，所述按钮设置于所述操控部，所述云台装配孔设置于所述操控部的自由端。

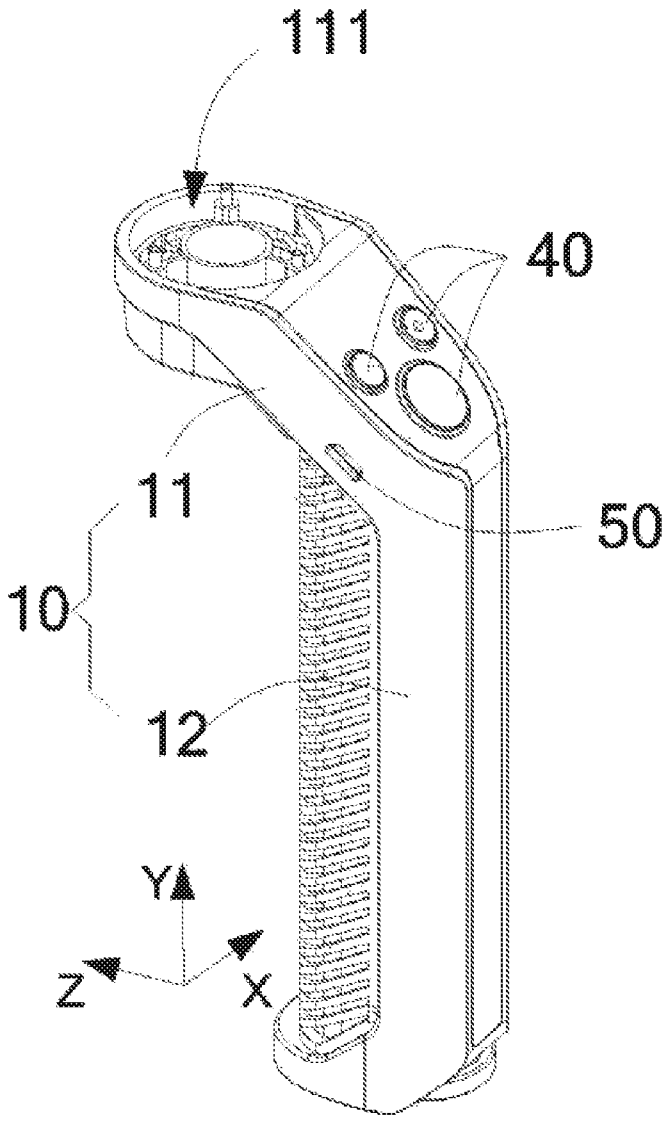
6.如权利要求5所述的手柄，其特征在于，所述操控部朝前倾斜设置，所述按钮设置于所述操控部后侧。

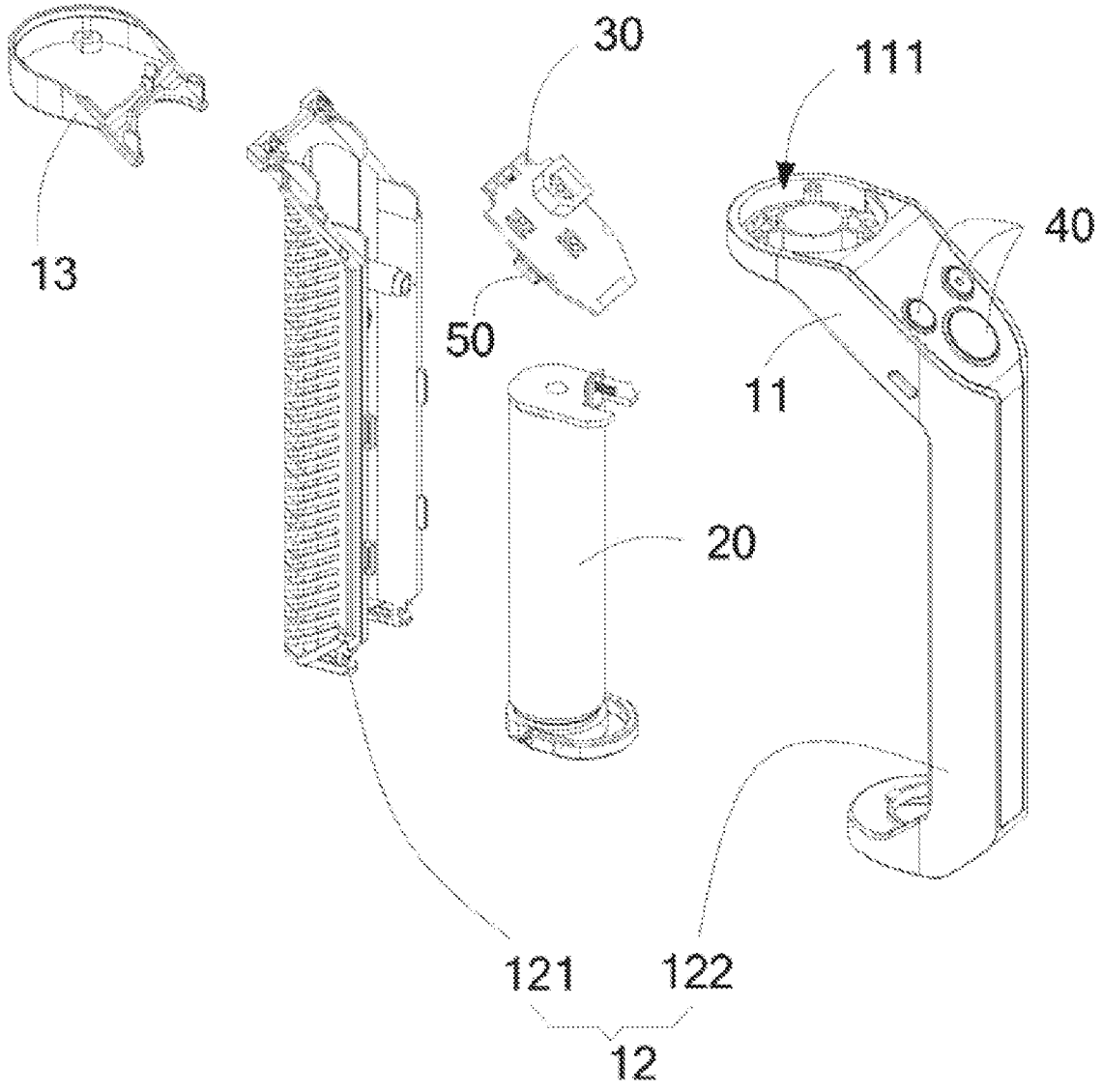
7.如权利要求6所述的手柄，其特征在于，所述握持部包括可拆卸连接的握持前面壳和握持后面壳，所述握持后面壳与所述操控部可拆卸连接。

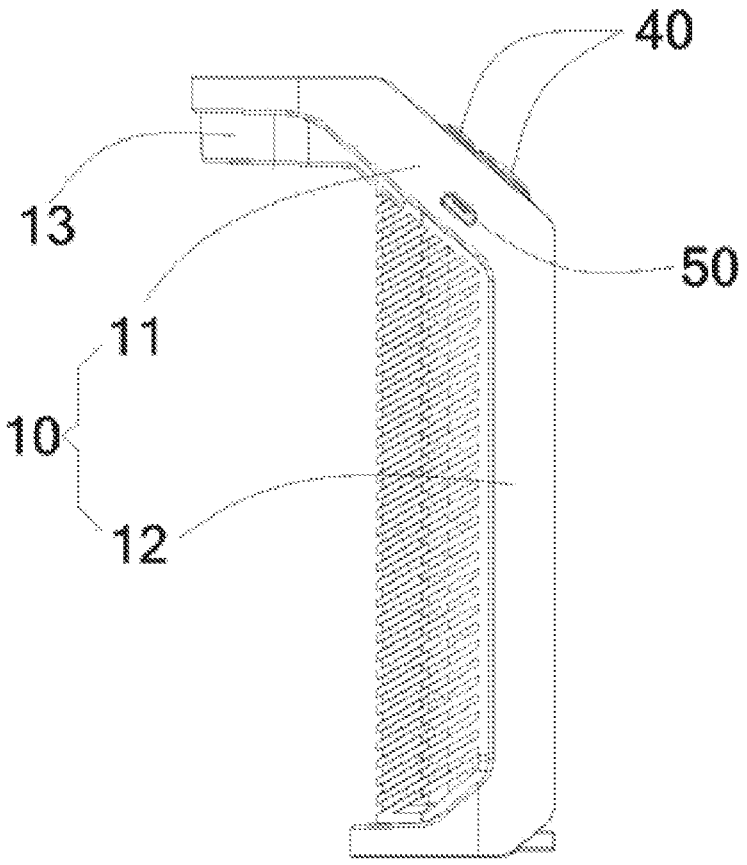
8.如权利要求7所述的手柄，其特征在于，所述握持前面壳的外表面包覆握持软胶垫。

9.如权利要求2至8中任一项所述的手柄，其特征在于，所述控制器连接有用于为所述手柄电池充电和/或让所述手柄电池给外接的电子产品供电的外接接口。

10.一种云台增稳器，其特征在于，连接有如权利要求1至9中任一项所述的手柄。


111
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Feedback Search
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1. CN205017429 - 手柄以及连接有该手柄的云台稳定器

Transla
Bacl

PermaLink

Office
China

Application Number
201520695515.8

Application Date
09.09.2015

Publication Number
205017429

Publication Date
03.02.2016

Publication Kind
U

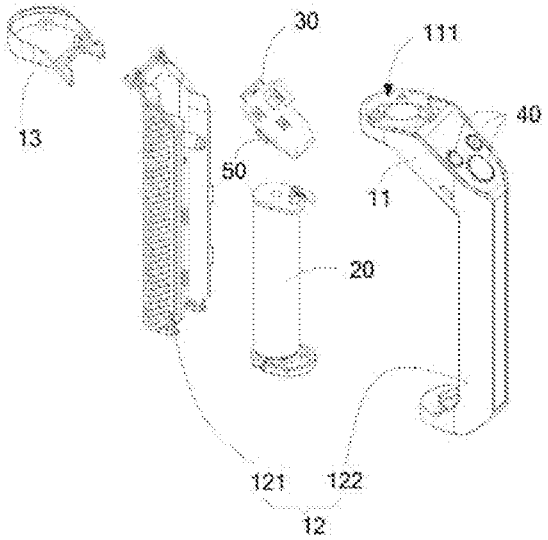
IPC
H04N 5/232 | G03B 17/56

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Title
(ZH) A handle and a pan-tilt regulator connected with the handle



Abstract
(ZH)
The invention provides a handle and a pan-tilt stabilizer connected with the handle, wherein the handle comprises a handle shell connected with a pan-tilt regulator and a handle battery for supplying power to the pan-tilt regulator, and a battery bin for accommodating the handle battery is formed in the handle shell. The invention provides a handle and a pan-tilt stabilizer with the handle, and aims to improve the endurance time of the pan-tilt booster.

CN205017429

Machine language translation

Note: Text-based On Automatic Optical Reader Recognition Processes. Please use the PDF Version for Legal matters

[ZH]

a handle and a pan-tilt regulator connected with the handle

TECHNICAL FIELD

The invention belongs to the field of photography/camera auxiliary equipment, and particularly relates to a handle convenient for holding a holder of a holder and a pan-tilt regulator connected with the handle

BACKGROUND

During motion, photographing/imaging needs to be stabilized by photographing/imaging equipment, and is usually stabilized through a pan-tilt regulator, but the pan-tilt stabilizer is constantly moving in use, and therefore, an user needs to grip the cradle head stabilizer through the handle.. The movement of the cradle head stabilizer in order to be stabilized requires a battery in the pan-tilt regulator to provide a power supply, but only the battery in the pan-tilt regulator is used to provide a power supply, and the problem of short endurance time of the pan-tilt regulator is solved.

SUMMARY OF THE INVENTION

The invention aims to overcome the defects in the prior art, and provides a handle, which aims to improve the endurance time of the holder of the pan-tilt

In order to achieve the above object, the invention provides a handle, which comprises a handle shell connected with a pan-tilt regulator, and a handle battery for supplying power to the pan-tilt regulator, wherein the handle shell is internally provided with a battery bin for accommodating the handle battery;

Optionally, the handle further includes a controller electrically connected to the handle battery for switching the handle battery power supply mode and/or for switching the pan-tilt regulator operating mode.

Optionally, the controller is connected with a button for user manipulation.

Optionally, one end of the handle housing is provided with a pan-tilt assembly hole for detachably connecting with the pan-tilt booster.

Optionally, the handle housing comprises an operating portion connected to each other, and an outer portion for holding the user, wherein the interior of the handle housing is provided with a holding portion of the battery compartment, the button is disposed on the control portion, and the pan-tilt mounting hole is disposed at the free end of the control portion.

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Optionally, the control part is obliquely arranged forward, and the button is arranged on the rear side of the control part.

Optionally, the holding part comprises a holding front shell and a holding rear shell which are detachably connected, and the holding rear shell is detachably connected with the control part.

Optionally, the outer surface of the holding front shell is coated with the soft rubber pad.

Optionally, the controller is connected with an external interface for powering the handle battery and/or supplying power to the external electronic product.

The invention also provides a pan-tilt stabilizer which is connected with a handle, wherein the handle comprises a handle shell connected with the pan-tilt regulator and a handle battery for supplying power to the pan-tilt regulator; the handle shell is internally provided with a battery bin for accommodating the handle battery;

For the pan-tilt regulator with the handle, in addition to the battery of the pan-tilt regulator itself, the handle battery is added as a power supply, compared with the prior art, the power supply supplied to the pan-tilt regulator is increased, so that the endurance time of the pan-tilt regulator is prolonged.

BRIEF DESCRIPTION OF THE DRAWINGS

BRIEF DESCRIPTION OF THE DRAWINGS. In order to more clearly illustrate the technical solutions of the embodiments of the present invention, reference will now be made to the accompanying drawings, which are to be used in the embodiments, as briefly described below. It will be apparent to those of ordinary skill in the art that other figures can be obtained from these drawings without creative efforts.

FIG. 1 is a perspective view of a handle according to an embodiment of the present invention;

FIG. 2 is a side schematic view of a handle provided in an embodiment of the present invention;

FIG. 3 is a perspective exploded view of a handle provided in an embodiment of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The label name 10 handle housing 11 operates the control section 111.The holder portion 121 of the holder assembly hole 12 holds the front shell 122 to hold the rear shell 13 trim piece 20The handle battery 30 controller 40 is connected to the external interface of the button 50

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In order to make the objects, technical solutions and advantages of the present invention more clear, the present invention will be described in further detail below in conjunction with the accompanying drawings and embodiments.. It should be understood that the specific embodiments described herein are for illustrative purposes only and are not intended to limit the invention.

It should be noted that when an element is referred to as being "fixed" or "disposed" another element, it may be directly on the other element or intervening elements may be present at the same time. When an element is referred to as

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being "connected to" another element, it may be directly connected to another element or intervening elements may be present at the same time.

It should also be noted that in the embodiment of the present invention, according to the XYZ rectangular coordinate system established in FIG. 1: one side in the positive direction of the X-axis is defined as the front, and one side in the negative direction of the X-axis is defined as the rear; one side in the positive direction of the Y-axis is defined as the left, and one side in the negative direction of the Y-axis is defined as the right; one side in the positive direction of the Z-axis is defined as the upper part, and one side of the negative direction of the Z-axis is defined as the lower part.. Wherein, the front is the visual direction when the user is normally used.

As shown in FIGS. 1-3, the handle is mainly used for assisting an user in holding a holder (not shown) of a holder. The handle comprises a handle housing 10 connected to a pan-tilt regulator. In the present invention, the handle further comprises a handle battery 20 for supplying power to the pan-tilt regulator, and the handle housing 10 is internally provided with a battery compartment (not labeled) for accommodating the handle battery 20. Based on this structure, for a pan-tilt regulator with the handle, in addition to the battery of the pan-tilt regulator itself, the handle battery 20 is added as a power supply, and compared with the prior art, the power supply supplied to the pan-tilt regulator is increased, thereby prolonging the endurance time of the pan-tilt regulator.

In the present invention, the handle may further include a controller 30 electrically connected to the handle battery 20 for switching the power supply mode of the handle battery 20 and for switching the operating mode of the pan-tilt regulator to expand the use function of the handle; of course, in other implementations, the controller 30 May simply be used to switch the power supply mode of the handle battery 20, or simply to switch the operating mode of the pan-tilt regulator.. The operating mode of the pan-tilt regulator typically includes a locking mode and a following mode, etc. and the power supply mode generally includes adjusting the power supply or cutting-off power supply of the handle battery 20, etc.

In the present invention, referring to FIGS. 1-3, the controller 30 is connected with a button 40 for user manipulation on the basis of all of the structures, when in use, an user can switch the power supply mode of the handle battery 20 and switch the working mode of the pan-tilt regulator through the touch button 40, and the operation is simple and convenient.. In an implementation, a plurality of buttons 40 May be provided and a corresponding switching function is set on each button 40; in particular, in the present implementation, three buttons 40 are provided, one of which is used for the switch of the power supply and the other two buttons 40 are used to switch the operating mode of the pan-tilt regulator.

In the invention, the handle shell 10 can be fixedly connected with the pan-tilt stabilizer, and can also be detachably connected with the pan-tilt regulator.. In the embodiment, referring to FIG. 1 and FIG. 3, one end of the handle housing 10 is provided with a holder assembly hole 111 for detachably connecting with the pan-tilt stabilizer; Based on this, in a specific use process, when the time required to use the holder of the holder is short, the handle with no battery can be replaced to reduce the weight of the use of the hand, and when the time required to use the holder of the holder is long, the handle with the handle battery 20 can be replaced so as to improve the endurance time of the holder of the pan-tilt.

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In the present invention, referring to FIGS. 1-3, the handle housing 10 includes a control portion 11 connected to each other, and a holding portion 12 provided with a battery compartment therein, wherein the button 40 is disposed on the control portion 11, and the pan-tilt assembly hole 111 is disposed at the free end of the control portion 11.. Based on this structure, when in use, one hand of the user is held on the holding portion 12, wherein, due to the physiological structure of the palm of the person, and the proper distance between the button 40 and the control portion 11 is set, the finger using the hand holding the handle may be in direct contact with the button 40 provided to the control portion 11 by bending without using another hand to touch the button 40.

Further, referring to FIGS. 1-3, the control portion 11 is obliquely arranged relative to the grip portion 12, and the button 40 is disposed on the rear side of the control portion 11. Based on this, it is convenient to use the thumb to control, thereby improving the use control efficiency and improving the comfort of the user.. In the present embodiment, in order to improve the aesthetic degree of the control part 11, a decoration part 13 can be arranged at the front end of the control part 11, and the decoration part 13 is detachably mounted to the control part 11

Further, the holding part 12 comprises a holding front shell 121 and a holding rear shell 122 which are detachably connected, and the holding rear shell 122 is detachably connected with the control part 11. Based on the structure, the battery bin can be opened, and the handle battery 20 can be replaced conveniently.

Further, the outer surface of the holding front shell 121 is coated with the soft rubber pad, and when the hand of the user is held, the soft rubber generates a certain deformation to fit the shape of the human hand, so that the anti-skid performance of the anti-skid handle can also be improved when the use comfort is improved.

In the present invention, referring to FIGS. 1-3, the controller 30 May also be connected with an external interface 50 for powering the handle battery 20 and supplying power to the electronic product externally connected to the handle battery 20. Based on this, the handle battery 20 can be charged through the external interface 50, so that the handle battery 20 does not need to be frequently taken out. Meanwhile, when the handle battery 20 is used outdoors, the handle can be other electronic products such as tablet computers, mobile phones, MP3 and the like.) In the present embodiment, the external interface 50 is MICROUSB.. In addition, in other implementations, the external interface 50 can simply serve as an interface for charging the handle battery 20, or an interface for supplying power to the externally connected electronic product.

The invention further provides a pan-tilt stabilizer which is connected with the handle of the structure. According to the embodiment, due to the adoption of all the technical schemes of all the embodiments, the pan-tilt stabilizer also has all the beneficial effects caused by the technical solutions of the above-mentioned embodiments, and the description is not repeated here.

Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

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CLAIM OF THE INVENTION

1. The handle comprises a handle shell connected with a pan-tilt regulator, and is characterized by further comprising a handle battery for supplying power to the pan-tilt regulator, wherein the handle shell is internally provided with a battery bin for accommodating the handle battery;

2. The handle of claim 1, wherein the handle further comprises a controller electrically connected to the handle battery for switching the handle battery power supply mode and/or for switching the pan-tilt regulator operating mode.

3. The handle of claim 2, wherein the controller is connected with a button for user manipulation.

4. The handle of claim 3, wherein one end of the handle housing is provided with a pan-tilt assembly hole for detachably connecting with the pan-tilt regulator.

5. The handle as claimed in claim 4, wherein the handle housing comprises a manipulation portion connected to each other, and an outer portion for holding the user, wherein the interior of the handle housing is provided with a holding portion of the battery compartment, the button is disposed on the control portion, and the cradle head assembly hole is disposed at the free end of the control portion.

6. The handle according to claim 5, wherein the control part is obliquely arranged forward, and the button is arranged on the rear side of the control part.

7. The handle according to claim 6, wherein the holding part comprises a holding front shell and a holding rear shell which are detachably connected, and the holding rear shell is detachably connected with the control part.

8. The handle according to claim 7, wherein the outer surface of the holding front shell is coated with a soft rubber pad.

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9. The handle of any one of claims 2-8, wherein the controller is connected with an external interface for powering the handle battery and/or supplying power to the external electronic product.

10. The pan-tilt stabilizer is characterized by being connected with the handle of any one of claims 1-9.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION
19932-022442APCT	see Form PCT/ISA/220 as well as, where applicable, item 5 below.

International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2021/057717	**02 November 2021**	**05 November 2020**

Applicant: **HYPER ICE, INC.**

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **4** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☑ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☑ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. **10**

   ☐ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☑ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2021/057717

A. CLASSIFICATION OF SUBJECT MATTER

A61H 23/00(2006.01)i; **A61H 23/02**(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)

A61H 23/00(2006.01); A45D 34/04(2006.01); A45D 40/18(2006.01); A61H 1/00(2006.01); A61H 23/02(2006.01); A61H 7/00(2006.01)

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: percussive massage device, reciprocation mechanism, enclosure, spatial positioning bracket, semi-cylindrical bracket, cylindrical piston passageway, cylindrical sleeve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 10314762 B1 (HYPER ICE, INC.) 11 June 2019 (2019-06-11) See columns 7-15; claim 1; and figures 1-3, 7, 11A-11B, 13-14.	1-20
A	US 4513737 A (MABUCHI, KENICHI) 30 April 1985 (1985-04-30) See the whole document.	1-20
A	WO 2012-177028 A2 (AMOREPACIFIC CORPORATION) 27 December 2012 (2012-12-27) See the whole document.	1-20
A	US 2020-0276079 A1 (CHENG, GUOMEI) 03 September 2020 (2020-09-03) See the whole document.	1-20
A	KR 10-2078829 B1 (ST CO., LTD) 19 February 2020 (2020-02-19) See the whole document.	1-20

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
23 February 2022	**23 February 2022**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office **189 Cheongsa-ro, Seo-gu, Daejeon** **35208, Republic of Korea**	**HEO, Joo Hyung**
Facsimile No. **+82-42-481-8578**	Telephone No. **+82-42-481-5373**

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	US 10993874 B1 (HYPER ICE, INC.) 04 May 2021 (2021-05-04) See claims 1-20.	1-20

Petitioner Therabody Ex-1004, 1257

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2021/057717

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	10314762	B1	11 June 2019	CA	3049387	A1	17 September 2019
				CA	3049387	C	01 September 2020
				CN	111166643	A	19 May 2020
				CN	111166643	B	30 July 2021
				EP	3650002	A1	13 May 2020
				EP	3650002	B1	06 October 2021
				JP	2020-078541	A	28 May 2020
				JP	6643518	B1	12 February 2020
				KR	10-2025760	B1	26 September 2019
				TW	202017550	A	16 May 2020
				TW	I691327	B	21 April 2020
				US	2020-0352822	A1	12 November 2020
				WO	2020-101725	A1	22 May 2020
US	4513737	A	30 April 1985	JP	55-129715	A	07 October 1980
				JP	56-133823	U	09 October 1981
				JP	5648806	B2	18 November 1981
				JP	5937231	Y2	15 October 1984
WO	2012-177028	A2	27 December 2012	CN	203789387	U	27 August 2014
				JP	2014-529301	A	06 November 2014
				JP	5746433	B2	08 July 2015
				KR	20-0464876	Y1	04 February 2013
				KR	20-2013-0000043	U	03 January 2013
				WO	2012-177028	A3	16 May 2013
US	2020-0276079	A1	03 September 2020	CN	111671636	A	18 September 2020
				CN	212522390	U	12 February 2021
KR	10-2078829	B1	19 February 2020	None			
US	10993874	B1	04 May 2021	None			

Petitioner Therabody Ex-1004, 1258

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
EMILY A. SHOUSE

Patterson Intellectual Property Law, PC 1600 Division Street, Suite 500 Nashville, Tennessee 37203 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**23 February 2022**
Applicant's or agent's file reference	**19932-022442APCT**
	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2021/057717	**02 November 2021**	**05 November 2020**

International Patent Classification (IPC) or both national classification and IPC
A61H 23/00(2006.01)i; **A61H 23/02**(2006.01)i

Applicant
HYPER ICE, INC.

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208	**23 February 2022**	**HEO, Joo Hyung**
Facsimile No. **+82-42-481-8578**		Telephone No. **+82-42-481-5373**

Form PCT/ISA/237 (Cover sheet) (revised January 2019)

Petitioner Therabody Ex-1004, 1259

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2021/057717

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   a. [ ] forming part of the international application as filed:
      - [ ] in the form of an Annex C/ST.25 text file.
      - [ ] on paper or in the form of an image file.
   b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
      - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
      - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2021/057717

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 10314762 B1 (HYPER ICE, INC.) 11 June 2019
D2: US 4513737 A (MABUCHI, KENICHI) 30 April 1985
D3: WO 2012-177028 A2 (AMOREPACIFIC CORPORATION) 27 December 2012
D4: US 2020-0276079 A1 (CHENG, GUOMEI) 03 September 2020
D5: KR 10-2078829 B1 (ST CO., LTD) 19 February 2020

I. Novelty and Inventive Step (PCT Article 33(2) and (3))

1. Claims 1-20

Claims 1, 12 differ from these prior art documents D1-D5 in a percussive massage device, comprising: a spatial positioning bracket including a motor mounting portion, a middle portion and a semi-cylindrical end portion; and a semi-cylindrical bracket coupleable to the semi-cylindrical end portion to define a cylindrical passageway. And it is not obvious to a person skilled in the art over the documents, taken alone or in combination.

Claims 2-11 and 13-20 are dependent on claims 1 and 12, respectively.

Therefore, claims 1-20 are novel and involve an inventive step.

II. Industrial Applicability (PCT Article 33(4))

Claims 1-20 are industrially applicable.

Petitioner Therabody Ex-1004, 1261

Espacenet

Bibliographic data: CN103248096 (A) — 2013-08-14

Charger

Inventor(s): WU MINGFEN ± (WU MINGFEN)

Applicant(s): WU MINGFEN ± (WU MINGFEN)

Classification: **- international:** ***F21L4/00; H02J7/00***
- cooperative:

Application number: CN201310171974 20130425 Global Dossier

Priority number(s): CN201310171974 20130425

Abstract of CN103248096 (A)

The invention discloses a charger which comprises a lithium battery and a casing, wherein the lithium battery is arranged inside the casing, a charging interface and an USB output interface are arranged on a side surface of the casing, an input indicator light and an output indicator light are arranged on the surface of the casing, a lighting lamp is arranged at the bottom of the casing, the lighting light is connected with the lithium battery, and a lighting indicator light and an electrical quantity indicator light are further arranged on the surface of the casing; and a photoelectric plate charging interface connected with the lithium battery is further arranged on the side surface of the casing, and the photoelectric plate charging interface is connected with a solar energy photoelectric plate arranged outside the casing. According to the invention, the lighting light, the lighting indicator light and the electrical quantity indicator light are arranged at the bottom of the casing, so as to enable the charger to have a lighting function at the same time; and the solar energy photoelectric plate is adopted for absorbing solar energy and converting solar energy into electric energy to charge the lithium battery inside the casing, and the purpose of energy conservation is achieved.

Petitioner Therabody Ex-1004, 1262

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Notice

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DESCRIPTION CN103248096A

power bank

[0001]

Technical field

[0002]

The present invention relates to a mobile power supply with a power storage unit, and in particular to a power bank.

[0003]

Background technique

[0004]

A power bank refers to a device that can directly charge mobile devices and has its own power storage unit.

The charging plug of the power bank can charge mobile devices directly through AC power and has the function of storing electricity. It is equivalent to a hybrid of a charger and a backup battery. Compared with a backup power supply, it can simplify the installation of a charging plug. Compared with the charger, it has its own power storage device, which can provide backup power for digital products when there is no direct power supply or when you are out.

[0005]

However, the current power bank only has the function of charging mobile devices and storing electricity itself, and has a single function.

[0006]

Contents of the invention

[0007]

In view of the above-mentioned shortcomings in the prior art, the present invention provides a power bank with multiple functions.

[0008]

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The power bank provided by the invention includes a lithium battery and a casing. The lithium battery is arranged in the casing. The side of the casing is provided with a charging interface and a USB output interface. The surface of the casing is provided with an input indicator light and an output indicator light. A lighting lamp is provided at the bottom of the housing, and the lighting lamp is connected to a lithium battery. A lighting indicator light and a power indicator light are also provided on the surface of the housing; a photovoltaic panel connected to the lithium battery is also provided on the side of the housing. Charging interface, the photovoltaic panel charging interface is connected to the solar photovoltaic panel arranged outside the housing through a power cord.

[0009]

As a preferred solution of the present invention, a player is provided in the casing, the player is connected to a lithium battery, and a plurality of sound-emitting holes are provided on the casing corresponding to the bell mouth of the player.

[0010]

As another preferred embodiment of the present invention, the power line connecting the player and the lithium battery is connected in series with a switch that turns the player on or off.

[0011]

As an improvement of the present invention, a charging data line connected to the mobile phone charging interface is provided on the side of the housing, and the charging data line is connected to a flat charging interface, a circular charging interface and a rectangular parallelepiped charging interface.

[0012]

The beneficial effects of the present invention are: the present invention is provided with a lighting lamp, a lighting indicator light and a power indicator light at the bottom of the casing, so that the power bank has a lighting function; a player is provided in the casing, and a switch is provided on the casing, which is controlled by the switch player, so that the power bank has a playback function; a flat charging interface, a circular charging interface and a rectangular charging interface are set on the side of the casing, which can be matched with the charging interfaces of different mobile devices (such as mobile phones) for charging.

[0013]

Description of the drawings

[0014]

Figure 1 is a schematic structural diagram of the power bank.

[0015]

In the attached figure, 1-shell; 2-charging interface; 3-USB output interface; 4-input indicator light; 5-output indicator light; 6-illumination light; 7-illumination indicator light; 8-sound hole; 9-switch ; 10-flat charging interface; 11-circular charging interface; 12-cuboid charging interface; 13-photovoltaic panel charging interface; 14-solar photovoltaic panel; 15-power indicator light.

[0016]

Detailed ways

[0017]

The present invention will be described in further detail below in conjunction with the accompanying drawings and specific embodiments.

Petitioner Therabody Ex-1004, 1264

[0018]

As shown in Figure 1, the power bank includes a lithium battery and a casing 1, and the lithium battery is arranged in the casing 1.

The side of the housing 1 is provided with a charging interface 2 and a USB output interface 3. The surface of the housing 1 is provided with an input indicator light 4 and an output indicator light 5. The bottom of the housing 1 is provided with an illuminating light 6, which is connected to a lithium battery. , the surface of the housing 1 is also provided with a lighting indicator light 7 and a power indicator light 15.

Set lighting lamp 6 and lighting indicator lamp 7 so that the power bank has lighting function.

The side of the housing 1 is also provided with a photovoltaic panel charging interface 13 connected to the lithium battery. The photovoltaic panel charging interface 13 is connected to the solar photovoltaic panel 14 provided outside the housing 1 through a power cord.

The solar photovoltaic panel 14 is used to absorb solar energy and convert the solar energy into electrical energy to charge the lithium battery in the housing 1 and supply power to the lighting lamp 6 and the player, thereby achieving the purpose of saving energy.

[0019]

A player is arranged in the casing 1, and the player is connected to a lithium battery. A plurality of sound holes 8 are provided on the casing 1 corresponding to the horn mouth of the player.

The power cord connecting the player to the lithium battery is connected in series with a switch 9 for turning on or off the player.

The player is controlled through switch 9 so that the power bank has a playback function.

[0020]

The side of the housing 1 is provided with a charging data line connected to the charging interface of the mobile phone. The charging data line is connected to the flat charging interface 10, the circular charging interface 11 and the rectangular parallelepiped charging interface 12.

A flat charging interface, a circular charging interface and a rectangular parallelepiped charging interface are provided on the side of the casing, which can be used to charge the charging interfaces of different mobile devices (such as mobile phones).

Petitioner Therabody Ex-1004, 1265

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CLAIMS CN103248096A

1.

The power bank includes a lithium battery and a casing (1). The lithium battery is arranged in the casing (1). The side of the casing (1) is provided with a charging interface (2) and a USB output interface (3). The casing (1)) is provided with an input indicator light (4) and an output indicator light (5) on the surface, which is characterized in that: an illuminating light (6) is provided at the bottom of the casing (1), and the illuminating light (6) is connected to a lithium battery , the surface of the casing (1) is also provided with a lighting indicator light (7) and a power indicator light (15); the side of the casing (1) is also provided with a photovoltaic panel charging interface (13) connected to a lithium battery. , the photovoltaic panel charging interface (13) is connected to the solar photovoltaic panel (14) provided outside the housing (1) through a power cord.

2.

The power bank according to claim 1, characterized in that: a player is provided in the casing (1), the player is connected to a lithium battery, and multiple casings (1) are provided corresponding to the horns of the player. sound holes (8).

3.

The power bank according to claim 2, characterized in that: the power line connecting the player to the lithium battery is connected in series with a switch (9) for turning on or off the player.

4.

The power bank according to claim 1, characterized in that: a charging data line connected to a mobile phone charging interface is provided on the side of the casing (1), and the charging data line is connected to a flat charging interface (10), a round charging interface (10), and a round charging interface (10). Charging interface (11) and cuboid charging interface (12).

Petitioner Therabody Ex-1004, 1266

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 103248096 A
(43)申请公布日 2013.08.14

(21)申请号 201310171974.1

(22)申请日 2013.04.25

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(72)发明人 吴明芬

(51)Int.Cl.
H02J 7/00(2006.01)
F21L 4/00(2006.01)

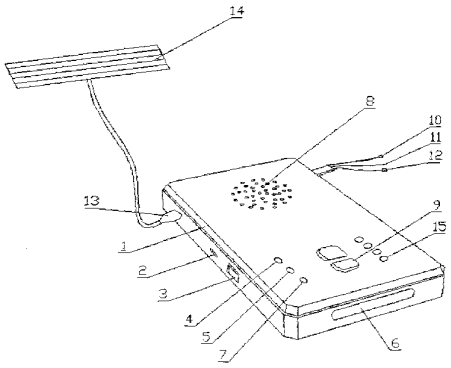
权利要求书1页 说明书2页 附图1页

(54)发明名称

充电宝

(57)摘要

本发明公开了一种充电宝，包括锂电池和外壳，锂电池设置在外壳内，外壳的侧面设有充电接口和USB输出接口，外壳的表面上设有输入指示灯和输出指示灯，在外壳的底部设有照明灯，照明灯与锂电池连接，外壳的表面上还设有照明指示灯和电量指示灯；外壳的侧面还设有与锂电池连接的光电板充电接口，光电板充电接口通过电源线与外壳外设置的太阳能光电板连接。本发明在外壳的底部设有照明灯、照明指示灯和电量指示灯，使该充电宝同时具备照明功能；采用太阳能光电板吸收太阳能并把太阳能转化为电能对外壳内的锂电池充电，达到节约能源的目的。



CN 103248096 A

Petitioner Therabody Ex-1004, 1267

1. 充电宝，包括锂电池和外壳 (1)，所述锂电池设置在外壳 (1) 内，所述外壳 (1) 的侧面设有充电接口 (2) 和 USB 输出接口 (3)，外壳 (1) 的表面上设有输入指示灯 (4) 和输出指示灯 (5)，其特征在于：在外壳 (1) 的底部设有照明灯 (6)，所述照明灯 (6) 与锂电池连接，所述外壳 (1) 的表面上还设有照明指示灯 (7) 和电量指示灯 (15)；所述外壳 (1) 的侧面还设有与锂电池连接的光电板充电接口 (13)，所述光电板充电接口 (13) 通过电源线与外壳 (1) 外设置的太阳能光电板 (14) 连接。

2. 根据权利要求 1 所述的充电宝，其特征在于：所述外壳 (1) 内设置播放器，所述播放器与锂电池连接，所述外壳 (1) 上与播放器的喇叭口对应设置多个发声孔 (8)。

3. 根据权利要求 2 所述的充电宝，其特征在于：所述播放器与锂电池连接的电源线上串联有开启或关闭播放器的开关 (9)。

4. 根据权利要求 1 所述的充电宝，其特征在于：所述外壳 (1) 的侧面设有一与手机充电接口连接的充电数据线，所述充电数据线上连接扁平充电接口 (10)、圆形充电接口 (11) 和长方体充电接口 (12)。

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充电宝

技术领域

[0001] 本发明涉及一种具有储电单元的移动电源，尤其涉及一种充电宝。

背景技术

[0002] 充电宝是指可以直接给移动设备充电且自身具有储电单元的装置。充电宝自身的充电插头直接通过交流电源可以对移动设备充电且自身具有存电功能，相当于一个充电器和备用电池的混合体，相比备用电源而言可以简化一个充电插头的装置，而相比于充电器它又自身具有存电装置，可以在没有直电源或外出时给数码产品提供备用电源。

[0003] 但目前的充电宝只具有给移动设备充电和自身具有储电的功能，功能单一。

发明内容

[0004] 针对上述现有技术中的不足之处，本发明提供了一种具有多种功能的充电宝。

[0005] 本发明提供的充电宝，包括锂电池和外壳，所述锂电池设置在外壳内，所述外壳的侧面设有充电接口和 USB 输出接口，外壳的表面上设有输入指示灯和输出指示灯，在外壳的底部设有照明灯，所述照明灯与锂电池连接，所述外壳的表面上还设有照明指示灯和电量指示灯；所述外壳的侧面还设有与锂电池连接的光电板充电接口，所述光电板充电接口通过电源线与外壳外设置的太阳能光电板连接。

[0006] 作为本发明的一种优选方案，所述外壳内设置播放器，所述播放器与锂电池连接，所述外壳上与播放器的喇叭口对应设置多个发声孔。

[0007] 作为本发明的另一种优选方案，所述播放器与锂电池连接的电源线上串联有开启或关闭播放器的开关。

[0008] 作为本发明的一种改进方案，所述外壳的侧面设有一与手机充电接口连接的充电数据线，所述充电数据线上连接扁平充电接口、圆形充电接口和长方体充电接口。

[0009] 本发明的有益效果是：本发明在外壳的底部设有照明灯、照明指示灯和电量指示灯，使该充电宝具备照明功能；在外壳内设置播放器，在外壳上设置开关，通过开关控制播放器，使该充电宝具备播放功能；在外壳的侧面设置扁平充电接口、圆形充电接口和长方体充电接口，可针对不同移动设备（如手机）的充电接口匹配进行充电。

附图说明

[0010] 图 1 为充电宝的结构示意图。

[0011] 附图中，1- 外壳；2- 充电接口；3-USB 输出接口；4- 输入指示灯；5- 输出指示灯；6- 照明灯；7- 照明指示灯；8- 发声孔；9- 开关；10- 扁平充电接口；11- 圆形充电接口；12- 长方体充电接口；13- 光电板充电接口；14- 太阳能光电板；15- 电量指示灯。

具体实施方式

[0012] 下面结合附图和具体实施例对本发明作进一步详细地描述。

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[0013] 如图 1 所示，充电宝，包括锂电池和外壳 1，锂电池设置在外壳 1 内。外壳 1 的侧面设有充电接口 2 和 USB 输出接口 3，外壳 1 的表面上设有输入指示灯 4 和输出指示灯 5，在外壳 1 的底部设有照明灯 6，照明灯 6 与锂电池连接，外壳 1 的表面上还设有照明指示灯 7 和电量指示灯 15。设置照明灯 6 和照明指示灯 7，使该充电宝具备照明功能。外壳 1 的侧面还设有与锂电池连接的光电板充电接口 13，光电板充电接口 13 通过电源线与外壳 1 外设置的太阳能光电板 14 连接。采用太阳能光电板 14 吸收太阳能并把太阳能转化为电能对外壳 1 内的锂电池充电，向照明灯 6 和播放器供电，达到节约能源的目的。

[0014] 外壳 1 内设置播放器，播放器与锂电池连接，外壳 1 上与播放器的喇叭口对应设置多个发声孔 8。播放器与锂电池连接的电源线上串联有开启或关闭播放器的开关 9。通过开关 9 控制播放器，使该充电宝具备播放功能。

[0015] 外壳 1 的侧面设有一与手机充电接口连接的充电数据线，充电数据线上连接扁平充电接口 10、圆形充电接口 11 和长方体充电接口 12。在外壳的侧面设置扁平充电接口、圆形充电接口和长方体充电接口，可针对不同移动设备（如手机）的充电接口匹配进行充电。

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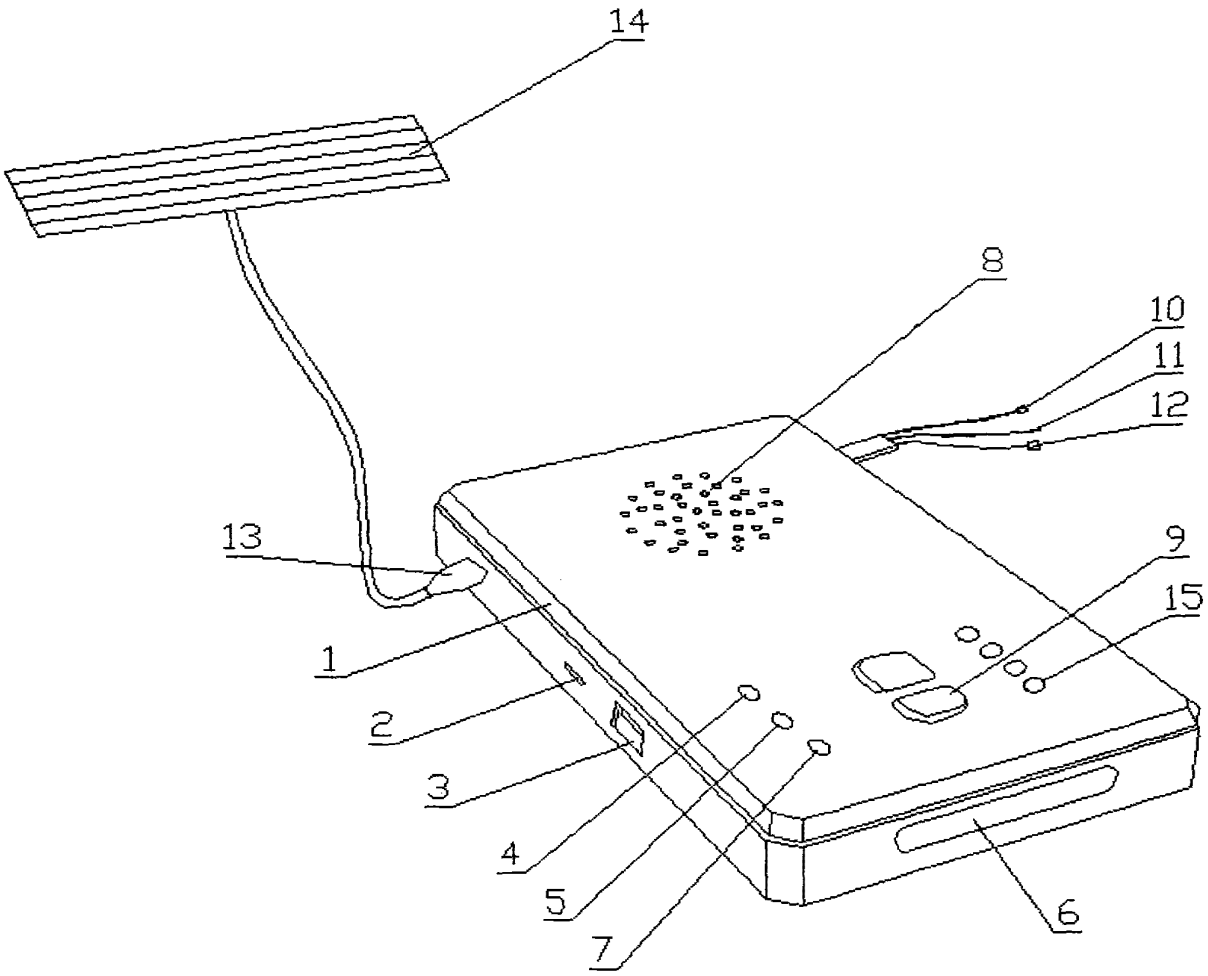


图 1

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Espacenet

Bibliographic data: EP3320888 (A1) — 2018-05-16

MASSAGE SYSTEM INCLUDING MASSAGE MACHINE

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Classification: **- international:** ***A61H7/00***
- cooperative: **A61H1/00 (CN); A61H23/02 (KR, US); A61H7/007 (EP, KR, US); G06F3/167 (KR, US); G10L15/26 (US); G16H20/30 (EP, KR, US); G16H50/20 (EP, KR, US);** A61H2201/0149 (EP, CN, KR, US); A61H2201/1207 (CN); A61H2201/50 (EP, US); A61H2201/5007 (CN, US); A61H2201/501 (EP, US); A61H2201/5012 (EP, KR, US); A61H2201/5048 (EP, CN, KR, US); A61H2203/0425 (CN); A61H2205/081 (EP, KR, US)

Application number: EP20170198974 20171027
Global Dossier

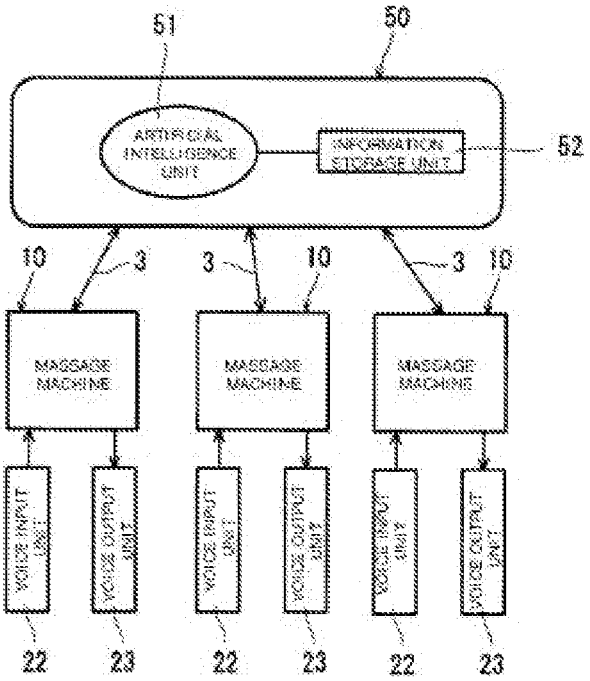
Priority number(s): JP20160222336 20161115

Also published as: CN108078732 (A) CN108078732 (B) JP2018079002 (A) JP6883837 (B2) KR20180054449 (A) more

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Abstract of EP3320888 (A1)

FIG. 1



There is provided a massage system including a massage machine in which artificial intelligence is utilized so as to enable suitable treatment depending on a timely health condition of a treatment target person. The massage system includes a massage machine that has a treatment unit for treating the treatment target person, a control unit for controlling the treatment unit, a voice input unit, and a voice output unit, and a server that is connected to the massage machine via a communication network. The massage machine transmits voice information of the treatment target person which is input from the voice input unit, to the server via the communication network. The server causes an artificial intelligence unit to determine treatment suitable for the treatment target person, based on the voice information of the treatment target person, and transmits the treatment to the massage machine. The massage machine is configured to output the transmitted treatment from the voice output unit.

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 320 888 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.05.2018 Bulletin 2018/20

(51) Int Cl.:
A61H 7/00 *(2006.01)*

(21) Application number: **17198974.2**

(22) Date of filing: **27.10.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **15.11.2016 JP 2016222336**

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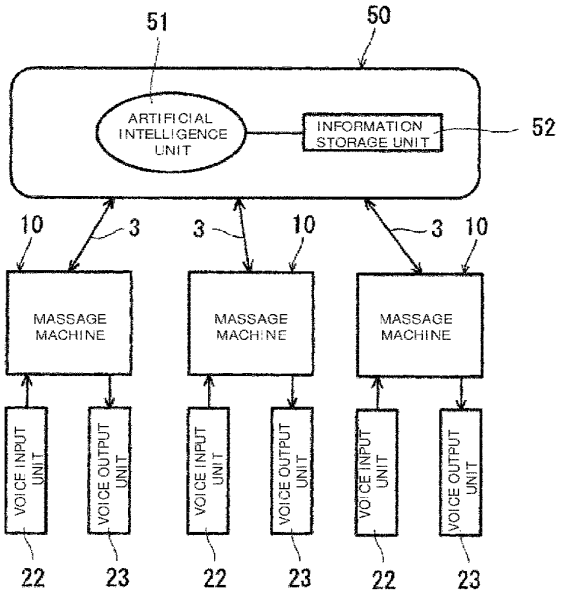
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(54) MASSAGE SYSTEM INCLUDING MASSAGE MACHINE

(57) There is provided a massage system including a massage machine in which artificial intelligence is utilized so as to enable suitable treatment depending on a timely health condition of a treatment target person. The massage system includes a massage machine that has a treatment unit for treating the treatment target person, a control unit for controlling the treatment unit, a voice input unit, and a voice output unit, and a server that is connected to the massage machine via a communication network. The massage machine transmits voice information of the treatment target person which is input from the voice input unit, to the server via the communication network. The server causes an artificial intelligence unit to determine treatment suitable for the treatment target person, based on the voice information of the treatment target person, and transmits the treatment to the massage machine. The massage machine is configured to output the transmitted treatment from the voice output unit.

FIG. 1



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Printed by Jouve, 75001 PARIS (FR)

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Description

TECHNICAL FIELD

[0001] The present invention relates to a massage system in which a massage machine and a server are connected to each other so as to enable interaction therebetween via a network.

BACKGROUND ART

[0002] In the related art, as a massage machine configured to perform suitable massage (treatment) depending on a physical condition of a treatment target person, a massage machine is known in which diagnostic inquiries are given to the treatment target person so as to determine a physical condition of a user, based on answers of the treatment target person (for example, refer to Patent Document 1). In this massage machine, the diagnostic inquiries are given to the treatment target person, and the treatment target person answers either "Yes" or "No" to the diagnostic inquiries.

RELATED ART DOCUMENT

PATENT DOCUMENT

[0003] Patent Document 1: JP-A-2000-70318

SUMMARY OF THE INVENTION

PROBLEM THAT THE INVENTION IS TO SOLVE

[0004] However, according to the massage machine disclosed in Patent Document 1 above, the content of the diagnostic inquiries given to the treatment target person is set in advance, and the treatment target person answers either "Yes" or "No". Accordingly, the treatment content selected from the determination of the physical condition is limited. If the treatment content needs to be adjusted by more precisely determining the physical condition of the treatment target person, it is necessary to set treatment in advance according to the content of enormous diagnostic inquiries and answers, thereby causing practical difficulties.

[0005] Therefore, the present invention aims to provide a massage system including a massage machine in which artificial intelligence is utilized so as to enable suitable treatment depending on a timely health condition of a treatment target person.

MEANS FOR SOLVING THE PROBLEM

[0006] In order to achieve the above-described object, a massage system according to the present invention includes a massage machine that has a treatment unit for treating a treatment target person, a control unit for controlling the treatment unit, a voice input unit, and a voice output unit, and a server that is connected to the massage machine via a communication network. The massage machine transmits voice information of the treatment target person which is input from the voice input unit, to the server via the communication network. The server causes an artificial intelligence unit to determine treatment suitable for the treatment target person, based on the voice information of the treatment target person, and transmits the treatment to the massage machine. The massage machine is configured to output the transmitted treatment from the voice output unit.

[0007] "The voice information" described in the specification and claims includes voice information (feelings which can be determined from accents, a voice tone, conversation speed, or a time needed to answer to a question), and utterance information (worrying sites or answer content to a question) of the treatment target person. In addition, "the treatment determination performed by the artificial intelligence unit" can include "automatic selection of a treatment course", "strength of the automatically selected treatment course", "advice on health", and "site to be intensively treated".

[0008] According to this configuration, if the treatment target person inputs the voice information to the massage machine, the voice information is transmitted to the server via the communication network, and the artificial intelligence unit in the server determines suitable treatment, based on the input voice information of the treatment target person. For example, in a case where information on "a stiff site" of the treatment target person is obtained from the voice information, it is possible to determine that a course for intensively treating the site is suitable for the treatment target person.

[0009] Then, the treatment determined by the artificial intelligence unit is notified to the treatment target person via the communication network. Accordingly, the treatment target person recognizes the treatment determined by the artificial intelligence unit, based on his or her own voice information, thereby enabling the treatment target person to determine whether or not to perform the treatment.

[0010] In addition, the massage machine may include a physical information acquisition unit that acquires physical information relating to the treatment target person. The control unit may transmit the physical information of the treatment target person which is acquired by the physical information acquisition unit, to the server via the communication network. The server may be configured to determine treatment suitable for the treatment target person by causing the artificial intelligence unit to consider the physical information of the treatment target person in addition to the voice information of the treatment target person.

[0011] "The physical information acquisition unit" described in the specification and claims includes a sphygmomanometer, a body composition meter, and a stress index measurement instrument. In addition, "the physical information" includes "pulse rate", "body weight", "body

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fat percentage", and "stress index". As the physical information, information obtained before the treatment target person starts treatment (massage) is transmitted.

[0012] According to this configuration, the artificial intelligence unit can comprehensively determine the treatment suitable for the treatment target person from the information in which the physical information is considered in addition to the voice information of the treatment target person.

[0013] In addition, at least any one of the massage machine and the server may include an information storage unit that stores personal information of the treatment target person.

[0014] "The personal information of the treatment target person" described in the specification and claims can include "age", "weight", "height", and "gender". The personal information can include the physical information relating to the treatment target person. "The information storage unit" can be a partial region in the storage unit of the massage machine, or a partial region in the storage unit of the server. For example, the information relating to the treatment target person is accumulated in the server, and the suitable treatment is determined by the artificial intelligence unit, based on the information and the voice information input by the treatment target person. In this manner, the artificial intelligence unit can determine the treatment suitable for the treatment target person, based on the voice information at that time and the accumulated information. If the physical information of the treatment target person is stored in the storage unit in advance, it is possible to determine the treatment suitable for the treatment target person by considering the physical information in the past and a change in the physical information at that time.

[0015] According to this configuration, the artificial intelligence unit can comprehensively determine the treatment suitable for the treatment target person from the voice information input by the treatment target person and the personal information stored in the information storage unit. For example, even if the same voice information is obtained from different treatment target persons, the treatment suitable for the treatment target person can be determined in accordance with the personal information (age or gender) of each treatment target person. In addition, it is possible to determine the treatment suitable for the treatment target person by considering an environment (time zone or season).

[0016] In addition, the artificial intelligence unit may extract information relating to the treatment of the treatment target person from the voice information of the treatment target person. The artificial intelligence unit may be configured to determine the treatment suitable for the treatment target person by considering the information relating to the treatment of the treatment target person.

[0017] "The information relating to the treatment of the treatment target person" described in the specification and claims includes extracting information of the "neck", the "shoulder", the "back", the "waist, the "leg", and the "foot", as a treatment-requiring site from the voice information. For example, the above-described site can be extracted as the treatment-requiring site from the voice information such as "My shoulder is stiff' and "My leg is tired".

[0018] According to this configuration, the artificial intelligence unit can determine the treatment suitable for the treatment-requiring site in the treatment target person at that time, from the information relating to the treatment of the treatment target person.

[0019] In addition, the artificial intelligence unit may determine feelings of the treatment target person, based on the voice information of the treatment target person, and may be configured to determine the treatment suitable for the treatment target person by considering information of the feelings. "The feelings of the treatment target person" described in the specification and claims includes feelings determined from keywords such as "hot", "cold", and "annoyed" of the voice information.

[0020] According to this configuration, the feelings can be determined from the voice information of the treatment target person, and the treatment suitable for the treatment target person can be notified to the treatment target person by considering the feelings. For example, treatment for stimulating an acupuncture point which can ease the feelings can be included in the treatment suitable for the treatment target person. The "acupuncture point" described in the specification and claims represents a so-called "pressure point".

[0021] In addition, the artificial intelligence unit may be configured to determine the treatment suitable for the treatment target person by determining activity information of the treatment target person from the voice information of the treatment target person and by considering the activity information. "The activity information of the treatment target person" described in the specification and claims represents information on that day (what kind of life activities), and can include "all day, standing work", "all day, outside work", and "all day, desk work".

[0022] According to this configuration, the activity information of the treatment target person is considered so as to determine a type or a site of the treatment. In this manner, it is possible to notify the treatment target person of the treatment suitable for the treatment target person. For example, in a case where the treatment target person carries out the standing work and the outside work, the treatment target person can be recommended to receive the intensive treatment for the legs, or in a case where the treatment target person carries out desk work, the treatment target person can be recommended to receive intensive treatment for the waist.

[0023] In addition, the artificial intelligence unit may determine information relating to a body of the treatment target person from the voice information of the treatment target person, and may be configured to determine the treatment suitable for the treatment target person by considering the information relating to the body. "The information relating to the body of the treatment target person"

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described in the specification and claims includes information (keywords) such as "I have a backache", "My shoulder is stiff', and "I am in a slightly bad condition". In a case where the physical condition of the treatment target person is stored, even if the information (keywords) obtained from the voice information on the day is the same as that obtained the previous day, it is possible to determine that the treatment target person needs the treatment which is different from that of the previous day, based on the information relating to the body on the day. In addition, it is possible to change the question content, the answer content, and the answer action (treatment) which are given from the artificial intelligence unit to the treatment target person.

[0024] According to this configuration, depending on a state of the body of the treatment target person, the content of the treatment can be determined. For example, in a case of "I have a backache", the treatment target person feels back pain. Accordingly, the treatment strength for the waist can be weakened. In a case of "My shoulder is stiff', the treatment target person can be recommended to receive an intensive shoulder treatment course.

[0025] In addition, the massage machine may include an imaging unit that images a face of the treatment target person. The artificial intelligence unit may perform determination based on a Visual diagnosis method from the face of the treatment target person which is imaged by the imaging unit, and is configured to determine the treatment suitable for the treatment target person by considering the determination based on the Visual diagnosis method in addition to the determination based on the voice information of the treatment target person. As "the imaging unit" described in the specification and claims, it is possible to utilize those which can capture an image so that facial expressions or facial colors of the treatment target person can be recognized, such as a camera. The Visual diagnosis method is a diagnostic method for diagnosing a health condition by observing the body or the face.

[0026] According to this configuration, based on the imaging data of the face of the treatment target person, the treatment suitable for the treatment target person can be determined by considering the diagnosis using the Visual diagnosis method (diagnosing feelings or the health condition from facial expressions and facial colors).

[0027] In addition, at least any one of the massage machine and the server may cause a history storage unit to store a usage history including the treatment determined based on the voice information of the treatment target person. The artificial intelligence unit may be configured to determine the treatment suitable for the treatment target person by considering the usage history stored in the history storage unit in addition to new voice information of the treatment target person. "The usage history" described in the specification and claims can include "used date and time", "used period of time", "used time zone", "used course", and "physical condition".

[0028] According to this configuration, the determination using the artificial intelligence unit can be made by considering the usage history including the determination in the past and the treatment selected by the treatment target person.

[0029] In addition, the artificial intelligence unit may ask the treatment target person a question or may answer a question from the treatment target person. In a case where the artificial intelligence unit obtains an answer to the question from the treatment target person, the artificial intelligence unit may be configured to determine the treatment suitable for the treatment target person from a plurality of answers by obtaining a new answer from the treatment target person after asking a question relating to the obtained answer. "The question to the treatment target person from the artificial intelligence unit or the answer to the question from the treatment target person" described in the specification and claims includes conversational questions and answers which are exchanged multiple times. For example, in a case where the artificial intelligence unit asks the treatment target person a question, the artificial intelligence unit can ask the treatment target person the following questions, for example, such as "Do you have any painful site on your body recently?", "Do you have any stiff site?", "How is your physical condition today?", "Do you feel tired?", and "How do you feel today?". Then, in a case where the treatment target person answers to the questions, for example, in a case where the answer is "I have a backache", the treatment target person feels back pain. Accordingly, the treatment strength for the waist can be weakened. In a case where the answer is "My shoulder is stiff', the treatment target person can be recommended to receive an intensive shoulder treatment course. In a case where the answer is "I am in a slightly bad condition", it is possible to confirm detailed content of the bad condition. In addition, in a case where no answer is heard, it is possible to ask the question again. If the meaning of the answer content cannot be recognized, it is possible to ask the meaning again, such as "What do you mean?" In a case where the artificial intelligence unit asks the treatment target person a question, it is possible to guide the answer content of the treatment target person so as to hear information for determining the suitable treatment.

[0030] On the other hand, for example, in a case where the treatment target person answers to the questions from the artificial intelligence unit, the treatment target person can answer to the questions (utterances) from the artificial intelligence unit, such as "I feel tired on my leg today", "I think my back is tired today", and "My shoulder is stiff today". Then, for example, in a case of the answer such as "I feel tired on my leg today", the artificial intelligence unit can respond to the answer, such as "Then, you are recommended to receive an intensive leg treatment course. What's your opinion?" In a case of an ambiguous answer such as "I think my back is tired today", in order to obtain further detailed information, the artificial intelligence unit can ask the treatment target per-

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son a question such as "How do you feel your back now?" In this manner, the detailed content can be heard from the treatment target person.

[0031] According to this configuration, the conversation relating to the treatment can be exchanged between the treatment target person and the artificial intelligence unit. The artificial intelligence unit extracts and collects the information relating to the treatment from the content of the conversation exchanged between the treatment target person and the artificial intelligence unit. In this manner, the treatment suitable for the treatment target person at that time can be determined so as to notify the treatment target person of the suitable treatment.

[0032] In addition, the artificial intelligence unit may exchange a casual conversation with the treatment target person, and may be configured to determine the treatment suitable for the treatment target person from the content of the conversation. "The casual conversation" described in the specification and claims can include the conversation such as the casual conversation about the news of the day, the weather of the day, and memorized family members, or chatting. For example, the casual conversation is exchanged between the artificial intelligence unit and the treatment target person, thereby enabling the treatment target person to relaxedly receive the treatment. For example, the content of the conversation can include "It's hot today", or "It's raining today". Then, the artificial intelligence unit can determine the treatment suitable for the treatment target person at that time by determining the health condition of the treatment target person from the content of the conversation with the treatment target person or the voice tone of the treatment target person.

[0033] According to this configuration, the artificial intelligence unit can notify the treatment target person of the suitable treatment by properly determining the treatment suitable for the treatment target person at that time from the content of the conversation exchanged between the treatment target person and the artificial intelligence unit. In addition, the conversation such as chatting is exchanged therebetween during the treatment, thereby enabling the treatment target person to feel as if he or she is treated by a massage master. Accordingly, the treatment target person can more relaxedly receive the treatment.

[0034] In addition, the artificial intelligence unit may confirm the treatment of the massage machine from the voice output unit while the treatment target person is treated. The artificial intelligence unit may determine whether or not to change an operation of the massage machine, based on the answer of the treatment target person which is input from the voice input unit. In a case where the artificial intelligence unit determines that the operation of the massage machine needs to be changed, the artificial intelligence unit may be configured to notify the treatment target person of the determined change result from the voice output unit of the massage machine. "The confirmation of the treatment of the massage machine from the voice output unit while the treatment target person is treated" and "the change of the operation of the massage machine" described in the specification and claims include the following cases, for example. The artificial intelligence unit asks the treatment target person a question for reconfirmation, such as "Doesn't massage hurt your back?" If there is an answer such as "It hurts me a little bit" from the treatment target person, a signal indicating a change result of weakening the treatment of the waist is transmitted to the massage machine, thereby performing an operation for weakening the treatment of the waist. In addition, for example, the case includes reconfirmation such as "How do you feel about shoulder massage?" and "How about the strength?", and adjusting the strength of the shoulder treatment based on the answer of the question. In addition, the case includes a change in the operation of the massage machine in response to the answer of the treatment target person after the suitable treatment can be confirmed by the conversation exchanged between the artificial intelligence unit and the treatment target person. The change in the operation of the massage machine can start, based on the conversation such as "It hurts me a little bit" from the treatment target person side. In a case where the confirmation such as "Good feeling" is obtained, the treatment is continued without any change. This operation is included in the above-described case.

[0035] According to this configuration, based on the content of the conversation exchanged between the treatment target person and the artificial intelligence unit during the treatment, the artificial intelligence unit can properly determine the treatment suitable for the treatment target person during the treatment, and can determine whether or not to change the treatment operation.

[0036] In addition, the massage machine may be a chair-type massage machine that has at least a seat unit on which the treatment target person sits, and a backrest unit that supports an upper body of the treatment target person sitting on the seat unit from behind. The control unit may be configured to adjust an angle of at least the backrest unit to a suitable angle, based on the determination of the artificial intelligence unit.

[0037] According to this configuration, in the chair-type massage machine, based on the determination of the artificial intelligence unit, the control unit adjusts the angle of the backrest unit, thereby enabling the treatment target person to receive the suitable treatment. For example, in a case where the treatment target person has a poor health condition or feels uncomfortable, it is possible to reduce the angle of tilting the backrest unit. In addition to the angle adjustment of the backrest unit, the respective treatment units can be additionally adjusted.

ADVANTAGE OF THE INVENTION

[0038] According to the present invention, the artificial intelligence unit determines the health condition of the treatment target person, based on the voice information

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of the treatment target person, and can notify the treatment target person of the suitable treatment by determining the treatment suitable for the treatment target person at that time. Therefore, the treatment target person can receive the suitable treatment depending on the health condition at that time.

BRIEF DESRIPTION OF THE DRAWINGS

[0039]

Fig. 1 is a block diagram illustrating a configuration of a massage system including a massage machine according to an embodiment of the present invention.

Fig. 2 is an overall configuration diagram of the massage system including the massage machine illustrated in Fig. 1.

Fig. 3 is a perspective view of the massage machine illustrated in Fig. 2.

Fig. 4 is a functional block diagram of the massage machine illustrated in Fig. 3.

BEST MODE FOR CARRYING OUT THE INVENTION

[0040] Hereinafter, an embodiment according to the present invention will be described with reference to the drawings. In the following embodiment, an example will be described in which a massage machine 10 and a cloud-type server 50 are connected to each other via a communication network 3. It is assumed that the concept of back, forth, right, and left directions in the specification and claims coincides with the concept of the directions which are viewed from a treatment target person when the treatment target person sits on a seat unit 11 of the massage machine 10 illustrated in Fig. 3.

Configuration of Massage System

[0041] Fig. 1 is a block diagram illustrating a configuration of a massage system 1 including the massage machine 10 according to an embodiment, and Fig. 2 is an overall configuration diagram of the massage system 1 including the massage machine 10 illustrated in Fig. 1. The massage system 1 including the massage machine 10 according to the present embodiment includes a plurality (three) of the massage machines 10 for treating the treatment target person, the communication network 3, and the server 50. The server 50 is connected to the massage machine 10 so as to enable communication therebetween via the communication network 3.

[0042] The above-described massage machine 10 has the seat unit 11 on which the treatment target person sits, and a backrest unit 12 for supporting an upper body of the treatment target person sitting on the seat unit 11 from behind. The seat unit 11 has an arm rest 13 at right and left positions, and has a foot rest 14 in a front portion of the seat unit 11. In this example, only a treatment unit (roller unit) 15 of the backrest unit 12 is illustrated. A treatment unit such as an air bag (not illustrated) is included in other places. In addition, an operation device 20 for operating the massage machine 10 is included in the place of the arm rest 13 on the right side. The operation device 20 according to the present embodiment is a tablet-type operation device, and has a screen 21 operated by the treatment target person, a voice input unit (microphone) 22, and a voice output unit (speaker) 23.

[0043] Furthermore, the massage machine 10 according to the present embodiment includes a terminal 40 in addition to the above-described operation device 20. As the terminal 40, it is possible to use a terminal such as a smartphone and a tablet. It is possible to use those which include the voice input unit (microphone) 22 and the voice output unit (speaker) 23. The terminal 40 can communicate with the massage machine 10 via wireless communication (Bluetooth (registered trademark)) 2. The terminal 40 may be connected to the massage machine 10 by using other forms of wireless or wired communication.

[0044] In addition, the massage machine 10 according to the present embodiment includes a measurement unit 30 as a physical information acquisition unit which obtains physical information relating to the treatment target person. As the measurement unit 30, the massage machine 10 includes a sphygmomanometer 31 and a body composition meter 32 which are configured to be separate from the massage machine 10. The sphygmomanometer 31 and the body composition meter 32 can communicate with the massage machine 10 through the wireless communication (Bluetooth (registered trademark)) 2. The measurement unit 30 may be connected to the massage machine 10 by using other forms of wireless or wired communication. In addition, the measurement unit 30 may be incorporated in the massage machine 10. In Fig. 2, the terminal 40, the sphygmomanometer 31, and the body composition meter 32 are illustrated in one of the massage machines 10. However, all of the massage machines 10 can include these configurations.

[0045] Then, the above-described server 50 is provided with an artificial intelligence unit 51. The artificial intelligence unit 51 is configured to include a computer provided with artificial intelligence. The artificial intelligence unit 51 has a function to understand utterance content of from voice information of the treatment target person ("the voice information" described in the specification and claims includes "utterance information", and the "utterance information" includes "the utterance content"). The understanding of the utterance content by the artificial intelligence unit 51 includes understanding of natural languages. The artificial intelligence unit 51 has a learning function to accumulate information understood from the utterance content in the information storage unit 52 and to utilize the information when the artificial intelligence unit 51 performs new determination.

[0046] In addition, according to the present embodiment, it is possible to utilize information of the utterance content obtained from three massage machines 10. The

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artificial intelligence unit 51 can utilize big data accumulated in the server 50.

Configuration of Massage Machine

[0047] Fig. 3 is a perspective view of the massage machine 10 illustrated in Fig. 2. Fig. 4 is a functional block diagram of the massage machine 10 illustrated in Fig. 3. As illustrated in Fig. 3, the massage machine 10 includes a control unit 17 for controlling the treatment unit such as the seat unit 11, the backrest unit 12, the arm rest 13, and the foot rest 14. The control unit 17 can operate a plurality of treatment courses by combining the respective treatment units (including not only the treatment unit 15 but also an air bag (not illustrated)) with each other. The control unit 17 can change the content of the treatment course. In addition to the treatment course, the control unit 17 can operate only a portion of the treatment content. The control unit 17 controls strength of an operation performed by the treatment unit 15 and a tilting angle of the backrest unit 12.

[0048] As illustrated in Fig. 4, the control unit 17 is connected to a storage unit 16 which stores a plurality of the treatment courses having mutually different treatment content used by the treatment unit 15. The storage unit 16 can also function as any one or both of an information storage unit 52 and a history storage unit (to be described later). For example, the control unit 17 has a CPU, a ROM, and a RAM. For example, as the storage unit 16, a flash memory or a hard disk drive can be used. In addition, the operation device 20 according to the present embodiment is provided with the voice input unit 22, the voice output unit 23, and a camera 24 serving as an imaging unit. The camera 24 may include the terminal 40.

Determination of Basic Treatment in Massage System

[0049] Hereinafter, determination of the treatment using the above-described massage system 1 will be described. In the following description, the above-described reference numerals will be given to the above-described configurations.

[0050] According to the above-described massage system 1, as described below, the conversation is exchanged between the treatment target person and the artificial intelligence unit 51, thereby causing the artificial intelligence unit 51 to determine the treatment suitable for the treatment target person. In the following example, an example in which the treatment target person first starts the conversation will be mainly described. However, the treatment target person turns on power of the massage machine 10, and the control unit 17 is connected to the artificial intelligence unit 51 via the communication network 3. In this way, the artificial intelligence unit 51 may first start the conversation.

[0051] If the treatment target person talks (inputs a voice) to the voice input unit 22 of the massage machine 10, the voice information is transmitted to the server 50 via the communication network 3. The artificial intelligence unit 51 of the server 50 understands the utterance content from the voice information of the treatment target person. The utterance content can be understood by the artificial intelligence unit 51 together with the voice information (feelings which can be determined from accents, a voice tone, or conversation speed), and the utterance information (concerns or the content relating to the treatment) of the treatment target person.

[0052] Then, the artificial intelligence unit 51 determines the treatment suitable for the treatment target person, based on the voice information. The treatment suitable for the treatment target person is treatment suitable for the health condition, the physical information, o the feelings of the treatment target person. The suitable treatment includes the determination of the treatment course suitable for the treatment target person at that time in the massage machine 10, and the determination in a state where the treatment strength of the treatment unit 15 and the angle of the backrest unit 12 are suitably arranged. As the determination of the treatment suitable for the treatment target person, the artificial intelligence unit 51 extracts a plurality of keywords from the content of the conversation with the treatment target person and the utterance content of the treatment target person. In this manner, the treatment course suitable for the treatment target person can be determined. For example, in a case where the information such as "stiff site" of the treatment target person is obtained from the voice information, it is possible to determine that the treatment course mainly for the site is suitable for the treatment target person. In a case where the information such as the treatment target person is "tired" from the voice information, it is possible to determine that the treatment course for weakening treatment is suitable for the treatment target person. In the determination of the artificial intelligence unit 51, the artificial intelligence unit 51 extracts a plurality of the keywords from the content of the conversation, and the answer may vary depending on the content, in some cases. "The determination of the artificial intelligence unit" can include "automatically selected course", "strength of the automatically selected course", "advice on health", and "site to be intensively treated".

[0053] In this way, according to the above-described massage system 1, if the treatment target person inputs the voice information to the massage machine 10, the voice information is transmitted to the server 50 via the communication network 3. In the server 50, the treatment suitable for the treatment target person is determined by the artificial intelligence unit 51.

[0054] Then, the artificial intelligence unit 51 transmits the determined treatment course to the massage machine 10 via the communication network 3. The massage machine 10 outputs the determination result such as the treatment course transmitted from the artificial intelligence unit 51 from the voice output unit 23, and notifies the treatment target person of the determination result. Based on the voice information input by himself or herself,

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the treatment target person recognizes the treatment course determined by the artificial intelligence unit 51, and can determine whether or not to receive the treatment course.

[0055] In addition, the treatment target person can vocally respond to the recognized determination of the artificial intelligence unit 51. In this manner, the treatment target person can vocally conversate with the artificial intelligence unit 51 with regard to the treatment. That is, the treatment target person can conversate with the artificial intelligence unit 51 with regard to the treatment as if he or she talks with a person. Based on the information obtained from the conversation, the artificial intelligence unit 51 determines the treatment suitable for the treatment target person, and can notify the treatment target person of the suitable treatment.

[0056] Furthermore, in a case where the massage system 1 is provided with the chair-type massage machine 10 (embodiment illustrated in Fig. 2), the artificial intelligence unit 51 determines the health condition of the treatment target person, and can transmits an angle signal for tilting the backrest unit 12 to the chair-type massage machine 10 in response to the physical condition of the treatment target person. Then, the control unit 17 of the massage machine 10 adjusts the angle of the backrest unit 12 to a suitable angle, based on the signal from the artificial intelligence unit 51. That is, for example, in a case where the artificial intelligence unit 51 determines the health condition of the treatment target person as described later and determines that the physical condition is not good, a signal for decreasing the angle for tilting the backrest unit 12 can be transmitted to the massage machine. Therefore, depending on the physical condition of the treatment target person, the control unit 17 adjusts the angle of the backrest unit 12, based on the determination of the artificial intelligence unit 51, and the treatment target person can receive the suitable treatment. In this example, the angle adjustment of the backrest unit 12 has been described. Alternatively, a control signal is transmitted from the artificial intelligence unit 51 to the control unit 17. In this manner, it is possible to adjust the strength or the treatment time of the respective treatment units.

Determination Example of Another Treatment in Massage System

[0057] In the massage system 1 according to the above-described embodiment, as illustrated in Fig. 2, the sphygmomanometer 31 and the body composition meter 32 are connected to the massage machine 10 as the measurement unit 30. Therefore, the massage machine 10 obtains the physical information such as "blood pressure value", "pulse rate", "weight", and "body fat rate" of the treatment target person from the measurement unit 30, and the massage machine 10 can transmit the physical information to the server 50 via the communication network 3. The physical information is transmitted before the treatment target person is treated. The physical information relating to the treatment target person can be previously stored in the information storage unit 52 of the server 50. In addition, if there is provided a stress index measurement instrument serving as the physical information acquisition unit, it is possible to obtain the "the stress index" of the treatment target person at that time. In this way, the artificial intelligence unit 51 can comprehensively determine the treatment suitable for the treatment target person by considering the physical information of the treatment target person in addition to the voice information of the treatment target person.

[0058] In addition, at least one of the storage unit 16 of the massage machine 10 and the information storage unit 52 of the server 50 can previously store each personal information relating to the treatment target persons who utilize the respective massage machines 10. The personal information can include "age", "weight", "height", and "gender" of each treatment target person. The personal information may be stored in at least either the massage machine 10 or the server 50. The information relating to the treatment target person is stored in the storage unit 16 or the information storage unit 52. In this manner, when the artificial intelligence unit 51 determines the treatment suitable for the treatment target person, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person, based on the voice information of the treatment target person at that time and the stored information.

[0059] For example, in a case where the artificial intelligence unit 51 obtains the information indicating that the treatment target person is an elderly person, based on the information of "age", the artificial intelligence unit 51 can ask the treatment target person a question such as "Do you want to weaken the treatment strength?" Depending on the age of the treatment target person, the artificial intelligence unit 51 can adjust the strength of the treatment course, such as usual treatment intensity and weak treatment strength. In addition, the artificial intelligence unit 51 can give an advice on health corresponding to the age. In addition, the artificial intelligence unit 51 can ask the treatment target person questions, based on the information of "weight", "height", and "gender".

[0060] In this way, based on the previously stored (registered) personal information and the voice information input by the treatment target person, the artificial intelligence unit 51 comprehensively determines the treatment suitable for the treatment target person, and can adjust the treatment operation to have proper content. Therefore, for example, even if the same voice information is obtained from different treatment target persons, the artificial intelligence unit 51 can determine the suitable treatment by considering the personal information (age, gender, or usage history) of each treatment target person. In addition, it is also possible to determine the suitable treatment by considering an environment (time zone or season). Therefore, if the treatment target persons utilize the massage machine 10 at mutually different

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times, even if the artificial intelligence unit 51 obtains similar keywords from the voice information, the artificial intelligence unit 51 differently determines the treatment suitable for the treatment target person.

Example of Factors for Determining Treatment Suitable for Treatment Target Person

[0061] Hereinafter, an example of factors for the artificial intelligence unit 51 to determine the treatment suitable for the treatment target person will be described. These factors serve as the information relating to the treatment of the treatment target person.

<Extraction of Treatment Information relating to Treatment Target Person>

[0062] The artificial intelligence unit 51 can extract information relating to the treatment suitable for the treatment target person at that time, based on the voice information of the treatment target person. As the information relating to the treatment of the treatment target person, the information such as "neck", "shoulder", "back", "waist", "leg", and "foot" can be extracted from on the utterance content as treatment-requiring sites. For example, in a case where the information indicating that "My waist is tired" is extracted from the utterance content of the treatment target person, the artificial intelligence unit 51 determines that the intensive treatment course for the waist is suitable for the treatment target person, and can output a voice such as "You are recommended to receive the intensive treatment course for the waist". In a case where the information indicating that "My shoulder is stiff' is extracted, it is possible to determine that the intensive treatment course for the shoulder is suitable for the treatment target person. In addition, in a case where the information indicating that "I have a backache" is extracted, the treatment target person feels back pain. Accordingly, it is possible to determine that the treatment strength for the waist needs to be weakened. In a case where the information indicating "I am in a slightly bad condition" is extracted, the artificial intelligence unit 51 confirms detailed content such as how is the bad condition, and can determine the treatment suitable for the treatment target person, based on the detailed information. In this way, the artificial intelligence unit 51 extracts the treatment-requiring site of the treatment target person at that time, and can determine the treatment suitable for the site.

<Extraction of Feelings from Voice Information>

[0063] Based on the voice information of the treatment target person, the artificial intelligence unit 51 can determine the feelings of the treatment target person. For example, the feelings can be determined by extracting keywords such as "hot", "cold", or "annoyed" from the utterance content of the treatment target person. In addition, the feelings of the treatment target person can be determined from accents, voice tones, or conversation speed of the treatment target person. Depending on the determined feelings of the treatment target person, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the information of the feelings. For example, in a case where the keyword such as "annoyed" is extracted, it is possible to recommend the treatment for stimulating an acupuncture point which can ease the feelings. In addition, it is possible to recommend the treatment target person to change the treatment intensity.

<Extraction of Activity Information>

[0064] The artificial intelligence unit 51 can determine activity information of the treatment target person, based on the voice information of the treatment target person. For example, based on the utterance content, the artificial intelligence unit 51 can determine the activity information indicating what kind of life the treatment target person has on that day. For example, the activity information such as "all day, standing work", "all day, outside work", and "all day, desk work" can be extracted. Then, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the activity information of the treatment target person in addition to the determination including a type or a site of the treatment. For example, in a case where the treatment target person carries out the standing work all day, the artificial intelligence unit 51 can determine that the legs are tired, and can recommend the treatment target person to receive the intensive treatment for the legs. In addition, in a case where the treatment target person carries out the outside work, the artificial intelligence unit 51 can determine that the legs and feet are tired, and can recommend the treatment target person to receive the intensive treatment for the legs and feet. In addition, in a case where the treatment target person carries out the desk work all day, the artificial intelligence unit 51 can determine that the waist and back are tired, and can recommend the treatment target person to receive the intensive treatment for the waist and back or the treatment for stimulating an acupuncture point which is effective for the tired waist and back.

<Extraction of Physical Information>

[0065] Based on the voice information of the treatment target person, the artificial intelligence unit 51 can determine information relating to the body of the treatment target person. The information relating to the body of the treatment target person can be determined by the artificial intelligence unit 51 extracting the information (keyword) such as "I have a backache", "My shoulder is stiff', and "I am in a slightly bad condition". Then, the information relating to the body of the treatment target person is extracted. In this manner, the artificial intelligence unit

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51 can determine the suitable treatment depending on a condition of the body of the treatment target person at that time. In addition, in a case where the physical condition of the treatment target person is stored, even if the information (keyword) obtained from the voice information on the day is the same as that of the previous day, it is possible to determine the treatment which is different from that of the previous day, based on the information relating to the body of the day. In addition, it is possible to change the question content, the answer content, and the answer action (treatment) which are given from the artificial intelligence unit 51 to the treatment target person. For example, in a case where "I have a backache", the treatment target person feels back pain. Accordingly, it is possible to recommend the treatment target person to weaken the treatment strength of the waist. In a case where "My shoulder is stiff', it is possible to recommend the treatment target person to receive the intensive treatment course for the shoulder.

<Diagnosis based on Visual Diagnosis Method>

[0066] In the massage machine 10, the operation device 20 is provided with the camera 24 for imaging the face of the treatment target person. Imaging data of the face of the treatment target person imaged by the camera 24 is transmitted from the control unit 17 to the server 50. Then, the imaging data of the face of the treatment target person which is transmitted to the server 50 is used by the artificial intelligence unit 51 so as to determine the feelings or the health condition from facial expressions and facial colors, based on a visual diagnosis method. In this manner, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the determination result of the visual diagnosis method based on the imaging data of the face of the treatment target person.

<Utilization of Usage History>

[0067] The server 50 can cause the information storage unit 52 to previously store a usage history including the treatment determined based on the voice information of the treatment target person. In the present embodiment, the information storage unit 52 also functions as a history storage unit. The usage history stored in the information storage unit 52 can include "used date and time", "used period of time", "used time zone", "used course", and "physical condition".

[0068] Then, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the usage history stored in the information storage unit 52 in addition to the new voice information of the treatment target person. For example, the artificial intelligence unit 51 can change the content of the questions using the voice output from the physical condition of the previous day to the physical condition of the day by previously storing the physical condition of the treatment target person of the previous day. Even if the keywords extracted from the voice information of the treatment target person are the same as each other, it is possible to change the answer content or the answer action. For example, even if a keyword such as "Tilt the backrest unit" is recognized from the voice information of the treatment target person, an angle for tilting the backrest unit 12 in a previous state can be changed so as to be different from the previous angle. In addition, in a case where there is an interval on the used days of the treatment target person, the artificial intelligence unit 51 can start with the conversation such as "You have not used the massage machine for a while". Depending on the used time zone, the artificial intelligence unit 51 can start with the conversation such as "You use the massage machine earlier today".

[0069] If the usage history of the treatment target person is previously stored in this way, the artificial intelligence unit 51 can perform the conversation or the determination by considering the usage history including the determination or the selected treatment in the past. In this manner, it is possible to consider preferences corresponding to the treatment target person. In addition, since the artificial intelligence unit 51 starts with the conversation based on the usage history, the treatment target person can confirm the history in the past.

<Extraction of Information relating to Treatment from Questions and Answers>

[0070] The artificial intelligence unit 51 can ask the treatment target person questions or can answer to questions from the treatment target person. In a case where the artificial intelligence unit 51 obtains the answer to the question from the treatment target person, the artificial intelligence unit 51 can continue the conversation so as to obtain a new answer by asking the treatment target person a question relating to the answer. Then, the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person, based on a plurality of answers obtained from the treatment target person.

[0071] The questions from the artificial intelligence unit to the treatment target person or the answers to the questions from the treatment target person include conversations exchanged multiple times. For example, in a case where the artificial intelligence unit 51 asks the treatment target person the questions, for example, the artificial intelligence unit 51 can ask the treatment target person the questions such as "Do you have any painful site on your body recently?", "Do you have any stiff site?", "How is your physical condition today?", "Do you feel tired?", and "How do you feel today?". Then, in a case where an answer is obtained from the treatment target person, for example, in a case where an answer such as "I have a backache" is obtained, the treatment target person feels back pain. Accordingly, it is possible to recommend the treatment target person to weaken the treatment strength of the waist. In a case where an answer such as "My

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shoulder is stiff' is obtained, it is possible to recommend the treatment target person to receive the intensive treatment course for the shoulder. In a case where an answer such as "I am in a slightly bad condition" is obtained, it is possible to confirm detailed content indicating why the treatment target person has the bad condition. In addition, in a case where the answer cannot be understood (heard), it is possible to ask the treatment target person to answer to the question one more time. If the content of the answer cannot be recognized, it is possible to ask the meaning again, such as "What do you mean?" If it is possible to recognize the meaning of the utterance content of the treatment target person after hearing the answer again, it is possible to learn the meaning. Then, it is possible to determine the treatment suitable for the treatment target person from the answer by confirming the detailed content from the answer heard again. The artificial intelligence unit 51 asks the treatment target person the question. In this manner, it is possible to guide the answer content of the treatment target person so as to hear the information for determining the treatment suitable for the treatment target person at that time.

[0072] On the other hand, in a case where the treatment target person side answers to the question, the treatment target person can answer to the question (utterance) such as "My legs are tired today", "I think my back is tired today", "My shoulder is stiff today", for example. Then, for example, in a case of the answer such as "My legs are tired today", the artificial intelligence unit 51 can reply to the answer, such as "You are recommended to receive the intensive leg treatment course for intensively treating your legs. What's your opinion?" In a case of an ambiguous answer such as "I think my back is tired today", in order to obtain further detailed information, the artificial intelligence unit 51 can ask the treatment target person a question such as "How do you feel your back now?"

[0073] The questions and answers are repeatedly exchanged between the treatment target person and the artificial intelligence unit 51 in this way. Accordingly, the artificial intelligence unit 51 can extract and collect the information relating to the treatment of the treatment target person from the content of the conversation. Based on the information, it is possible to notify the treatment target person of the suitable treatment by properly determining the treatment suitable for the treatment target person at that time.

<Extraction of Information relating to Treatment from Casual Conversation>

[0074] The artificial intelligence unit 51 exchanges a casual conversation with the treatment target person, and can determine the treatment suitable for the treatment target person, based on the content of the conversation. The casual conversation from the artificial intelligence unit 51 can include conversations such as the casual conversation about the news of the day, the weather of the day, and memorized family members, or chatting. In addition, the casual conversation is exchanged between the artificial intelligence unit 51 and the treatment target person. In this manner, the treatment target person is not bored with the conversation, and can relaxedly receive the treatment. For example, the content of the conversation can include "It was hot today" and "It will rain today, and the rainfall probability is xx%". This casual conversation is included therein. Accordingly, the treatment target person can exchange a natural conversation with the artificial intelligence unit 51. The treatment target person is not bored with the conversation with the artificial intelligence unit 51, and can relaxedly receive the treatment.

[0075] Then, the artificial intelligence unit 51 properly determines the treatment suitable for the treatment target person at that time, based on the content of the conversation with the treatment target person and the voice tone of the treatment target person, and can notify the treatment target person of the suitable treatment. In addition, the conversation is exchanged therebetween during treatment, thereby enabling the treatment target person to feel as if he or she is treated by a massage master. Accordingly, the treatment target person can relaxedly receive the treatment.

<Change of Treatment Operation from Conversation during Treatment>

[0076] The artificial intelligence unit 51 can confirm the treatment of the massage machine 10 from the voice output unit 23 while the treatment target person is treated. Then, the artificial intelligence unit 51 obtains the answer of the treatment target person from the voice input unit 22, and can determine whether or not to change the operation of the massage machine 10, based on the obtained answer. In a case where the artificial intelligence unit 51 determines to change the operation of the massage machine 10, the artificial intelligence unit 51 can notify the treatment target person of the determination result through the voice output unit 23 of the massage machine 10. Then, in a case where the treatment target person accepts the change, a control signal for changing the operation is transmitted to the control unit 17, and the operation of the treatment unit can be changed by the control unit 17.

[0077] For example, if the artificial intelligence unit 51 asks the treatment target person a confirmation question such as "Doesn't massage hurt your back?", and if there is an answer such as "It hurts me a little bit" from the treatment target person, the artificial intelligence unit 51 asks the treatment target person a question such as "Do you want to slightly weaken the waist massage?" Then, if an answer such as "Please weaken the massage" is obtained from the treatment target person, the artificial intelligence unit 51 can transmit a change signal for weakening the waist treatment to the massage machine 10. Then, the control unit 17 causes the treatment unit to

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weaken the operation performed on the waist. In a case where the confirmation such as "Good feeling" is obtained, the treatment is continued without any change. In addition, the artificial intelligence unit 51 asks the confirmation questions such as "How do you feel about shoulder massage?" and "How about the strength?" For example, if the answer is "A little strong", a voice such as "The strength will be weakened a little" is output, and the signal indicating the change result of weakening the shoulder treatment is transmitted to the massage machine 10. The treatment unit is caused to weaken the shoulder treatment by the control unit 17. In addition, the treatment can be confirmed by the conversation between the artificial intelligence unit 51 and the treatment target person. The operation of the treatment unit can be changed in response to the answer of the treatment target person. In order to change the operation of the massage machine 10, the conversation can start from the treatment target person side.

[0078] In addition, after the treatment operation is changed, it is possible to ask a condition of the treatment operation again. In a case where the answer is "Still hurting" as a result of the reconfirmation, a signal for further weakening the treatment performed by the treatment unit during the operation is transmitted to the control unit 17 of the massage machine 10. In this manner, a voice such as "The treatment will be weakened a little" is output by the control unit 17, and the treatment of the treatment unit can be further weakened.

[0079] If the conversation is exchanged in this way while the treatment target person is treated, based on the content of the conversation exchanged between the treatment target person and the artificial intelligence unit 51, the artificial intelligence unit 51 properly determines the treatment suitable for the treatment target person at that time. In this manner, the artificial intelligence unit 51 notifies the treatment target person of the suitable treatment, and can properly adjust the operation of the massage machine 10.

<Others>

[0080] In addition to factors for determining the treatment suitable for the treatment target person as described above, the artificial intelligence unit 51 can confirm whether or not the treatment content is suitable for the treatment course (the treatment content) selected by the treatment target person through the conversation. For example, with regard to the treatment course in which the treatment target person operates the operation device 20, the artificial intelligence unit 51 may ask the treatment target person a question such as "Are you satisfied with the usual treatment course today?" If the treatment target person answers to the question from the artificial intelligence unit 51 such as "Slightly weak" or "Slightly strong", the artificial intelligence unit 51 transmits a control signal suitable for the conversation to the control unit 17 of the massage machine 10. The control unit 17 can adjust the massage machine 10 so that desired treatment can be performed in the treatment course selected by the treatment target person.

[0081] The factors for determining the treatment suitable for the treatment target person by the artificial intelligence unit 51 can be combined with each other. Depending on conditions, the artificial intelligence unit 51 appropriately combines the factors with each other. In addition, the factors for determining the treatment suitable for the treatment target person by the artificial intelligence unit 51 as described above are merely examples. It is possible to add various factors thereto within the scope without impairing the gist of the present invention. The factors are not limited to the above-described examples.

Summary

[0082] As described above, according to the massage system 1 including the above-described massage machine 10, based on the conversation exchanged between the treatment target person and the artificial intelligence unit 51, the artificial intelligence unit 51 can determine the treatment suitable for the health condition of the treatment target person at that time. Accordingly, the treatment target person can recognize and receive the treatment suitable for a state of his or her mind and body when using the massage machine 10.

[0083] Therefore, depending on the physical conditions and feelings which vary every day, the treatment target person can receive the treatment suitable for himself or herself at that time in the massage machine 10.

[0084] In the above-described embodiment, the massage system 1 including the three chair-type massage machines 10 has been described as an example. However, even if the massage machine 10 is not the chair-type massage machine, massage machines having mutually different types may be mixed with each other, and the number of the massage machines is not limited to the above-described embodiment.

[0085] In addition, in the above-described embodiment, the server 50 includes the artificial intelligence unit 51. However, the artificial intelligence unit 51 may be configured to be independent of the server 50, and a configuration relating to the artificial intelligence unit 51 is not limited to the above-described embodiment.

[0086] Furthermore, the above-described embodiment shows an example, the content of the conversation exchanged between the treatment target person and the artificial intelligence unit 51 may vary due to various factors. Various conversations are available as long as the gist of the present invention is not impaired. The present invention is not limited to the above-described embodiment.

LIST OF REFERENCE NUMERALS

[0087]

Petitioner Therabody Ex-1004, 1285

1 MASSAGE SYSTEM
2 WIRELESS COMMUNICATION
3 COMMUNICATION NETWORK
10 MASSAGE MACHINE (CHAIR-TYPE MASSAGE MACHINE)
12 BACKREST UNIT
15 TREATMENT UNIT (ROLLER UNIT)
16 STORAGE UNIT
17 CONTROL UNIT
20 OPERATION DEVICE
21 SCREEN
22 VOICE INPUT UNIT
23 VOICE OUTPUT UNIT
24 CAMERA (IMAGING UNIT)
30 MEASUREMENT UNIT
31 SPHYGMOMANOMETER
32 BODY COMPOSITION METER
40 TERMINAL
50 SERVER
51 ARTIFICIAL INTELLIGENCE UNIT
52 INFORMATION STORAGE UNIT

Claims

1. A massage system including a massage machine, the massage system comprising:

   a massage machine that has a treatment unit for treating a treatment target person, a control unit for controlling the treatment unit, a voice input unit, and a voice output unit; and
   a server that is connected to the massage machine via a communication network,
   wherein the massage machine transmits voice information of the treatment target person which is input from the voice input unit, to the server via the communication network,
   wherein the server causes an artificial intelligence unit to determine treatment suitable for the treatment target person, based on the voice information of the treatment target person, and transmits the treatment to the massage machine, and
   wherein the massage machine is configured to output the transmitted treatment from the voice output unit.

2. The massage system including a massage machine according to Claim 1,
   wherein the massage machine includes a physical information acquisition unit that acquires physical information relating to the treatment target person,
   wherein the control unit transmits the physical information of the treatment target person which is acquired by the physical information acquisition unit, to the server via the communication network, and
   wherein the server is configured to determine treatment suitable for the treatment target person by causing the artificial intelligence unit to consider the physical information of the treatment target person in addition to the voice information of the treatment target person.

3. The massage system including a massage machine according to Claim 1 or 2,
   wherein at least any one of the massage machine and the server includes an information storage unit that stores personal information of the treatment target person.

4. The massage system including a massage machine according to any one of Claims 1 to 3,
   wherein the artificial intelligence unit extracts information relating to the treatment of the treatment target person from the voice information of the treatment target person, and
   wherein the artificial intelligence unit is configured to determine the treatment suitable for the treatment target person by considering the information relating to the treatment of the treatment target person.

5. The massage system including a massage machine according to any one of Claims 1 to 4,
   wherein the artificial intelligence unit determines feelings of the treatment target person, based on the voice information of the treatment target person, and is configured to determine the treatment suitable for the treatment target person by considering information of the feelings.

6. The massage system including a massage machine according to any one of Claims 1 to 5,
   wherein the artificial intelligence unit is configured to determine the treatment suitable for the treatment target person by determining activity information of the treatment target person from the voice information of the treatment target person and by considering the activity information.

7. The massage system including a massage machine according to any one of Claims 1 to 6,
   wherein the artificial intelligence unit determines information relating to a body of the treatment target person from the voice information of the treatment target person, and is configured to determine the treatment suitable for the treatment target person by considering the information relating to the body.

8. The massage system including a massage machine according to any one of Claims 1 to 7,
   wherein the massage machine includes an imaging unit that images a face of the treatment target person, and
   wherein the artificial intelligence unit performs determination based on a Visual diagnosis method from

Petitioner Therabody Ex-1004, 1286

the face of the treatment target person which is imaged by the imaging unit, and is configured to determine the treatment suitable for the treatment target person by considering the determination based on the Visual diagnosis method in addition to the determination based on the voice information of the treatment target person.

9. The massage system including a massage machine according to any one of Claims 1 to 8,
wherein at least any one of the massage machine and the server causes a history storage unit to store a usage history including the treatment determined based on the voice information of the treatment target person, and
wherein the artificial intelligence unit is configured to determine the treatment suitable for the treatment target person by considering the usage history stored in the history storage unit in addition to new voice information of the treatment target person.

10. The massage system including a massage machine according to any one of Claims 1 to 9,
wherein the artificial intelligence unit asks the treatment target person a question or answers a question from the treatment target person, and
wherein in a case where the artificial intelligence unit obtains an answer to the question from the treatment target person, the artificial intelligence unit is configured to determine the treatment suitable for the treatment target person from a plurality of answers by obtaining a new answer from the treatment target person after asking a question relating to the obtained answer.

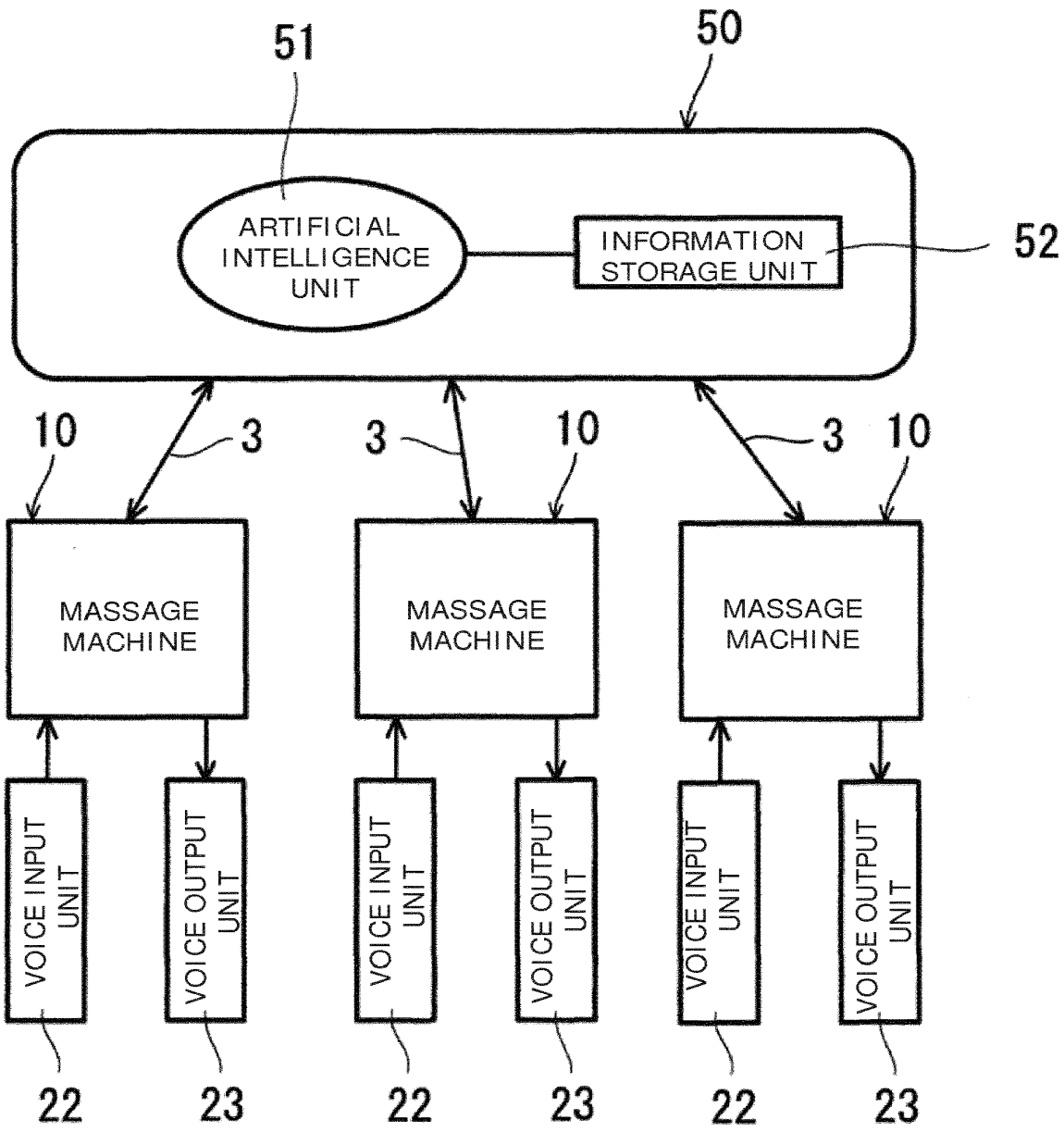
11. The massage system including a massage machine according to any one of Claims 1 to 10,
wherein the artificial intelligence unit exchanges a casual conversation with the treatment target person, and is configured to determine the treatment suitable for the treatment target person from the content of the conversation.

12. The massage system including a massage machine according to any one of Claims 1 to 11,
wherein the artificial intelligence unit confirms the treatment of the massage machine from the voice output unit while the treatment target person is treated,
wherein the artificial intelligence unit determines whether or not to change an operation of the massage machine, based on the answer of the treatment target person which is input from the voice input unit, and
wherein in a case where the artificial intelligence unit determines that the operation of the massage machine needs to be changed, the artificial intelligence unit is configured to notify the treatment target person of the determined change result from the voice output unit of the massage machine.

13. The massage system including a massage machine according to any one of Claims 1 to 12,
wherein the massage machine is a chair-type massage machine that has at least a seat unit on which the treatment target person sits, and a backrest unit that supports an upper body of the treatment target person sitting on the seat unit from behind, and
wherein the control unit is configured to adjust an angle of at least the backrest unit to a suitable angle, based on the determination of the artificial intelligence unit.

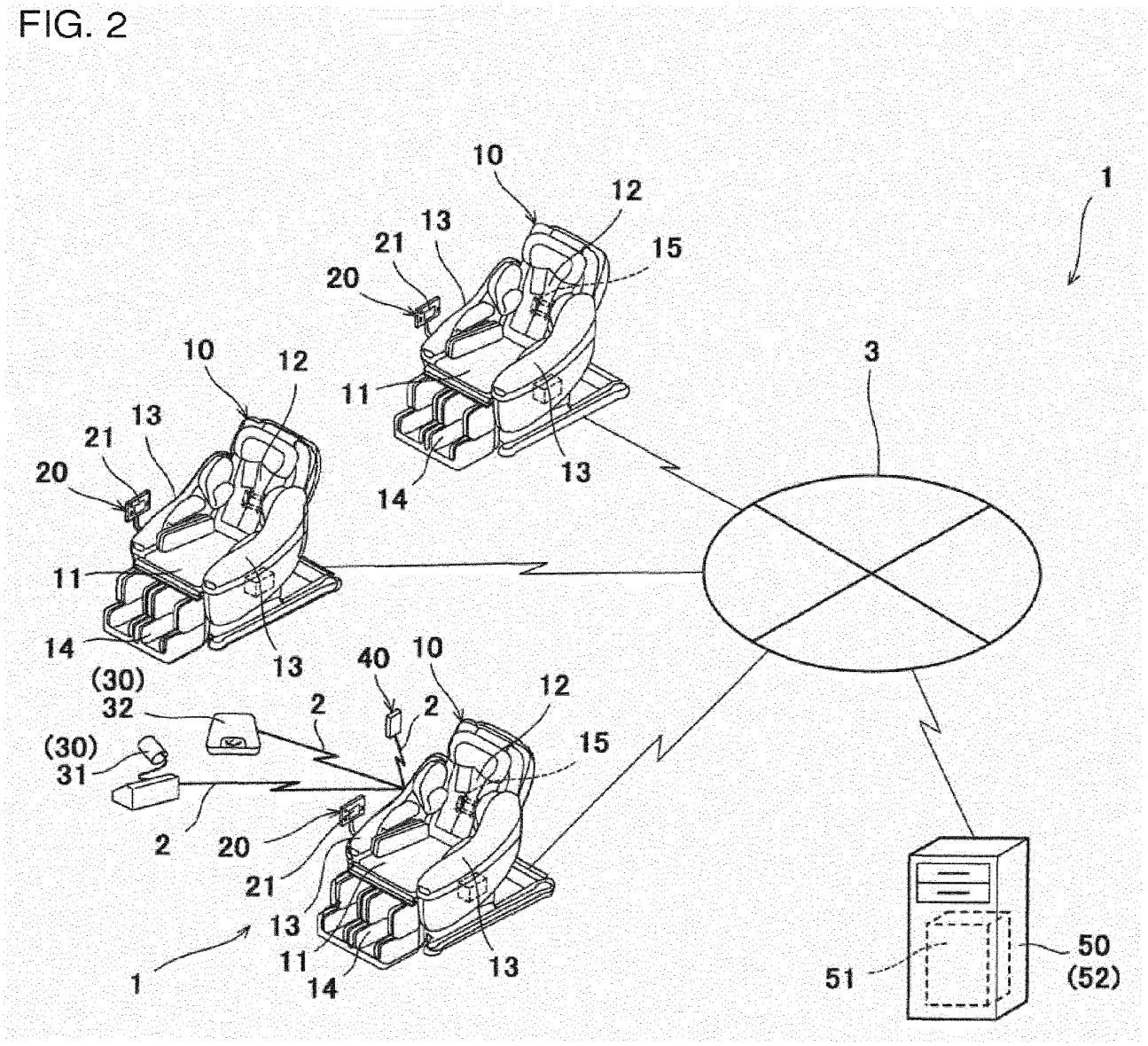
Petitioner Therabody Ex-1004, 1287

FIG. 1



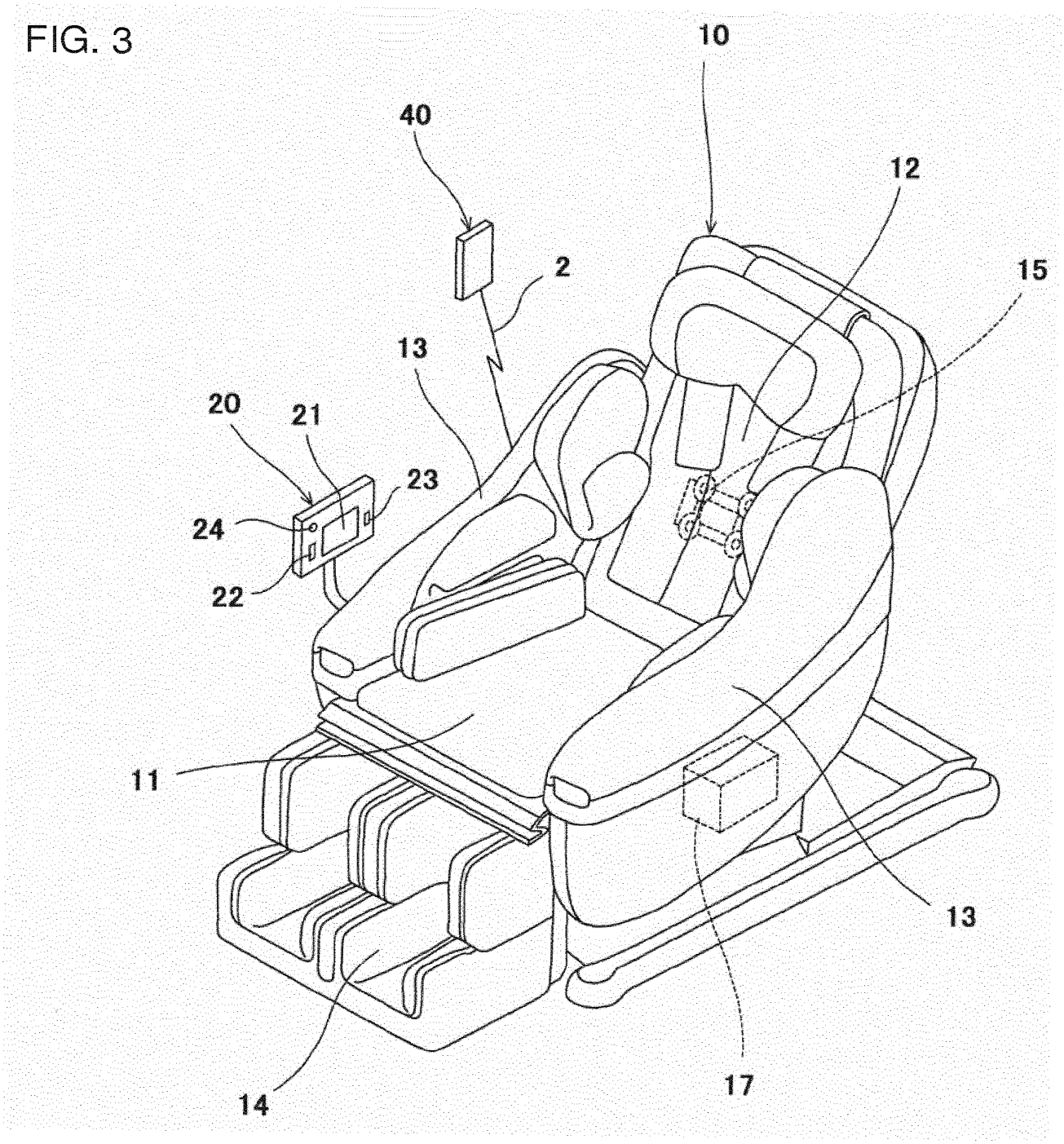
Petitioner Therabody Ex-1004, 1288

FIG. 2



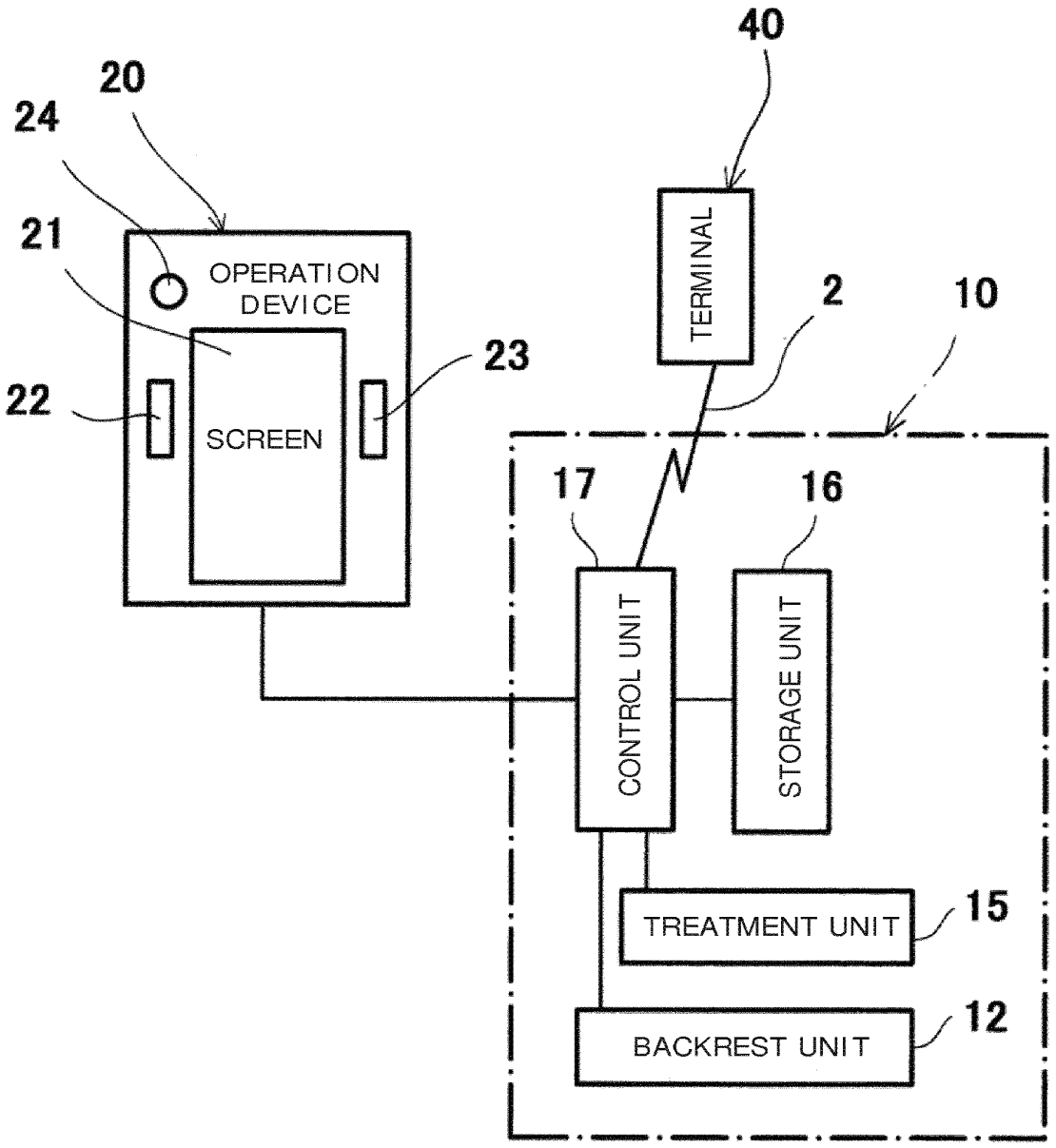
Petitioner Therabody Ex-1004, 1289

FIG. 3



Petitioner Therabody Ex-1004, 1290

FIG. 4



Petitioner Therabody Ex-1004, 1291

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 19 8974

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2002 315804 A (FAMILY KK) 29 October 2002 (2002-10-29) * abstract; figures * -----	1-13	INV. A61H7/00
X	JP 2005 334136 A (FAMILY CO LTD) 8 December 2005 (2005-12-08) * abstract; figures * -----	1-13	
X	JP 3 695066 B2 (OMRON TATEISI ELECTRONICS CO) 14 September 2005 (2005-09-14) * abstract; figures * -----	1-13	
A	HASLINA JAAFAR ET AL: "Intelligent massage chair based on blood pressure and heart rate", BIOMEDICAL ENGINEERING AND SCIENCES (IECBES), 2012 IEEE EMBS CONFERENCE ON, IEEE, 17 December 2012 (2012-12-17), pages 514-518, XP032363895, DOI: 10.1109/IECBES.2012.6498196 ISBN: 978-1-4673-1664-4 * abstract * -----	1-13	

TECHNICAL FIELDS SEARCHED (IPC)
A61H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 March 2018	Fischer, Elmar

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 19 8974

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-03-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2002315804 A	29-10-2002	JP 3694467 B2	14-09-2005
		JP 2002315804 A	29-10-2002
JP 2005334136 A	08-12-2005	NONE	
JP 3695066 B2	14-09-2005	JP 3695066 B2	14-09-2005
		JP H10337314 A	22-12-1998

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Petitioner Therabody Ex-1004, 1293

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2000070318 A **[0003]**

Petitioner Therabody Ex-1004, 1294

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
SHOUSE, Emily A.

Patterson Intellectual Property Law, PC 1600 Division Street, Suite 500 Nashville, Tennessee 37203 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	09 August 2019 (09.08.2019)
Applicant's or agent's file reference 19932-019539AWO	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2019/013769**	International filing date *(day/month/year)* **16 January 2019 (16.01.2019)**
Applicant **HYPER-ICE, INC.**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9-011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **22 months** from the priority date, the applicant may request that a supplementary international search be carried out by a different International Searching Authority, that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-481-8578	Telephone No. 82-42-481-8751

Form PCT/ISA/220 (July 2017)

Petitioner Therabody Ex-1004, 1295

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for six months(expire date : **2020.02.09**) from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT ISA Portal => PCT Status

ID : PCT international application number

PW : **MB9DQZ4K***

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

Petitioner Therabody Ex-1004, 1296

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 19932-019539AWO	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2019/013769**	International filing date *(day/month/year)* **16 January 2019 (16.01.2019)**	(Earliest) Priority Date *(day/month/year)* 12 November 2018 (12.11.2018)
Applicant **HYPER-ICE, INC.**		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **3** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **1**
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figures is to be published with the abstract.

Petitioner Therabody Ex-1004, 1297

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2019/013769

A. CLASSIFICATION OF SUBJECT MATTER

A61H 23/00(2006.01)i, A61H 23/02(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)
A61H 23/00; A61F 5/00; A61H 1/00; A61H 23/02; A61H 7/00; B05B 11/00

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: massage, device, pressure, sensor, speed, motor, battery, power, piston

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4513737 A (MABUCHI, K.) 30 April 1985 See figures 1, 2; column 2, lines 42-62 and column 5, lines 39-51 and column 6, lines 24-37; claims 1-2.	1-3,5,7-9,11-12,14-17
A		4,6,10,13,18-19
Y	US 2014-0031866 A1 (ACTIVATOR METHODS INTERNATIONAL, LTD.) 30 January 2014 See paragraphs [0037], [0049], [0056]-[0057].	1-3,5,7-9,11-12,14-17
Y	US 5656017 A (KELLER, T. S. et al.) 12 August 1997 See column 4, lines 50-59 and column 12, lines 3-10, 34-39.	5,11-12,16
Y	US 2017-0333280 A1 (ASHLEY DIANA BLACK INTERNATIONAL HOLDINGS, LLC) 23 November 2017 See paragraph [0071].	15
A	US 2018-0168913 A1 (SEDIC, F.) 21 June 2018 See the whole document.	1-19

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

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
09 August 2019 (09.08.2019)	**09 August 2019 (09.08.2019)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea
Facsimile No. +82-42-481-8578

Authorized officer
HAN, Inho
Telephone No. +82-42-481-3362

Form PCT/ISA/210 (second sheet) (January 2015)

Petitioner Therabody Ex-1004, 1298

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2019/013769

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4513737 A	30/04/1985	CA 1152842 A	30/08/1983
		DE 3048293 A1	15/10/1981
		FR 2472380 A1	03/07/1981
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		GB 2066081 A	08/07/1981
		GB 2066081 B	20/06/1984
		JP 55-129715 A	07/10/1980
		JP 56-048806 B2	18/11/1981
		JP 56-109665 A	31/08/1981
		JP 56-133823 U	09/10/1981
		JP 59-037231 Y2	15/10/1984
US 2014-0031866 A1	30/01/2014	AU 2013-292319 A1	29/01/2015
		AU 2013-292319 B2	29/06/2017
		CA 2878013 A1	23/01/2014
		EP 2874592 A1	27/05/2015
		EP 2874592 A4	16/03/2016
		US 2016-0242985 A1	25/08/2016
		US 2017-0281450 A1	05/10/2017
		US 9345633 B2	24/05/2016
		US 9687405 B2	27/06/2017
		WO 2014-015301 A1	23/01/2014
US 5656017 A	12/08/1997	US 5626615 A	06/05/1997
		US 5653733 A	05/08/1997
		US 5897510 A	27/04/1999
US 2017-0333280 A1	23/11/2017	WO 2017-193054 A1	09/11/2017
		WO 2017-193054 A9	01/03/2018
US 2018-0168913 A1	21/06/2018	CN 107913174 A	17/04/2018
		CN 208525375 U	22/02/2019

Petitioner Therabody Ex-1004, 1299

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
SHOUSE, Emily A.

Patterson Intellectual Property Law, PC 1600 Division Street, Suite 500 Nashville, Tennessee 37203 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**09 August 2019 (09.08.2019)**
Applicant's or agent's file reference 19932-019539AWO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2019/013769	**16 January 2019 (16.01.2019)**	12 November 2018 (12.11.2018)

International Patent Classification (IPC) or both national classification and IPC
A61H 23/00(2006.01)i, A61H 23/02(2006.01)i

Applicant
HYPER-ICE, INC.

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	09 August 2019 (09.08.2019)	HAN, Inho Telephone No. +82-42-481-3362

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2019/013769

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:
      ☐ in the form of an Annex C/ST.25 text file.
      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2019/013769

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	4,6,10,13,18-19	YES
	Claims	1-3,5,7-9,11-12,14-17	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 4513737 A (MABUCHI, K.) 30 April 1985
D2: US 2014-0031866 A1 (ACTIVATOR METHODS INTERNATIONAL, LTD.) 30 January 2014
D3: US 5656017 A (KELLER, T. S. et al.) 12 August 1997
D4: US 2017-0333280 A1 (ASHLEY DIANA BLACK INTERNATIONAL HOLDINGS, LLC) 23 November 2017
D5: US 2018-0168913 A1 (SEDIC, F.) 21 June 2018

I . Novelty and Inventive Step (PCT Article 33(2) and (3))

1. Claims 1-3, 5

1.1. Claims 1-3

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses a patting device for a treatment comprising: a device body(1) having a space guide(5); an actuator(4) having a rod shaft(18); a motor(20); a rotating disc(17) fixed to the motor output shaft(21); a rod(3) fitted at an end thereof to a crankshaft(19); and a patter assembly(6) connected to the actuator(4) (See figures 1, 2; column 2, lines 42-52; column 5, lines 39-51; claims 1-2).

The subject matter of claim 1 differs from that of D1 in a battery assembly and a motor controller to control a speed of the motor, wherein the motor controller has a sensor that

Continued on Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Box No. V

senses a magnitude of an electrical current flowing through the motor, the motor controller responsive to the sensed magnitude of the electrical current to display a pressure indication signal corresponding to the sensed magnitude of the electrical current.

However, the difference can be easily modified or optimized by a person skilled in the art without the exercise of inventive skill considering the disclosure of D2 in a power source(30); a control electronic assembly(100) that is operable connected to the power source(30) to provide current to the solenoid(82) to impart impulse energy; measuring a force output indirectly through the electric power applied to the solenoid; and a indicator(112) depicting results of the signal analysis as a feedback to the device operator (See paragraphs [0037], [0049], [0056]-[0057]).

Accordingly, claim 1 would have been obvious over D1 in view of D2. Therefore, claim 1 is novel, but lacks an inventive step.

The additional feature of claim 2 is easily derived from D1 in changing the patter assembly(6) (See column 6, lines 24-37).

The additional feature of claim 3 is easily derived from D1 in a rod being connected to an actuator(4) via a rod shaft(18) (See figures 1-2; column 2, lines 47-50).

Accordingly, claims 2-3 would have been obvious over D1 in view of D2. Therefore, claims 2-3 are novel, but lack an inventive step.

1.2. Claim 5

The additional feature of claim 5 is easily derived from D3 in measuring the input force and detecting the dynamic output response during excitation; a data acquisition and analysis means; and a data display means (See column 4, lines 50-59; column 12, lines 3-10, 34-39).

Accordingly, claim 5 would have been obvious over combination of D1, D2 and D3. Therefore, claim 5 is novel, but lacks an inventive step.

Continued on The Next Page

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Supplemental Box

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2. Claims 7-9, 11-12

2.1. Claims 7-9

D1, which is considered to be the closest prior art to the subject matter of claim 7, discloses a patting device for a treatment comprising:

a motor(20) which causes a motor output shaft(21) to rotate via a reduction gear, wherein a rotating disc(17) is fixed to the motor output shaft(21), a rod(3) is fitted at an end thereof to a crankshaft(19) provided on the rotating disc(17); and

a rod(3) being connected to an actuator(4) via a rod shaft(18), wherein the patter assembly(6) is connected to the actuator(4) by means of a patter connecting mechanism(12), the actuator(4) is connected to the patter slide tube(10) via the patter connecting mechanism(12), and the reciprocating motion of the actuator(4) is transmitted directly to the patter slide tube(10) (See figures 1-2; column 2, lines 42-62).

The subject matter of claim 7 differs from that of D1 in measuring an electrical current through the motor, the electrical current having a magnitude responsive to a pressure applied to the applicator head; and displaying at least one of a plurality of pressure indicators, each range of pressures corresponding to a range of current magnitudes.

However, the difference can be easily modified or optimized by a person skilled in the art without the exercise of inventive skill considering the disclosure of D2 in measuring a force output indirectly through the electric power applied to the solenoid; and an indicator(112) depicting results of the signal analysis as a feedback to the device operator (See paragraphs [0056]-[0057]).

Accordingly, claim 7 would have been obvious over D1 in view of D2. Therefore, claim 7 is novel, but lacks an inventive step.

The additional feature of claim 8 is easily derived from D1 in changing the patter assembly(6) (See column 6, lines 24-37).

The additional feature of claim 9 is easily derived from D1 in a rod being connected to an

Continued on The Next Page

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
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actuator(4) via a rod shaft(18) (See figures 1-2; column 2, lines 47-50).

Accordingly, claims 8-9 would have been obvious over D1 in view of D2. Therefore, claims 8-9 are novel, but lack an inventive step.

2.2. Claims 11-12

Concerning the additional features of claims 11-12, D3 discloses measuring the input force and detecting the dynamic output response during excitation; a data acquisition and analysis means; and a data display means (See column 4, lines 50-59; column 12, lines 3-10, 34-39). Although the remote communication device in claim 12 is not explicitly disclosed in D1-D3, said feature is considered to be something which can be easily selected by a person skilled in the art without the exercise of inventive skill.

Accordingly, claims 11-12 would have been obvious over combination of D1, D2 and D3. Therefore, claims 11-12 are novel, but lack an inventive step.

3. Claims 14-17

3.1. Claims 14, 17

D1, which is considered to be the closest prior art to the subject matter of claim 14, discloses a patting device for a treatment comprising:

a motor(20) which causes a motor output shaft(21) to rotate via a reduction gear, wherein a rotating disc(17) is fixed to the motor output shaft(21), and a rod(3) is fitted at an end thereof to a crankshaft(19) provided on the rotating disc(17); and

a rod(3) being connected to an actuator(4) via a rod shaft(18) and an actuator bearing(16), wherein the patter assembly(6) is connected to the actuator(4) by means of a patter connecting mechanism(12), the actuator(4) is connected to the patter slide tube(10) via the patter connecting mechanism(12), and the reciprocating motion of the actuator(4) is transmitted directly to the patter slide tube(10) (See figures 1-2; column 2, lines 42-62; column 6, lines 24-37).

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Supplemental Box

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The subject matter of claim 14 differs from that of D1 in a motor controller coupled to the source of electrical energy and coupled to the motor, the motor controller configured to selectively provide electrical energy to the motor to cause the motor to rotate the motor controller including a pressure indication system, the pressure indication system configured to measure a magnitude of a current flowing through the electric motor, the magnitude of the current responsive to pressure applied against the applicator head, the magnitude of the current including a plurality of current ranges, the pressure indication system including a pressure indication display having a plurality of display states, each display state corresponding to a respective one of the current ranges.

However, the difference can be easily modified or optimized by a person skilled in the art without the exercise of inventive skill considering the disclosure of D2 in a control electronic assembly(100) that is operable connected to the power source(30) to provide current to the solenoid(82) to impart impulse energy; measuring a force output indirectly through the electric power applied to the solenoid; and an indicator(112) depicting results of the signal analysis as a feedback to the device operator (See paragraphs [0049], [0056]-[0057]).

Accordingly, claim 14 would have been obvious over D1 in view of D2. Therefore, claim 14 is novel, but lacks an inventive step.

The additional feature of claim 17 is easily derived from D1 in a rod being connected to an actuator(4) via a rod shaft(18) (See figures 1-2; column 2, lines 47-50).

Accordingly, claim 17 would have been obvious over D1 in view of D2. Therefore, claim 17 is novel, but lacks an inventive step.

3.2. Claim 15

The additional feature of claim 15 is easily derived from D4 in a pressure sensor which generates a desired pressure signal to cause a device to generate a light (via one or more LED that may include different colors, such as red, yellow, green) depending on the pressure ranges (See paragraph [0071]).

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Supplemental Box

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Continuation of : Previous Page

Accordingly, claim 15 would have been obvious over combination of D1, D2 and D4. Therefore, claim 15 is novel, but lacks an inventive step.

3.3. Claim 16

The additional feature of claim 16 is easily derived from D3 in measuring the input force and detecting the dynamic output response during excitation; a data acquisition and analysis means; and a data display means (See column 4, lines 50-59; column 12, lines 3-10, 34-39).

Accordingly, claim 16 would have been obvious over combination of D1, D2 and D3. Therefore, claim 16 is novel, but lacks an inventive step.

4. Claims 4, 6, 10, 13, 18-19

The additional features of claims 4, 6, 10, 13, 18-19 differ from the feature of the prior art documents. And these are not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claims 4, 6, 10, 13, 18-19 are novel and involve an inventive step.

Ⅱ. Industrial Applicability (PCT Article 33(4))

Claims 1-19 are industrially applicable.

※note:
The word 'to the motor cause' in claim 14 is considered to be a writing error for 'to the motor to cause'.

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Espacenet

Bibliographic data: EP0158870 (A1) — 1985-10-23

Toothbrush.

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Applicant(s): BLENDAX WERKE SCHNEIDER CO [DE] ± (BLENDAX-WERKE R. SCHNEIDER GMBH & CO)

Classification: - international: ***A46B13/02; A46B15/00; A61C17/22; A61C17/34;*** (IPC1-7): A46B13/02; A46B15/00

- cooperative: **A46B15/0002 (EP); A46B15/0012 (EP); A46B15/0038 (EP); A61C17/22 (EP); A61C17/221 (EP); A61C17/3418 (EP);** A46B2200/1066 (EP); A61C2204/002 (EP)

Application number: EP19850103456 19850323
Global Dossier

Priority number(s): DE19843414623 19840418

Also published as: EP0158870 (B1) AT33919 (T) DE3414623 (C1) JPS6122812 (A) US4698869 (A)

Abstract of EP0158870 (A1)

Die Erfindung betrifft eine Zahnbürste, insbesondere eine Elektrozahnbürste, die mit einer Vorrichtung zur

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Ermittlung und Anzeige des optimalen Anpressdrucks gekoppelt ist.

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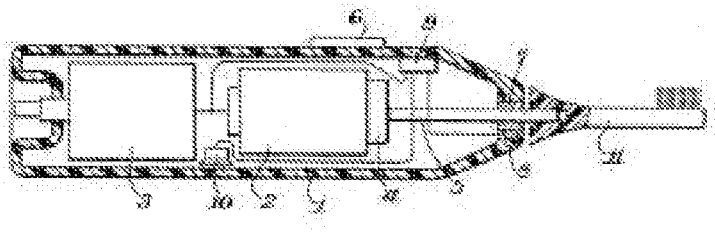
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ABSTRACT EP0158870A1

[0001]

The invention relates to a toothbrush, in particular an electric toothbrush, which is coupled to a device for determining and displaying the optimum contact pressure.



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DESCRIPTION EP0158870A1

[0001]

The present invention relates to a toothbrush, in particular an electrically driven toothbrush, which allows the user to determine and maintain the correct contact pressure of the brush when cleaning teeth. An essential criterion for the optimal function of a toothbrush, in particular an electric toothbrush, is maintaining the correct contact pressure during use. If the contact pressure is too low, there is insufficient cleaning. On the other hand, if the pressure is too high, the gums are irritated, which can lead to gum bleeding and, under certain circumstances, even to receding gums and exposure of the tooth necks over a longer period of time. It is therefore an essential requirement for the usefulness of tooth brushing, particularly when using an electric toothbrush, that the correct contact pressure is used for brushing.

[0002]

The present invention is therefore based on the task of creating a toothbrush that allows the user to set the appropriate contact pressure when operating the brush and to maintain it while brushing the teeth.

[0003]

The solution to this problem consists in providing a toothbrush, preferably one with an electric drive of a construction known per se, with a device for optically or acoustically displaying the optimum contact pressure while brushing the teeth.

[0004]

In the case of an electric toothbrush, this requirement is met by the fact that a pressure sensor is attached to the axle bearing provided for accommodating the brush shaft, which absorbs the contact pressure acting on the brush attachment and which is connected to a microprocessor in which a target pressure value is stored, which corresponds to the is compared to the actual pressure value effective on the brush, the microprocessor being coupled to a signal generator in such a way that a perceptible signal is triggered when the stored target contact pressure value is exceeded or fallen below.

[0005]

If it is a manual toothbrush, the pressure is measured by strain gauges, which are also coupled to a microprocessor.

Here it is possible and also sensible to design the pressure measuring and signaling device in such a way that it can be used for a large number of manual toothbrushes, ie can be reused or reused when replacing the toothbrush.

[0006]

An electric toothbrush is already known from DE-PS 3 117 160, which should allow the user to control the tooth brushing time.

This is done in that this toothbrush is equipped with a timer that monitors the duration of toothbrushing, which is activated when the toothbrush is handled, and a display element, the timer, controlled by a load measuring device, only running during the operating time in which a predetermined Load is applied to the bristle part and after a preset minimum operating time the timer generates a signal.

[0007]

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This known toothbrush has nothing in common with the task of the present invention, to allow the optimal contact pressure to be maintained while the toothbrush is in use and to display upward and downward deviations from a stored desired pressure value by means of a signal generator.

[0008]

FIG. 1 shows an electric toothbrush designed according to the invention:

A housing (1) contains an electric motor (2), an accumulator or battery (3), a gear (4) for converting the rotary motion of the motor into an oscillating motion of the slip-on axle (5) and brush (11), a switch (6) and housed the axle bearing (7).

[0009]

A pressure sensor (8) on the bearing (7) absorbs the contact pressure acting on the brush head (11) and transmits it to a microprocessor (9).

[0010]

A desired pressure value is stored in the microprocessor (9) and is compared with the actual incoming pressure value acting on the brush.

If both values are identical, there is no reaction.

[0011]

However, if the contact pressure on the brush head (11) is higher or lower than the stored setpoint, the microprocessor (9) triggers an optical or acoustic signal that can be heard by the user via a signal generator (10), which causes the user to reduce the pressure on the toothbrush on the teeth to change until the signal goes off.

[0012]

FIG. 2 shows the schematic structure of the control circuit described above.

[0013]

A further preferred embodiment of the invention consists in determining the contact pressure of an electric toothbrush during use via the power consumption of its electric motor and in monitoring compliance with the optimum range.

There is a direct correlation between the current consumption of the electric motor and the contact pressure when using the brush: the higher the contact pressure, the higher the current consumption and vice versa.

[0014]

By setting the optimum current consumption as a function of the optimum pressure range, compliance with the same can be checked and transmitted to the user via a signal transmitter.

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CLAIMS EP0158870A1

1.

Toothbrush with manual or electrical actuation of known construction, characterized in that it is provided with a device for visual or acoustic indication of compliance with the optimal contact pressure entered in a microprocessor during tooth brushing.

2.

Electrically driven toothbrush according to Claim 1, characterized in that a pressure transducer (8) is attached to the axle bearing (7) provided for receiving the brush shaft (5), which records the contact pressure acting on the brush attachment (11) during tooth brushing and which is connected to a microprocessor (9) in which a target pressure unit is stored, which is compared with the actual pressure value effective on the brush, the microprocessor (9) being coupled to a signal generator (10) in such a way that when the over - A signal perceivable by the user is triggered if the stored target contact pressure is not reached.

3.

Electrically driven toothbrush according to claim 1, characterized in that the pressure exerted during tooth brushing is measured via the power consumption of the electric motor of the electric brush and deviations in the power consumption value set in correlation with a defined optimum pressure range are transmitted to the user via a signal transmitter.

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(11) Veröffentlichungsnummer: **0 158 870**
A1

(12) # EUROPÄISCHE PATENTANMELDUNG

(21) Anmeldenummer: **85103456.1**

(22) Anmeldetag: **23.03.85**

(51) Int. Cl.⁴: **A 46 B 13/02**
A 46 B 15/00

(30) Priorität: **18.04.84 DE 3414623**

(43) Veröffentlichungstag der Anmeldung:
23.10.85 Patentblatt 85/43

(84) Benannte Vertragsstaaten:
AT BE CH DE FR GB IT LI LU NL SE

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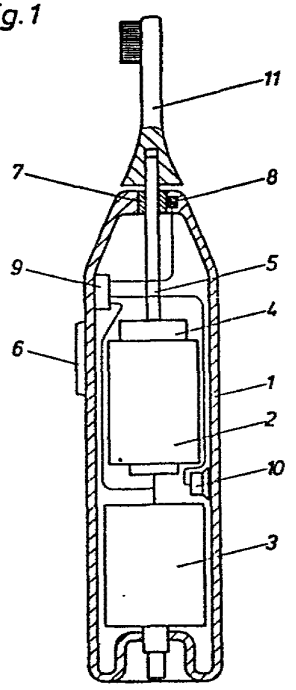
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(54) **Zahnbürste.**

(57) Die Erfindung betrifft eine Zahnbürste, insbesondere eine Elektrozahnbürste, die mit einer Vorrichtung zur Ermittlung und Anzeige des optimalen Anpressdrucks gekoppelt ist.

Fig. 1



EP 0 158 870 A1

Croydon Printing Company Ltd

Petitioner Therabody Ex-1004, 1314

Zahnbürste

Die vorliegende Erfindung betrifft eine Zahnbürste, insbesondere eine elektrisch angetriebene Zahnbürste, die es dem Benutzer gestattet, den richtigen Anpressdruck der Bürste bei der Reinigung des Gebisses zu ermitteln und einzuhalten.

Ein wesentliches Kriterium für die optimale Funktion einer Zahnbürste, insbesondere einer Elektrozahnbürste, ist die Einhaltung eines richtigen Anpressdrucks beim Gebrauch. Ist der Anpressdruck zu niedrig, so tritt keine ausreichende Reinigung ein. Ist hingegen der Druck zu hoch, wird das Zahnfleisch gereizt, was zu Zahnfleischblutungen und, unter Umständen, auf längere Dauer sogar zur Rückbildung des Zahnfleisches und Freilegung der Zahnhälse führen kann. Es ist daher eine wesentliche Voraussetzung für die Nützlichkeit des Zähneputzens, insbesondere bei Anwendung einer elektrischen Zahnbürste, daß mit dem richtigen Anpressdruck geputzt wird.

Die vorliegende Erfindung geht daher von der Aufgabenstellung aus, eine Zahnbürste zu schaffen, die es dem Benutzer gestattet, den geeigneten Anpressdruck beim Betrieb der Bürste einzustellen und während des Zähneputzens aufrecht zu erhalten.

Die Lösung dieser Aufgabe besteht darin, eine Zahnbürste, vorzugsweise eine solche mit elektrischem Antrieb an sich bekannter Konstruktion, mit einer Vorrichtung zur optischen oder akustischen Anzeige des optimalen Anpressdrucks während des Zähneputzens zu versehen.

Bei einer Elektrozahnbürste wird dieser Anspruch dadurch realisiert, daß am zur Aufnahme des Bürstenschaftes vorgesehenen Achsenlager ein Druckaufnehmer angebracht ist, der den an der Aufsteckbürste wirksamen Anpressdruck aufnimmt und der mit einem Mikroprozessor verbunden ist, in dem ein Soll-Druckwert gespeichert ist, der mit dem an der Bürste wirksamen Ist-Druckwert verglichen wird, wobei der Mikroprozessor mit einem Signalgeber so gekoppelt ist, daß beim Über- oder Unterschreiten des eingespeicherten Soll-Anpressdruckwertes ein wahrnehmbares Signal ausgelöst wird.

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Falls es sich um eine manuelle Zahnbürste handelt, erfolgt die Druckmessung durch Dehnungsmeßstreifen, die ebenfalls mit einem Mikroprozessor gekoppelt sind. Hier ist es möglich und auch sinnvoll, die Druckmeß- und Signalvorrichtung so auszugestalten, daß sie für eine Vielzahl manueller Zahnbürsten verwendbar ist, also beim Austausch der Zahnbürste wieder- bzw. weiterverwendbar ist.

Aus der DE-PS 3 117 160 ist bereits eine Elektrozahnbürste bekannt, die dem Benutzer eine Kontrolle der Zahnputzzeit gestatten soll. Dies geschieht dadurch, daß diese Zahnbürste mit einem die Zahnputzdauer überwachenden Zeitgeber, der bei Handhabung der Zahnbürste in Betrieb gesetzt wird, und einem Anzeigeelement ausgestattet ist, wobei der Zeitgeber, von einer Belastungsmesseinrichtung gesteuert, nur in derjenigen Betriebszeit laufen soll, in der eine vorgegebene Belastung auf das Borstenteil ausgeübt wird und nach Ablauf einer voreingestellten Mindestbetriebszeit der Zeitgeber ein Signal erzeugt.

Mit der Aufgabenstellung der vorliegenden Erfindung, die Einhaltung des optimalen Anpressdrucks während der Benutzung der Zahnbürste zu gestatten und deren Lösung, Abweichungen nach unten und oben von einem gespeicherten Soll-Druckwert mittels eines Signalgebers anzuzeigen, hat diese bekannte Zahnbürste also nichts gemeinsam.

In Figur 1 wird eine erfindungsgemäß gestaltete elektrische Zahnbürste dargestellt:

In einem Gehäuse (1) sind Elektromotor (2), Akkumulator oder Batterie (3), ein Getriebe (4) zur Umwandlung der Drehbewegung des Motors in eine Schwingbewegung der Aufsteckachse (5) und Aufsteckbürste (11), ein Schalter (6) und das Achsenlager (7) untergebracht.

Ein Druckaufnehmer (8) am Lager (7) nimmt den an der Aufsteckbürste (11) wirkenden Anpressdruck auf und gibt ihn an einen Mikroprozessor (9) weiter.

In dem Mikroprozessor (9) ist ein Soll-Druckwert gespeichert, der mit dem an der Bürste wirksamen, eingehenden Ist-Druckwert

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verglichen wird. Wenn beide Werte identisch sind, erfolgt keine Reaktion.

Ist der Anpressdruck an der Aufsteckbürste (11) jedoch höher oder niedriger als der eingespeicherte Sollwert, wird vom Mikroprozessor (9) ein optisches oder akustisches, vom Benutzer wahrnehmbares Signal über einen Signalgeber (10) ausgelöst, das den Benutzer veranlaßt, den Druck der Zahnbürste auf die Zähne so zu verändern, bis das Signal erlischt.

Figur 2 zeigt den schematischen Aufbau des oben beschriebenen Regelkreises.

Eine weitere bevorzugte Ausführungsform der Erfindung besteht darin, den Anpressdruck einer elektrischen Zahnbürste während ihrer Benutzung über die Stromaufnahme ihres Elektromotors zu ermitteln und die Einhaltung des optimalen Bereiches zu kontrollieren. Zwischen der Stromaufnahme des Elektromotors und dem Anpressdruck bei Benutzung der Bürste besteht nämlich eine direkte Korrelation: Je höher der Anpressdruck, desto höher die Stromaufnahme und umgekehrt.
So kann durch Einstellung der optimalen Stromaufnahme in Abhängigkeit vom optimalen Druckbereich die Einhaltung derselben kontrolliert und über einen Signalgeber dem Benutzer übermittelt werden.

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Ansprüche

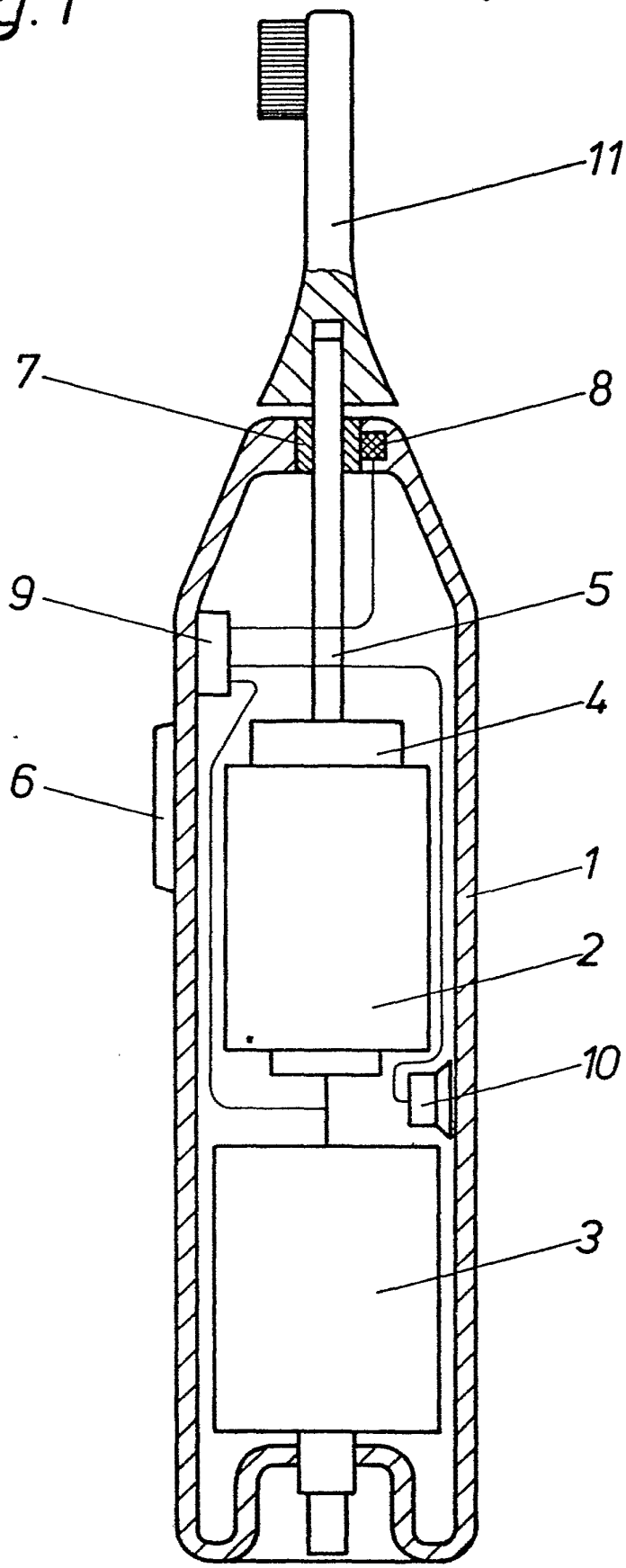
1. Zahnbürste mit manueller oder elektrischer Betätigung an sich bekannter Konstruktion, dadurch gekennzeichnet, daß sie mit einer Vorrichtung zur optischen oder akustischen Anzeige der Einhaltung des in einem Mikroprozessor eingegebenen optimalen Anpressdrucks während des Zähneputzens versehen ist.

2. Elektrisch angetriebene Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß am zur Aufnahme des Bürstenschaftes (5) vorgesehenen Achsenlager (7) ein Druckaufnehmer (8) angebracht ist, der den an der Aufsteckbürste (11) während des Zähneputzens wirksamen Anpressdruck aufnimmt und der mit einem Mikroprozessor (9) verbunden ist, in dem ein Soll-Druckwerk gespeichert ist, der mit dem an der Bürste wirksamen Ist-Druckwert verglichen wird, wobei der Mikroprozessor (9) mit einem Signalgeber (10) so gekoppelt ist, daß beim Über- oder Unterschreiten des eingespeicherten Soll-Anpressdrucks ein vom Benutzer wahrnehmbares Signal ausgelöst wird.

3. Elektrisch angetriebene Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß der während des Zähneputzens ausgeübte Druck über die Stromaufnahme des Elektromotors der Elektrobürste gemessen und Abweichungen des in Korrelation mit einem definierten optimalen Druckbereich eingestellten Stromaufnahmewertes über einen Signalgeber dem Benutzer übermittelt werden.

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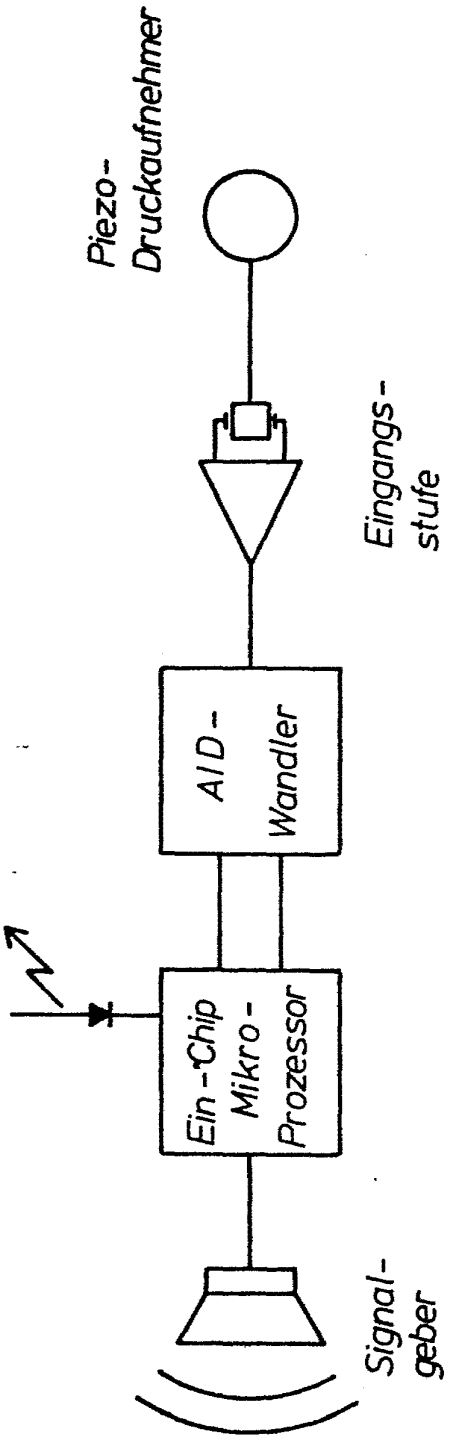
Fig. 1



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Fig. 2



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Europäisches Patentamt

EUROPÄISCHER RECHERCHENBERICHT

0158870
Nummer der Anmeldung

EP 85103456.1

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl.4)
D,A	DE - C2 - 3 117 160 (SCHELLER, SCHELLER) * Gesamt * --	1,2	A 46 B 13/02 A 46 B 15/00
P,A	EP - A2 - 0 127 465 (WHITE, INGELS) * Gesamt * --	1,2	
A	US - A - 4 253 212 (KINYA FUJITA) * Gesamt * ----	1,2	

RECHERCHIERTE SACHGEBIETE (Int. Cl.4)

A 46 B 13/00
A 46 B 15/00
A 46 B 17/00
A 46 B 9/00

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt.

Recherchenort	Abschlußdatum der Recherche	Prüfer
WIEN	26-06-1985	PIRKER

KATEGORIE DER GENANNTEN DOKUMENTEN
X : von besonderer Bedeutung allein betrachtet
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& : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument

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Espacenet

Bibliographic data: CN206381369 (U) — 2017-08-08

Human body massager

Inventor(s): ZHOU ELIN ± (周鄂林)

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Classification: **- international:** ***A61H23/02***
- cooperative:

Application number: CN201621146941U 20161020

Priority number (s): CN201621146941U 20161020

Abstract of CN206381369 (U)

The utility model relates to a technical field of massage equipment discloses human body massager, and rotating shell's both ends are rotated through a pivot respectively and are connected between two installation arms on the fuselage, install vibrating motor in the rotating shell, and rotating shell installs the massage head outward, during operation vibrating motor will vibrate by the rotating shell transmission to massaging the head, the massage is realized to human face to the massage head. This human body massager avoids having now human body massager and establishes vibrating motor in the fuselage and dispose drive mechanism and extremely massage the first condition with vibrating motor's vibration transmission, and simple structure makes easily and assembles, can also reduce the energy loss who vibrates the in -process, vibration effect improvement, user experience improvement.

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DESCRIPTION CN206381369U

body massager

[0001]

Technical field

[0002]

The utility model relates to the technical field of massage equipment, in particular to a human body massager.

[0003]

Background technique

[0004]

The massager is a health care equipment used to relax muscles, soothe nerves, promote blood circulation, strengthen cell metabolism, and enhance skin elasticity. It can relieve fatigue, significantly reduce various chronic pain, acute pain and muscle soreness, relax the body and reduce stress. Reduce skin wrinkles.

There are many types of massagers, which are mainly used to massage various parts of the human body. The human body massagers in the existing technology include a fuselage, a vibration motor installed in the fuselage, a massage head that is rotated and installed on the fuselage, and a massage head installed in the fuselage. It is used to transmit the power of the vibration motor to the transmission mechanism of the massage head. This solution requires a transmission mechanism, has a complex structure, and the vibration effect is not strong, resulting in poor user experience.

[0005]

Utility model content

[0006]

The purpose of this utility model is to provide a human body massager, which is designed to solve the technical problems of complex structure and weak vibration effect of human body massagers in the prior art.

[0007]

The embodiment of the present utility model provides a human body massager, including:

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[0008]

A fuselage with two oppositely arranged mounting arms, and mounting holes are provided on both mounting arms;

[0009]

A rotating assembly is provided between the two mounting arms. The rotating assembly includes a rotating housing and two rotating shafts respectively fixed on both ends of the rotating housing. The two rotating shafts are connected to the two rotating shafts in a one-to-one correspondence. said mounting holes;

[0010]

a vibration motor installed in the rotating housing; and

[0011]

A massage head that rotates synchronously with the rotating housing and has a through hole, and the rotating housing passes through the through hole.

[0012]

Further, it also includes a circuit board installed on the body and a power supply electrically connected to the circuit board.

[0013]

Further, both of the two rotating shafts are conductive rotating shafts, and the two rotating shafts are electrically connected to the positive and negative poles of the vibration motor respectively; the human body massager also includes a rotating shaft that is electrically connected to the two rotating shafts in one-to-one correspondence. Two conductive members, the conductive members have two connecting ends, one of the connecting ends of the two conductive members is electrically connected to the two rotating shafts in one-to-one correspondence, and the other of the two conductive members is The connection ends are all electrically connected to the circuit board, and the power supply, the circuit board, the two conductive parts, the two rotating shafts and the vibration motor form a power supply circuit.

[0014]

Further, the conductive member is a torsion spring, and the torsion spring includes a first spiral part and two first torsion arms connected to the first helical part, and the ends of the first torsion arms form the connection. end, both mounting arms are provided with limit rods on the side facing away from the rotating component, the first spiral part of the torsion spring is sleeved on the corresponding limit rod, and one of the torsion springs The end of the first torsion arm is in contact with the corresponding rotating shaft, and the end of the other first torsion arm is electrically connected to the circuit board.

[0015]

Further, the rotating shaft is a conductive rotating shaft, the massage head is a conductive massage head, a conductive component is electrically connected between the rotating shaft and the massage head, the rotating shaft is electrically connected to the circuit board, and the circuit There is a conductor electrically connected to the board. The conductor is located outside the fuselage. The conductor, the circuit board, the rotating shaft and the electrical conductor are formed to detect whether the massage head is in contact. Human body current detection path.

[0016]

Further, the rotating housing is provided with a through hole, and the electrical conductor includes an annular body sleeved outside the rotating shaft and an extension arm connected to the outer edge of the annular body. The extension arm passes through The end of the extension arm is disposed in the through hole and contacts the inner wall of the massage head.

[0017]

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Further, two through holes are opened in the rotating housing, and the electrical component is a torsion spring. The electrical component includes a second spiral part sleeved outside the rotating shaft and connected to the second There are two second twist arms on the spiral part. The two second twist arms are threaded through the two through holes one by one, and the ends of the second twist arms are in contact with the inner wall of the massage head.

[0018]

Further, a shaft seat for supporting the rotating shaft is installed at the mounting hole.

[0019]

Further, there is an interference fit between the rotating housing and the through hole.

[0020]

Further, the fuselage includes a lower shell and an upper shell covering the lower shell. The upper shell and the lower shell are enclosed to form a receiving cavity. A space is formed between the lower shell and the upper shell. There is an opening, the fuselage further includes a cover body covering the opening, and the mounting arm is formed on the cover body.

[0021]

Based on the above technical solution, compared with the existing technology, the two ends of the rotating housing are respectively connected to the two mounting arms of the fuselage through a rotating shaft. A vibration motor is installed inside the rotating housing, and a massage head is installed outside the rotating housing. During operation, the vibration motor transmits vibration from the rotating shell to the massage head, and the massage head massages the human face.

This human body massager avoids the situation in the existing human body massager that the vibration motor is installed in the body and is equipped with a transmission mechanism to transmit the vibration of the vibration motor to the massage head. It has a simple structure, is easy to manufacture and assemble, and can also reduce the energy in the vibration process. loss, the vibration effect is improved, and the user experience is improved.

[0022]

Description of the drawings

[0023]

Figure 1 is a front view of the human body massager provided by the first embodiment of the present utility model;

[0024]

Figure 2 is a three-dimensional exploded view of the human body massager of Figure 1;

[0025]

Figure 3 is a three-dimensional exploded view of the body used in the human body massager of Figure 1;

[0026]

Figure 4 is a three-dimensional assembly view of the human body massager of Figure 1, in which the lower shell is not shown;

[0027]

Figure 5 is a three-dimensional assembly view of the human body massager in Figure 4 from another angle, in which the upper shell and the lower shell are not shown;

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[0028]

Figure 6 is a three-dimensional assembly diagram of the electrical components, rotating components and vibration motor used in the human massager of Figure 1;

[0029]

The three-dimensional structural diagram of the electrical conductor in Figure 7;

[0030]

Figure 8 is a three-dimensional assembly diagram of the electrical components, rotating components and vibration motor used in the human body massager provided by the second embodiment of the present invention;

[0031]

FIG. 9 is a three-dimensional structural view of the electrical conductor of FIG. 8 .

[0032]

Detailed ways

[0033]

In order to make the purpose, technical solutions and advantages of the present utility model more clear, the utility model will be further described in detail below with reference to the drawings and embodiments.

It should be understood that the specific embodiments described here are only used to explain the present invention and are not intended to limit the present invention.

[0034]

It should be noted that when an element is referred to as being "mounted" or "disposed on" another element, it can be directly on the other element or intervening elements may also be present.

When an element is said to be "connected to" another element, it can be directly connected to the other element or intervening elements may also be present.

[0035]

In addition, it should be noted that the terms left, right, up, and down in the embodiments of the present invention are only relative concepts or refer to the normal use state of the product, and should not be considered as having Restrictive.

The implementation of the present invention will be described in detail below with reference to specific embodiments.

[0036]

As shown in Figures 1 to 5, the first embodiment of the present utility model proposes a human body massager, which includes a body 2 with two oppositely arranged mounting arms 231, and the two mounting arms 231 are both provided with mounting holes 232; The rotating assembly 3 is provided between the two mounting arms 231. The rotating assembly 3 includes a rotating housing 31 and two rotating shafts 32 respectively fixed on both ends of the rotating housing 31. The two rotating shafts 32 are connected to the two rotating shafts in a one-to-one correspondence. The mounting hole 232; the vibration motor 4 installed in the rotating housing 31; and the massage head 1 that rotates synchronously with the rotating housing 31 and has a through hole 13, and the rotating housing 31 is inserted through the through hole 13.

[0037]

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Both ends of the rotating housing 31 are rotatably connected between the two mounting arms 231 of the fuselage through a rotating shaft 32. The vibration motor 4 is installed inside the rotating housing 31, and the massage head 1 is installed outside the rotating housing 31. When working, The vibration motor 4 transmits vibration from the rotating housing 31 to the massage head 1, and the massage head 1 massages the human face.

This human body massager avoids the situation in the existing human body massager that the vibration motor 4 is installed in the body 2 and is equipped with a transmission mechanism to transmit the vibration of the vibration motor 4 to the massage head 1. It has a simple structure, is easy to manufacture and assemble, and can also reduce vibration. Energy loss during the process, vibration effect is improved, and user experience is improved.

[0038]

Specifically, the axes of the rotating shaft 32 on the rotating housing 31 coincide with each other, and the mounting holes 232 on the two mounting arms 231 face each other.

The two rotating shafts 32 are correspondingly plugged into the two mounting holes 232. When the vibration motor 4 is working, the vibration motor 4 transmits the vibration to the rotating housing 31, and the massage head 1 follows the vibration of the rotating housing 31 to massage the human face. This utility model The human body massager in the novel embodiment can be applied to the face, hands, back, legs, etc.

[0039]

Further, as shown in FIGS. 3 to 5 , it also includes a circuit board 5 installed on the fuselage 2 and a power supply 6 electrically connected to the circuit board 5 .

Specifically, the power source 6 is powered by a battery, that is, a battery is provided inside the body 2 , and the battery provides electrical energy to the circuit board 5 and components connected to the circuit board 5 .

Of course, according to the actual situation and specific needs, in other embodiments of the present invention, the power supply mode of the power supply 6 can be other ways, for example: the power supply 6 adopts a wired power supply mode, that is, the body 2 is provided with an external power supply 6 The connected power plug (not shown in the figure) provides electric energy to the circuit board 5; the power supply 6 can also be powered by a charging power supply, that is, the body 2 is provided with a plug connected to an external power supply (not shown in the figure). A charging plug (not shown) is connected to a rechargeable battery (not shown) provided inside the fuselage 2 , and the rechargeable battery provides electrical energy to the circuit board 5 .

[0040]

Furthermore, the two rotating shafts 32 are both conductive rotating shafts, and the two rotating shafts 32 are electrically connected to the positive and negative poles of the vibration motor 4 respectively; the human body massager also includes two conductive parts 7 that are electrically connected to the two rotating shafts 32 in one-to-one correspondence. The conductive member 7 has two connecting ends. One of the connecting ends of the two conductive members 7 corresponds to the two rotating shafts 32 , and the conductive member 7 is electrically connected to the corresponding rotating shaft 32 . The other two conductive members 7 One connection end is electrically connected to the circuit board 5, and the power supply 6, the circuit board 5, the two conductive parts 7, the two rotating shafts 32 and the vibration motor 4 form a power supply circuit.

Specifically, after the power supply 6 starts supplying power, the current provided by the power supply 6 passes through the positive electrode of the power supply 6, the circuit board 5, the conductive member 7 on one side, and the rotating shaft 32 on one side to the positive electrode of the vibration motor 4. Then, the current passes through the vibration motor 4 in sequence. The negative pole of the motor 4, the rotating shaft 32 on the other side, the conductive member 7 and the circuit board 5 on the other side finally flow back to the negative pole of the power supply 6, and the vibration motor 4 can start working at this time.

It can be understood that the power supply 6 can also be installed in the rotating housing 31 to supply power to the vibration motor 4 .

[0041]

Further, as shown in Figure 5, the conductive member 7 is a torsion spring. The torsion spring includes a first spiral part 71 and two first torsion arms 72 connected to the first spiral part 71. The ends of the first torsion arms 72 are formed At the connection

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end, the two mounting arms 231 are provided with limit rods 8 on the side facing away from the rotating assembly 3. The first spiral part 71 of the torsion spring is sleeved on the corresponding limit rod 8. One of the first spiral parts of the torsion spring is sleeved on the corresponding limit rod 8. The end of the torsion arm 72 remains in contact with the corresponding rotating shaft 32 , and the end of the other first torsion arm 72 is electrically connected to the circuit board 5 .

Specifically, the first spiral portion 71 in the middle of the torsion spring is sleeved on the limiting rod 8 on one side of the rotating assembly 3, and the end of one of the first torsion arms 72 of the torsion spring is in contact with the corresponding rotating shaft 32. The torsion arm 72 and the rotating shaft 32 are press-fitted and fixedly connected. The other end of the first torsion arm 72 is electrically connected to the circuit board 5 , and the first torsion arm 72 is fixedly connected to the circuit board 5 .

Since the vibration motor 4 is arranged inside the rotating housing 31, the vibration of the vibration motor 4 will drive the vibration of the massage head 1, that is, the rotating shaft 32 will also vibrate. The conductive member 7 uses an elastic torsion spring, which can effectively reduce the vibration of the rotating shaft. 32 Vibration damages the conductive parts 7 and increases the service life of the conductive parts 7 .

Of course, according to the actual situation and specific needs, in other embodiments of the present invention, the connection method between the conductive member 7 and the rotating shaft 32 can also be other methods, for example: the conductive member 7 is wound and fixed on the rotating shaft 32, in this case There are no unique limitations.

In addition, the cross section of the limiting rod 8 is cross-shaped, which facilitates the first spiral portion 71 of the torsion spring to be installed and limited on the limiting rod 8 .

The cross section of the limiting rod 8 can also be in other shapes.

The inner wall of the fuselage 2 is provided with a limiting arm 73, and the limiting arm 73 is provided with a limiting groove 731 for limiting the conductive member 7.

It can be understood that the conductive member 7 can also be in the shape of strips or other shapes.

The end of the rotating shaft 32 is provided with a limiting groove 321 for limiting the end of the first torsion arm 72 along the axial direction of the rotating shaft 32 so that the end of the first torsion arm 72 can reliably contact the rotating shaft 32

[0042]

Further, the rotating shaft 32 is a conductive rotating shaft, the massage head 1 is a conductive massage head, a conductive component 9 is electrically connected between the rotating shaft 32 and the massage head 1, the rotating shaft 32 is electrically connected to the circuit board 5, and the circuit board 5 is electrically connected to a conductive The conductive body 10 is provided outside the body 2. The conductive body 10, the circuit board 5, the rotating shaft 32 and the electrical conductor 9 form a human body current detection path for detecting whether the massage head 1 is in contact with the human body.

Specifically, the rotating shaft 32 is made of conductive material, and the massage head 1 is also made of conductive material. Therefore, a conductive component 9 is provided between the rotating shaft 32 and the massage head 1, so that the rotating shaft 32 and the massage head 1 can connect to each other. Electrical connection.

The working flow of the human body current detection path is as follows: when a person's face comes into contact with the massage head 1, the human body and the massage head 1 are electrically connected, the massage head 1 and the rotating shaft 32 are electrically connected through the electrical component 9, and the rotating shaft 32 and the circuit board 5 are electrically connected through the conductive member 7, and the circuit board 5 is electrically connected to the human hand through the conductor 10 through the conductor. At this time, a human body current path is formed.

The micro-current flows from the human body to the circuit board 5 through the massage head 1, the conductive component 9, the rotating shaft 32 and the conductive component 7, and then flows from the circuit board 5 through the wires to the conductor 10. The circuit board 5 can detect the micro-current. If there is a micro current passing through the circuit board 5, the power supply 6 will be started and the power supply 6 will start supplying power.

It should be noted that the circuit board 5 capable of detecting human body microcurrent belongs to the existing technology.

The circuit board 5 is set to start the power supply 6 when receiving this micro current, and the current causes the vibration motor 4 to start working.

When the massage head 1 leaves the human skin, the microcurrent disappears. When the circuit board 5 cannot receive the microcurrent, the power supply 6 is turned off, thereby causing the vibration motor 4 to stop working.

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[0043]

The human body current detection path that can detect whether the face is in contact with the massage head 1 is used to control the opening and closing of the vibration motor 4, thus avoiding the situation where the face is not in contact with the massage head 1 but the vibration motor 4 is still working, resulting in a waste of electric energy.

Preferably, the conductive body 10 is in an annular shape, and the conductive body 10 is ring-shaped outside the fuselage 2 so that the human hand can easily access the conductive body 10 when holding the fuselage 2 .

[0044]

Further, as shown in Figures 2, 6 and 8, the rotating housing 31 is provided with a through hole 33, and the electrical passing element 9 includes an annular body 911 sleeved outside the rotating shaft 32 and an outer edge connected to the annular body 911. The extension arm 912 is inserted through the through hole 33 and the end of the extension arm 912 is in contact with the inner wall of the massage head 1 .

Specifically, the annular body 911 of the electrical conductor 9 is sleeved on the rotating shaft 32 . The diameter of the annular body 911 is larger than the diameter of the rotating shaft 32 . The inner edge of the annular body 911 extends to form a number of holes for limiting the annular body 911 on the rotating shaft 32 . Limiting arm 913, the electrical component 1 is simple to assemble. You only need to set the ring on the rotating shaft 32 and then fix it on the rotating shaft 32 through the limiting arm 913, which reduces the difficulty of assembly.

It can be understood that the annular body 911 can also be directly sleeved on the outer edge of the rotating shaft 32; the electrical conductor 9 can also be connected to the massage head 1 without passing through the rotating housing 31, for example. between the rotating housing 31 and the electrical conductor A conductive piece is provided at the contact position of the massage head 9, and the conductive piece 9 and the massage head 1 are connected through the conductive piece.

Preferably, a bent portion 914 is formed at the end of the extension arm 912. The bent portion 914 passes through the through hole 33 of the rotating housing 31 and reliably contacts the inner wall of the massage head 1, thereby forming the above-mentioned human body current detection path.

[0045]

Further, the rotating housing 31 includes a base 312 having an inner cavity 311 and an opening, and a cover 313 covering the opening.

Both the cover 313 and the base 312 have arc-shaped side walls 315. When the cover 313 is assembled on the base 312, a cylindrical rotating housing 31 is formed.

Annular flanges 314 protrude from the arc-shaped side walls 315 of the cover 313 and the base 312 to facilitate interference fit with the inner wall of the massage head 1 .

The inner wall of the base 312 is provided with a number of limiting walls 318 extending in the direction perpendicular to the axis of the rotating housing 31. The limiting walls 318 are provided with inner limiting grooves 319, and the vibration motor 4 is limited in the inner limiting grooves 319. This solution Easy to assemble.

The base 312 and the cover 313 are detachably connected.

Specifically, the cover 313 is provided with a plurality of limiting posts 316, and the base 312 is provided with a pair of limiting grooves 317 for the limiting posts 316 to be plugged into. When the limiting posts 316 are plugged into the limiting grooves 317, The cover 313 is assembled on the base 312, making it easy to manufacture and assemble.

The via hole 33 is provided on the cover body 313 to facilitate processing, and the via hole 33 can also be provided at the joint between the cover body 313 and the base 312 .

[0046]

Furthermore, mounting posts 34 are formed extending from both ends of the rotating housing 31 , and the mounting posts 34 are provided with through holes 341 for the rotating shaft 32 to pass through.

The rotating shaft 32 is fixedly connected to the corresponding through hole 341 .

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The outer cover of the mounting post 34 is provided with an annular magnet 35, and the magnet 35 can perform magnetic therapy on the face during facial massage.

Further, a shaft seat 11 for supporting the rotating shaft 32 is installed at the mounting hole 232 .

Specifically, the axle seat 11 is a plastic part. The axle seat 11 is arranged inside the mounting hole 232 and is fixed by a snap ring 12. The main function of the axle seat 11 of this plastic part is to avoid wear between the rotating shaft 32 and the mounting arm 231 . , and the vibration transmitted from the vibration motor 4 to the fuselage 2 is reduced

[0047]

Furthermore, there is an interference fit between the rotating housing 31 and the through hole 13 .

Specifically, the vibration motor 4 is arranged inside the massage head 1, and the rotating housing 31 is arranged inside the through hole 13 that transversely penetrates the massage head 1. The fitting method of the rotating housing 31 and the through hole 13 is an interference fit, which can ensure The vibration of the vibration motor 4 can drive the vibration of the rotating housing 31, thereby smoothly driving the vibration of the massage head 1.

It can be understood that fasteners, snap-in structures or other mechanical connections can also be used between the rotating housing 31 and the massage head 1 .

[0048]

Further, as shown in Figures 1 and 2, the fuselage 2 includes a lower shell 22 and an upper shell 21 covering the lower shell 22. The upper shell 21 and the lower shell 22 are enclosed to form a receiving cavity, and the lower shell 22 and the upper shell 22 are enclosed. An opening is formed between the shells 21 . The body 2 further includes a cover 23 that covers the opening. The mounting arm 231 is formed on the cover 23 .

Specifically, the conductive part 7, the circuit board 5 and the power supply 6 are all arranged inside the receiving cavity of the fuselage 2, and the massage head 1 is installed between the mounting arms 231 on both sides.

[0049]

Please refer to Figures 8 and 9. The human body massager provided by the second embodiment of the present invention is substantially the same as the human body massager provided by the first embodiment. The difference from the first embodiment is that the rotating housing 31 is provided with a There are two through holes 33, and the electrical component 9 is a torsion spring. The electrical component 9 includes a second spiral part 921 sleeved outside the rotating shaft 32 and two second torsion arms 922 connected to the second spiral part 921. The two second twisting arms 922 are passed through the two through holes 33 in one-to-one correspondence, and the ends of the second twisting arms 922 are in contact with the inner wall of the massage head 1 .

Specifically, the second spiral part 921 is wound around the outer edge of the rotating shaft 32. In order to ensure that the second spiral part 921 and the rotating shaft 32 can always maintain close contact, the distance between the second twisting arm 922 and the inner wall of the massage head 1 needs to be adjusted to ensure that the twisting spring specifications

When a torsion spring is used as the overcurrent component 9, the manufacturing process of the torsion spring is simple

[0050]

The above embodiments are only specific implementations of the present utility model, but the protection scope of the present utility model is not limited thereto. Any person familiar with the technical field can easily think of various etc within the technical scope disclosed by the present utility model. Effective modifications, replacements and improvements, etc., shall be included in the protection scope of the present utility model.

Therefore, the protection scope of the present utility model should be subject to the protection scope of the claims.

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CLAIMS CN206381369U

1.

The human body massager is characterized by including:

A fuselage with two oppositely arranged mounting arms, and mounting holes are provided on both mounting arms;

A rotating assembly is provided between the two mounting arms. The rotating assembly includes a rotating housing and two rotating shafts respectively fixed on both ends of the rotating housing. The two rotating shafts are connected to the two rotating shafts in a one-to-one correspondence. said mounting holes;

a vibration motor installed in the rotating housing; and

A massage head that rotates synchronously with the rotating housing and has a through hole, and the rotating housing passes through the through hole.

2.

The human body massager according to claim 1, further comprising a circuit board installed on the body and a power supply electrically connected to the circuit board.

3.

The human body massager according to claim 2, wherein both of the rotating shafts are conductive rotating shafts, and the two rotating shafts are electrically connected to the positive and negative poles of the vibration motor respectively; the human body massager further includes Two conductive members are electrically connected to the two rotating shafts in a one-to-one correspondence. The conductive member has two connecting ends. One of the connecting ends of the two conductive members is electrically connected to the two rotating shafts in a one-to-one correspondence. On the rotating shaft, the other connecting end of the two conductive parts is electrically connected to the circuit board. The power supply, the circuit board, the two conductive parts, the two rotating shafts and the vibration motor Form a power supply loop.

4.

The human body massager according to claim 3, wherein the conductive member is a torsion spring, and the torsion spring includes a first spiral part and two first torsion arms connected to the first spiral part, The end of the first torsion arm forms the connecting end. Limiting rods are provided on the sides of the two mounting arms away from the rotating component. The first spiral part of the torsion spring is sleeved on the corresponding In the limiting rod, the end of one of the first torsion arms of the torsion spring is in contact with the corresponding rotating shaft, and the end of the other first torsion arm is electrically connected to the circuit board.

5.

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The human body massager according to claim 2, wherein the rotating shaft is a conductive rotating shaft, the massage head is a conductive massage head, and there is an electrical component electrically connected between the rotating shaft and the massage head, and the The rotating shaft is electrically connected to the circuit board. The circuit board is electrically connected to a conductor. The conductor is located outside the fuselage. The conductor, the circuit board, the rotating shaft and the electrical conductor are connected to the circuit board. The component forms a human body current detection path for detecting whether the massage head is in contact with the human body.

6.

The human body massager according to claim 5, characterized in that the rotating housing is provided with a through hole, and the electrical conductor includes an annular body sleeved outside the rotating shaft and an annular body connected to the annular body. An extension arm is provided on the outer edge, the extension arm is passed through the through hole, and the end of the extension arm is in contact with the inner wall of the massage head.

7.

The human body massager according to claim 5, characterized in that the rotating shell is provided with two through holes, the electrical conductor is a torsion spring, and the electrical conductor includes a sleeve that is sleeved outside the rotating shaft. The second spiral part and two second twist arms connected to the second spiral part, the two second twist arms are threaded through the two through holes in one-to-one correspondence, and the second twist arms The end is in contact with the inner wall of the massage head.

8.

The human body massager according to any one of claims 1 to 7, characterized in that a shaft seat for supporting the rotating shaft is installed at the mounting hole.

9.

The human body massager according to any one of claims 1 to 7, characterized in that there is an interference fit between the rotating housing and the through hole.

10.

The human body massager according to any one of claims 1 to 7, wherein the body includes a lower shell and an upper shell covering the lower shell, and the upper shell and the lower shell enclose A receiving cavity is formed, and an opening is formed between the lower shell and the upper shell. The fuselage further includes a cover body covering the opening, and the mounting arm is formed on the cover body.

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(19)中华人民共和国国家知识产权局

(12)实用新型专利

(10)授权公告号 CN 206381369 U
(45)授权公告日 2017.08.08

(21)申请号 201621146941.7

(22)申请日 2016.10.20

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(51)Int.Cl.
A61H 23/02(2006.01)

(ESM)同样的发明创造已同日申请发明专利

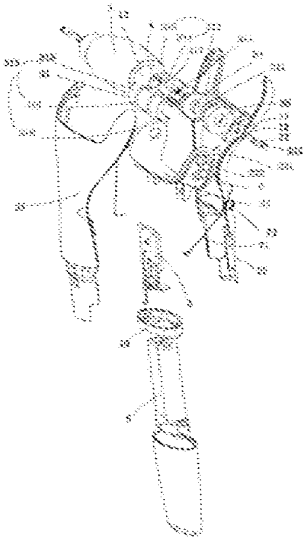
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(54)实用新型名称

人体按摩器

(57)摘要

本实用新型涉及按摩器材的技术领域，公开了人体按摩器，转动壳体的两端分别通过一转轴转动连接于机身两个安装臂之间，转动壳体内安装有振动电机，转动壳体外安装有按摩头，在工作时振动电机将振动由转动壳体传递至按摩头，按摩头对人体面部实现按摩。该人体按摩器避免现有人体按摩器将振动电机设在机身内并配置传动机构将振动电机的振动传递至按摩头的情况，结构简单，容易制作与装配，还能降低振动过程中的能量损失，振动效果提高，用户体验提高。



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1.人体按摩器，其特征在于，包括：

具有两个相对设置的安装臂的机身，两个所述安装臂上均开设有安装孔；

设于两个所述安装臂之间的转动组件，所述转动组件包括转动壳体及分别固定于所述转动壳体的两端的两个转轴，两个所述转轴一一对应转动连接于两个所述安装孔；

安装于所述转动壳体内的振动电机；以及

与所述转动壳体同步转动且具有一通孔的按摩头，所述转动壳体穿设于所述通孔。

2.如权利要求1所述的人体按摩器，其特征在于，还包括安装于所述机身上的线路板及与所述线路板电连接的电源。

3.如权利要求2所述的人体按摩器，其特征在于，两个所述转轴均为导电转轴，两个所述转轴分别电连接于所述振动电机的正极与负极；所述人体按摩器还包括与两个所述转轴一一对应电连接的两个导电件，所述导电件具有两个连接端，两个所述导电件的其中一个所述连接端一一对应电连接于两个所述转轴上，该两个导电件的另外一个所述连接端均电连接于所述线路板，所述电源、所述线路板、两个所述导电件、两个所述转轴与所述振动电机形成一供电回路。

4.如权利要求3所述的人体按摩器，其特征在于，所述导电件为扭簧，所述扭簧包括第一螺旋部及连接于所述第一螺旋部上的两个第一扭臂，所述第一扭臂的末端形成所述连接端，两个所述安装臂背离于所述转动组件的一侧上均设有限位杆，所述扭簧的第一螺旋部套设于对应的所述限位杆，该扭簧的其中一个所述第一扭臂的末端抵接于对应的所述转轴上，且另外一个所述第一扭臂的末端电连接于所述线路板。

5.如权利要求2所述的人体按摩器，其特征在于，所述转轴为导电转轴，所述按摩头为导电按摩头，所述转轴与所述按摩头之间电连接有一过电件，所述转轴与所述线路板电连接，所述线路板上电连接有一导电体，所述导电体设于所述机身以外，所述导电体、所述线路板、所述转轴与所述过电件形成用于检测所述按摩头是否抵接于人体的人体电流检测通路。

6.如权利要求5所述的人体按摩器，其特征在于，所述转动壳体上开设有过孔，所述过电件包括套设于所述转轴以外的环形体及连接于所述环形体的外缘上的延伸臂，所述延伸臂穿设于所述过孔且所述延伸臂的末端抵接于所述按摩头的内壁。

7.如权利要求5所述的人体按摩器，其特征在于，所述转动壳体上开设有两个过孔，所述过电件为扭簧，所述过电件包括套设于所述转轴以外的第二螺旋部及连接于所述第二螺旋部上的两个第二扭臂，两个所述第二扭臂一一对应穿设于两个所述过孔且所述第二扭臂的末端抵接于所述按摩头的内壁。

8.如权利要求1至7任一项所述的人体按摩器，其特征在于，所述安装孔处安装有用于支承所述转轴的轴座。

9.如权利要求1至7任一项所述的人体按摩器，其特征在于，所述转动壳体与所述通孔之间为过盈配合。

10.如权利要求1至7任一项所述的人体按摩器，其特征在于，所述机身包括下壳及盖合于所述下壳的上壳，所述上壳与所述下壳围合形成一容纳腔，所述下壳与所述上壳之间形成有一开口，所述机身还包括盖合于所述开口处的盖体，所述安装臂形成于所述盖体上。

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人体按摩器

技术领域

[0001] 本实用新型涉及按摩器材的技术领域，尤其涉及人体按摩器。

背景技术

[0002] 按摩器是一种保健器材，用于放松肌肉、舒缓神经、促进血液循环、加强细胞新陈代谢、增强皮肤弹性，可缓解疲劳、明显减轻各种慢性疼痛、急性疼痛和肌肉酸痛，放松身体减轻压力，减少皮肤皱纹。按摩器有很多种类，主要是对人体各部位进行按摩，现有技术中的人体按摩器包括机身、设于机身内的振动电机、转动安装于机身上的按摩头、设于机身上且用于将振动电机的动力传递至按摩头的传动机构，该方案需要传动机构，结构复杂，而且振动效果不强，用户体验欠佳。

实用新型内容

[0003] 本实用新型的目的在于提供一种人体按摩器，旨在解决现有技术中人体按摩器结构复杂及振动效果不强的技术问题。

[0004] 本实用新型实施例提供了人体按摩器，包括：

[0005] 具有两个相对设置的安装臂的机身，两个所述安装臂上均开设有安装孔；

[0006] 设于两个所述安装臂之间的转动组件，所述转动组件包括转动壳体及分别固定于所述转动壳体的两端的两个转轴，两个所述转轴一一对应转动连接于两个所述安装孔；

[0007] 安装于所述转动壳体内的振动电机；以及

[0008] 与所述转动壳体同步转动且具有一通孔的按摩头，所述转动壳体穿设于所述通孔。

[0009] 进一步的，还包括安装于所述机身上的线路板及与所述线路板电连接的电源。

[0010] 进一步的，两个所述转轴均为导电转轴，两个所述转轴分别电连接于所述振动电机的正极与负极；所述人体按摩器还包括与两个所述转轴一一对应电连接的两个导电件，所述导电件具有两个连接端，两个所述导电件的其中一个所述连接端一一对应电连接于两个所述转轴上，该两个导电件的另外一个所述连接端均电连接于所述线路板，所述电源、所述线路板、两个所述导电件、两个所述转轴与所述振动电机形成一供电回路。

[0011] 进一步的，所述导电件为扭簧，所述扭簧包括第一螺旋部及连接于所述第一螺旋部上的两个第一扭臂，所述第一扭臂的末端形成所述连接端，两个所述安装臂背离于所述转动组件的一侧上均设有限位杆，所述扭簧的第一螺旋部套设于对应的所述限位杆，该扭簧的其中一个所述第一扭臂的末端抵接于对应的所述转轴上，且另外一个所述第一扭臂的末端电连接于所述线路板。

[0012] 进一步的，所述转轴为导电转轴，所述按摩头为导电按摩头，所述转轴与所述按摩头之间电连接有一过电件，所述转轴与所述线路板电连接，所述线路板上电连接有一导电体，所述导电体设于所述机身以外，所述导电体、所述线路板、所述转轴与所述过电件形成用于检测所述按摩头是否抵接于人体的人体电流检测通路。

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[0013] 进一步的，所述转动壳体上开设有过孔，所述过电件包括套设于所述转轴以外的环形体及连接于所述环形体的外缘上的延伸臂，所述延伸臂穿设于所述过孔且所述延伸臂的末端抵接于所述按摩头的内壁。

[0014] 进一步的，所述转动壳体上开设有两个过孔，所述过电件为扭簧，所述过电件包括套设于所述转轴以外的第二螺旋部及连接于所述第二螺旋部上的两个第二扭臂，两个所述第二扭臂一一对应穿设于两个所述过孔且所述第二扭臂的末端抵接于所述按摩头的内壁。

[0015] 进一步的，所述安装孔处安装有用于支承所述转轴的轴座。

[0016] 进一步的，所述转动壳体与所述通孔之间为过盈配合。

[0017] 进一步的，所述机身包括下壳及盖合于所述下壳的上壳，所述上壳与所述下壳围合形成一容纳腔，所述下壳与所述上壳之间形成有一开口，所述机身还包括盖合于所述开口处的盖体，所述安装臂形成于所述盖体上。

[0018] 基于上述技术方案与现有技术相比，转动壳体的两端分别通过一转轴转动连接于机身两个安装臂之间，转动壳体内安装有振动电机，转动壳体外安装有按摩头，在工作时振动电机将振动由转动壳体传递至按摩头，按摩头对人体面部实现按摩。该人体按摩器避免现有人体按摩器将振动电机设在机身内并配置传动机构将振动电机的振动传递至按摩头的情况，结构简单，容易制作与装配，还能降低振动过程中的能量损失，振动效果提高，用户体验提高。

附图说明

[0019] 图1为本实用新型第一实施例提供的人体按摩器的主视图；

[0020] 图2为图1的人体按摩器的立体分解图；

[0021] 图3为图1的人体按摩器中应用的机身的立体分解图；

[0022] 图4为图1的人体按摩器的立体装配图，其中下壳未示；

[0023] 图5为图4的人体按摩器的另一角度的立体装配图，其中上壳与下壳未示；

[0024] 图6为图1的人体按摩器中应用的过电件、转动组件与振动电机的立体装配图；

[0025] 图7的过电件的立体结构图；

[0026] 图8为本实用新型第二实施例提供的人体按摩器中应用的过电件、转动组件与振动电机的立体装配图；

[0027] 图9为图8的过电件的立体结构图。

具体实施方式

[0028] 为了使本实用新型的目的、技术方案及优点更加清楚明白，以下结合附图及实施例，对本实用新型进行进一步详细说明。应当理解，此处所描述的具体实施例仅仅用以解释本实用新型，并不用于限定本实用新型。

[0029] 需要说明的是，当元件被称为“固定于”或“设置于”另一个元件，它可以直接在另一个元件上或可能同时存在居中元件。当一个元件被称为是“连接于”另一个元件，它可以是直接连接到另一个元件或者可能同时存在居中元件。

[0030] 另外，还需要说明的是，本实用新型实施例中的左、右、上、下等方位用语，仅是互为相对概念或是以产品的正常使用状态为参考的，而不应该认为是具有限制性的。以下结

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合具体实施例对本实用新型的实现进行详细的描述。

[0031] 如图1至图5所示，本实用新型第一实施例提出了人体按摩器，包括具有两个相对设置的安装臂231的机身2，两个安装臂231上均开设有安装孔232；设于两个安装臂231之间的转动组件3，转动组件3包括转动壳体31及分别固定于转动壳体31的两端的两个转轴32，两个转轴32一一对应转动连接于两个安装孔232；安装于转动壳体31内的振动电机4；以及与转动壳体31同步转动且具有一通孔13的按摩头1，转动壳体31穿设于通孔13。

[0032] 转动壳体31的两端分别通过一转轴32转动连接于机身两个安装臂231之间，转动壳体31内安装有振动电机4，转动壳体31外安装有按摩头1，在工作时振动电机4将振动由转动壳体31传递至按摩头1，按摩头1对人体面部实现按摩。该人体按摩器避免现有人体按摩器将振动电机4设在机身2内并配置传动机构将振动电机4的振动传递至按摩头1的情况，结构简单，容易制作与装配，还能降低振动过程中的能量损失，振动效果提高，用户体验提高。

[0033] 具体地，转动壳体31上的转轴32的轴线重合，两个安装臂231上的安装孔232相对。两个转轴32对应插接于两个安装孔232，在振动电机4工作时，振动电机4将振动传递至转动壳体31，按摩头1跟随转动壳体31振动对人体面部实现按摩，本实用新型实施例中的人体按摩器可以应用于脸部、手部、背部和腿部等。

[0034] 进一步的，如图3至图5所示，还包括安装于机身2上的线路板5及与线路板5电连接的电源6。具体的，电源6采用电池供电，即机身2的内部设置有电池，该电池为线路板5及与线路板5相连接的部件提供电能。当然，根据实际情况和具体需求，在本实用新型的其他实施例中，电源6的供电方式可以为其他方式，例如：电源6采用有线供电的方式，即机身2上设置有与外界电源6相连接的电源插头(图未示)，该电源插头为线路板5提供电能；电源6还可用采用充电电源的供电方式，即机身2上设置有与外界电源(图未示)相连接的充电插头(图未示)，充电插头与机身2的内部设置的充电电池(图未示)相连接，该充电电池为线路板5提供电能。

[0035] 进一步的，两个转轴32均为导电转轴，两个转轴32分别电连接于振动电机4的正极与负极；人体按摩器还包括与两个转轴32一一对应电连接的两个导电件7，导电件7具有两个连接端，两个导电件7的其中一个连接端与两个转轴32一一对应，且该导电件7电连接于对应的转轴32上，这两个导电件7的另外一个连接端电连接于线路板5，电源6、线路板5、两个导电件7、两个转轴32与振动电机4形成一供电回路。具体的，电源6开始供电后，电源6提供的电流依次经过电源6的正极、线路板5、一侧的导电件7、一侧的转轴32至振动电机4的正极，然后，电流依次经过振动电机4的负极、另一侧的转轴32、另一侧的导电件7和线路板5，最终流回电源6的负极，此时振动电机4即可以开始工作。可以理解地，电源6还可以装配于转动壳体31内，对振动电机4供电。

[0036] 进一步的，如图5所示，导电件7为扭簧，扭簧包括第一螺旋部71及连接于第一螺旋部71上的两个第一扭臂72，第一扭臂72的末端形成连接端，两个安装臂231背离于转动组件3的一侧上均设有限位杆8，扭簧的第一螺旋部71套设于对应的限位杆8，该扭簧的其中一个第一扭臂72的末端保持抵接于对应的转轴32上，且另外一个第一扭臂72的末端电连接于线路板5。具体的，扭簧中间的第一螺旋部71套在转动组件3一侧的限位杆8上，扭簧的其中一个第一扭臂72的末端抵接于对应的转轴32上，该第一扭臂72和转轴32是压合固定连接的，另外一个第一扭臂72的末端电连接于线路板5，该第一扭臂72与线路板5固定连接。由于振

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动电机4设置在转动壳体31的内部，振动电机4的振动会带动按摩头1的振动，即转轴32也会发生振动，导电件7采用具有弹性的扭簧，能够有效的减小转轴32振动对导电件7的损害，更增加了导电件7的使用寿命。当然，根据实际情况和具体需求，在本实用新型的其他实施例中，导电件7和转轴32之间的连接方式还可为其他方式，例如：导电件7缠绕并固定于转轴32上，此处不作唯一限定。还有，限位杆8截面呈十字型，便于扭簧的第一螺旋部71安装并限位于限位杆8上。限位杆8截面还可以呈其它形状。机身2内壁设有限位臂73，限位臂73上开设有用于对导电件7进行限位的限位槽731。可以理解地，导电件7还可以为片条状或其它形状。转轴32的端部设有用于对第一扭臂72的端部沿转轴32轴向限位的限位槽321，使第一扭臂72的端部可靠抵接于转轴32。

[0037] 进一步的，转轴32为导电转轴，按摩头1为导电按摩头，转轴32与按摩头1之间电连接有一过电件9，转轴32与线路板5电连接，线路板5上电连接有一导电体10，该导电体10设于机身2以外，导电体10、线路板5、转轴32与过电件9形成用于检测按摩头1是否抵接于人体的人体电流检测通路。具体的，转轴32采用导电材料制成导电转轴，按摩头1也采用导电材料制成导电按摩头，因此在转轴32与按摩头1之间设置过电件9，能够使转轴32和按摩头1电性连接。人体电流检测通路的工作流程如下：人的脸部接触到按摩头1时，人体与按摩头1相导通，按摩头1与转轴32之间通过过电件9电连接，转轴32和线路板5之间通过导电件7电连接，线路板5通过导线与人体手部通过导电体10电连接，此时即形成一个人体电流的通路。微电流从人体依次经过按摩头1、过电件9、转轴32和导电件7流至线路板5，再从线路板5经导线流至导电体10，线路板5即能够检测到微电流的通过，如果有微电流的通过线路板5则启动电源6，电源6开始供电。需要说明的是，能检测人体微电流的线路板5属于现有技术。线路板5设定为接收到这种微电流时启动电源6供电，电流使振动电机4开始工作。当按摩头1从人体皮肤离开时，微电流消失，当线路板5接收不到微电流时关闭电源6供电，从而使振动电机4停止工作。

[0038] 采用能够检测到脸部是否与按摩头1相接触的人体电流检测通路控制振动电机4的开启和关闭，避免了脸部未接触按摩头1，而振动电机4仍然在工作导致电能浪费的情况。优选地，导电体10呈环形，导电体10环设于机身2以外，便于人手握住机身2时接触到导电体10。

[0039] 进一步的，如图2、图6和图8所示，转动壳体31上开设有过孔33，过电件9包括套设于转轴32以外的环形体911及连接于环形体911的外缘上的延伸臂912，延伸臂912穿设于过孔33且延伸臂912的末端抵接于按摩头1的内壁。具体的，过电件9的环形体911套设在转轴32上，环形体911的直径大于转轴32的直径，环形体911的内缘延伸形成有用于将环形体911限位于转轴32上的若干限位臂913，该过电件1装配简单，仅需要将圆环套设在转轴32上后再通过限位臂913固定于转轴32上即可，降低了装配难度。可以理解地，环形体911还可以直接套设在转轴32的外缘；过电件9还可以不穿过转动壳体31与按摩头1相连接，例如：在转动壳体31与过电件9相接触的位置设置导电件，过电件9和按摩头1通过该导电件相连接。优选地，延伸臂912的末端形成有弯折部914，弯折部914穿过转动壳体31的过孔33并可靠抵接于按摩头1的内壁，从而形成上述人体电流检测通路。

[0040] 进一步的，转动壳体31包括具有一内腔311与一开口的底座312及盖合于开口处的盖体313。盖体313与底座312均具有弧形侧壁315，盖体313装配于底座312上时，形成圆柱体

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状的转动壳体31。盖体313与底座312的弧形侧壁315上均凸出有环形凸缘314，便于与按摩头1的内壁过盈配合。底座312内壁设有若干沿垂直于转动壳体31的轴线方向延伸的限位壁318，限位壁318上开设有内限位槽319，振动电机4限位于内限位槽319中，该方案便于装配。底座312与盖体313之间为可拆卸连接。具体地，盖体313上凸设有若干限位柱316，底座312上开设有一一对应供限位柱316插接的限位槽317，限位柱316插接于限位槽317时，盖体313装配于底座312上，制作与装配容易。过孔设33于盖体313上，便于加工，且过孔33还可以设置于盖体313和底座312的拼接处。

[0041] 进一步的，转动壳体31的两端延伸形成有安装柱34，安装柱34上开设有供转轴32穿过的通孔341。转轴32固定连接于对应的通孔341。安装柱34外套设有环形磁铁35，在脸部按摩时磁铁35可对脸部进行磁疗。进一步的，安装孔232处安装有用于支承转轴32的轴座11。具体的，轴座11为一塑胶件，轴座11设置在安装孔232的内部，且经过卡环12固定，该塑胶件的轴座11主要作用是避免转轴32和安装臂231之间产生磨损，还有将振动电机4传递至机身2的振动降低。

[0042] 进一步的，转动壳体31与通孔13之间为过盈配合。具体的，振动电机4设置在按摩头1的内部，转动壳体31设置在横向贯通按摩头1的通孔13内部，其中转动壳体31与通孔13的配合方式为过盈配合，能够保证振动电机4的振动能够带动转动壳体31的振动，从而平稳的带动按摩头1的振动。可以理解地，转动壳体31与按摩头1之间还可以采用紧固件、卡接结构或其它机械连接。

[0043] 进一步的，如图1和图2所示，机身2包括下壳22及盖合于下壳22的上壳21，上壳21与下壳22围合形成一容纳腔，下壳22与上壳21之间形成有一开口，机身2还包括盖合于开口处的盖体23，安装臂231形成于盖体23上。具体的，导电件7、线路板5和电源6均设置在机身2的容纳腔内部，按摩头1安装在两侧的安装臂231之间。

[0044] 请参阅图8、图9，本实用新型第二实施例提供的人体按摩器，与第一实施例提供的人体按摩器大致相同，与第一实施例不同的是，转动壳体31上开设有两个过孔33，过电件9为扭簧，过电件9包括套设于转轴32以外的第二螺旋部921及连接于第二螺旋部921上的两个第二扭臂922，两个第二扭臂922一一对应穿设于两个过孔33且第二扭臂922的末端抵接于按摩头1的内壁。具体的，第二螺旋部921缠绕在转轴32的外缘，为保证第二螺旋部921与转轴32能够始终保持紧密接触，需要将第二扭臂922与按摩头1的内壁的距离和保证扭簧的规格。采用扭簧作为过电件9时，扭簧的制造工艺简单。

[0045] 以上实施例，仅为本实用新型具体实施方式，但本实用新型的保护范围并不局限于此，任何熟悉本技术领域的技术人员在本实用新型揭露的技术范围内，可轻易想到各种等效的修改、替换和改进等等，这些修改、替换和改进都应涵盖在本实用新型的保护范围之内。因此，本实用新型的保护范围应以权利要求的保护范围为准。

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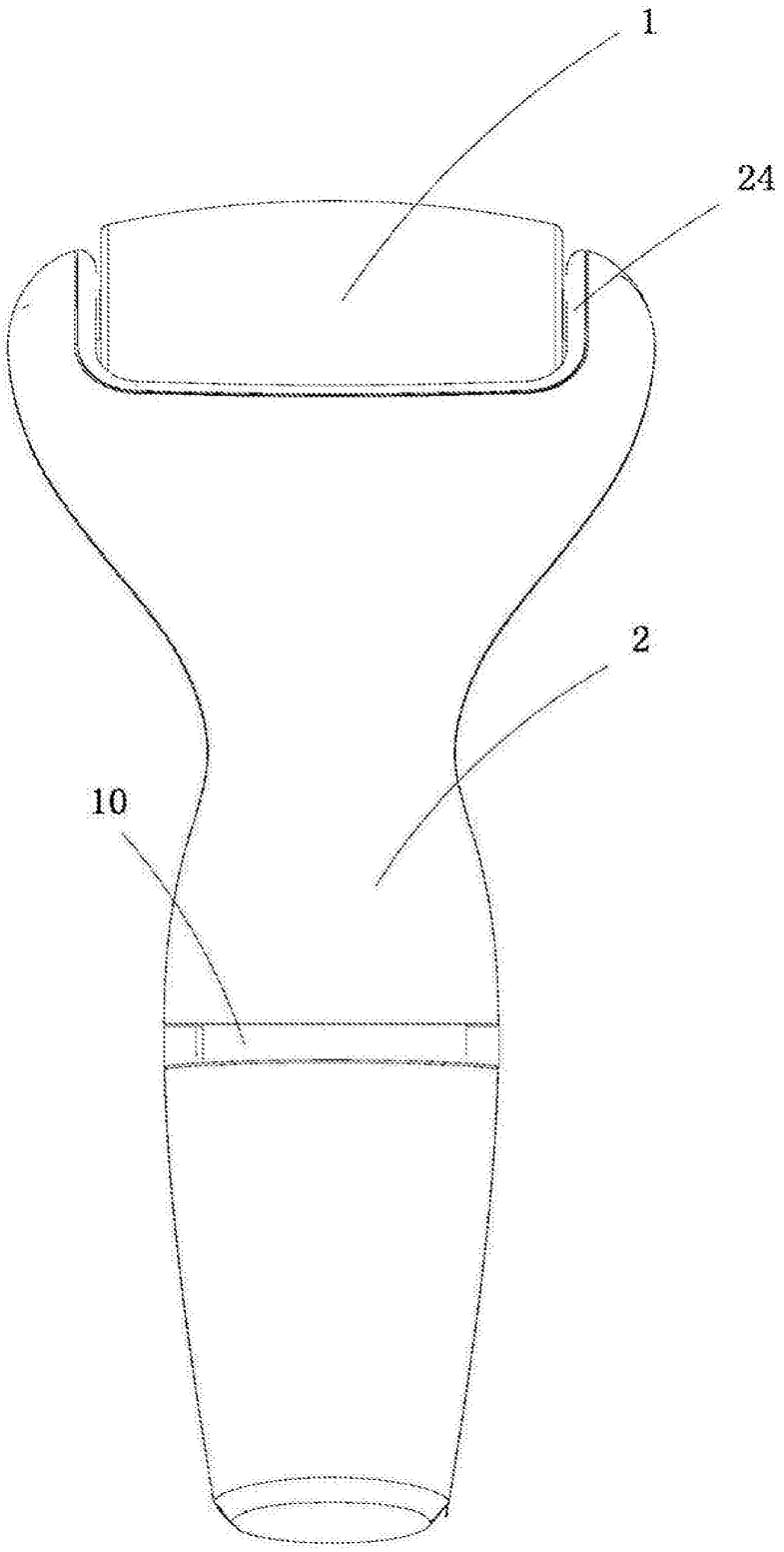


图1

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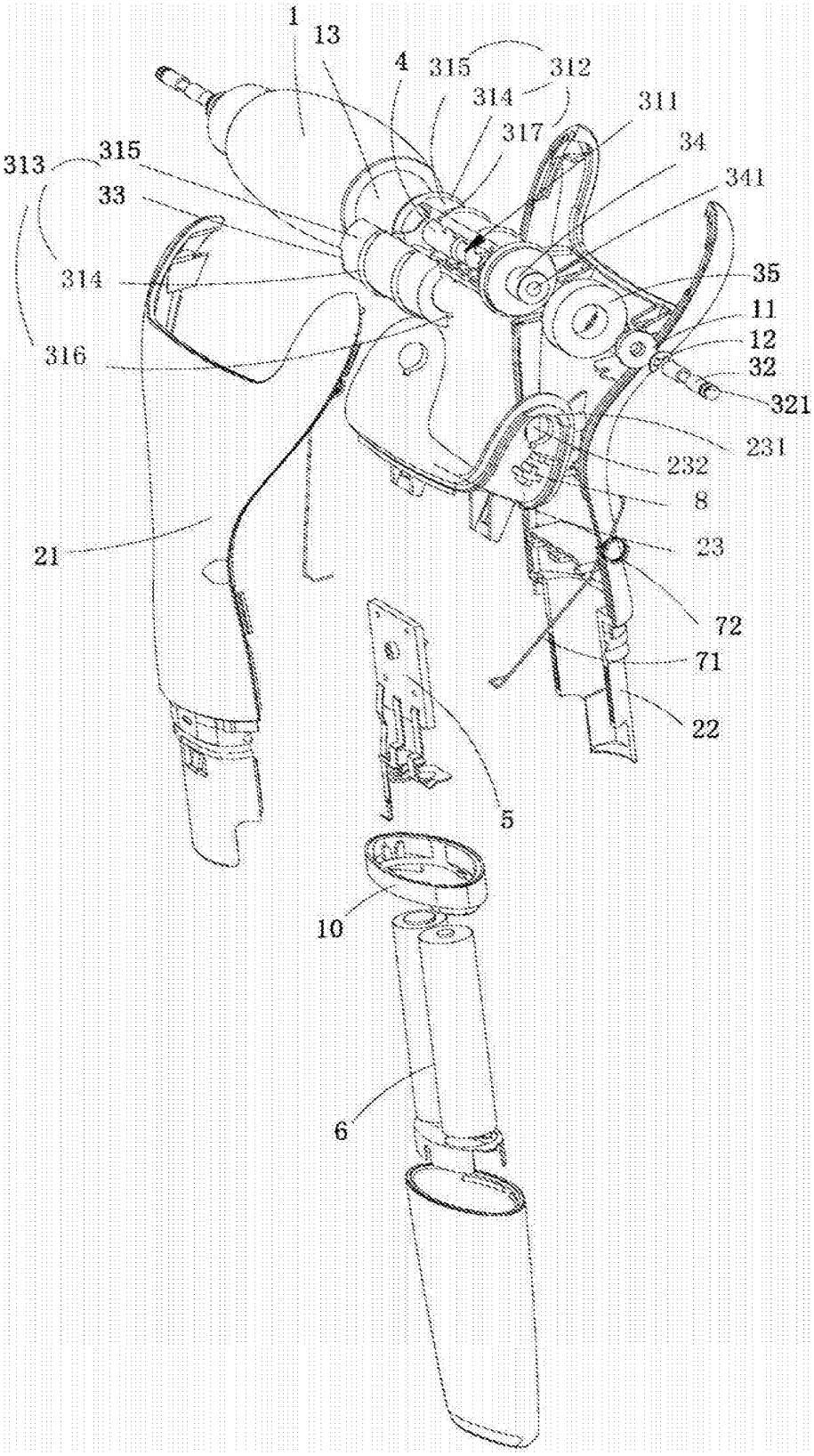


图2

Petitioner Therabody Ex-1004, 1341

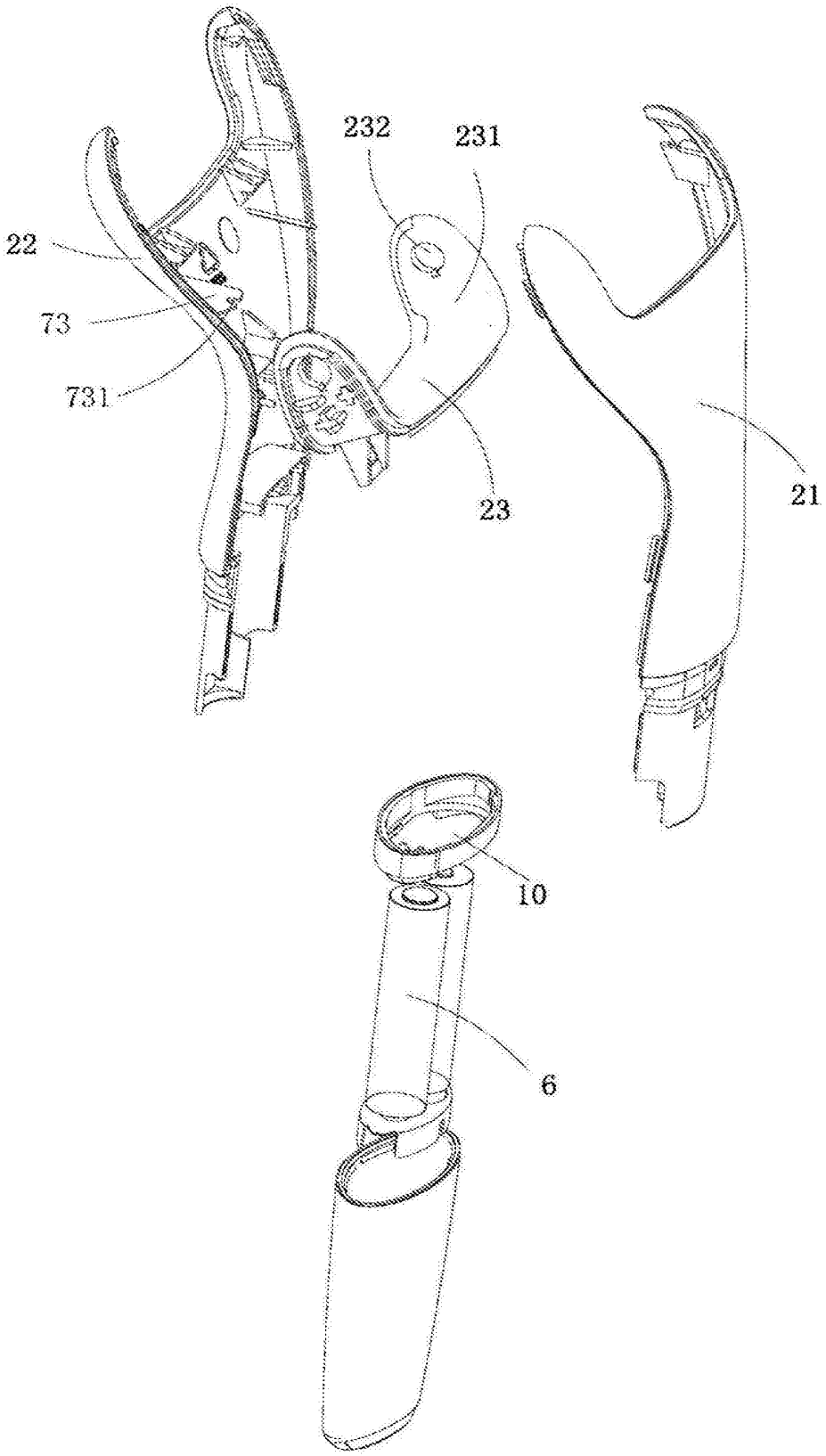


图3

Petitioner Therabody Ex-1004, 1342

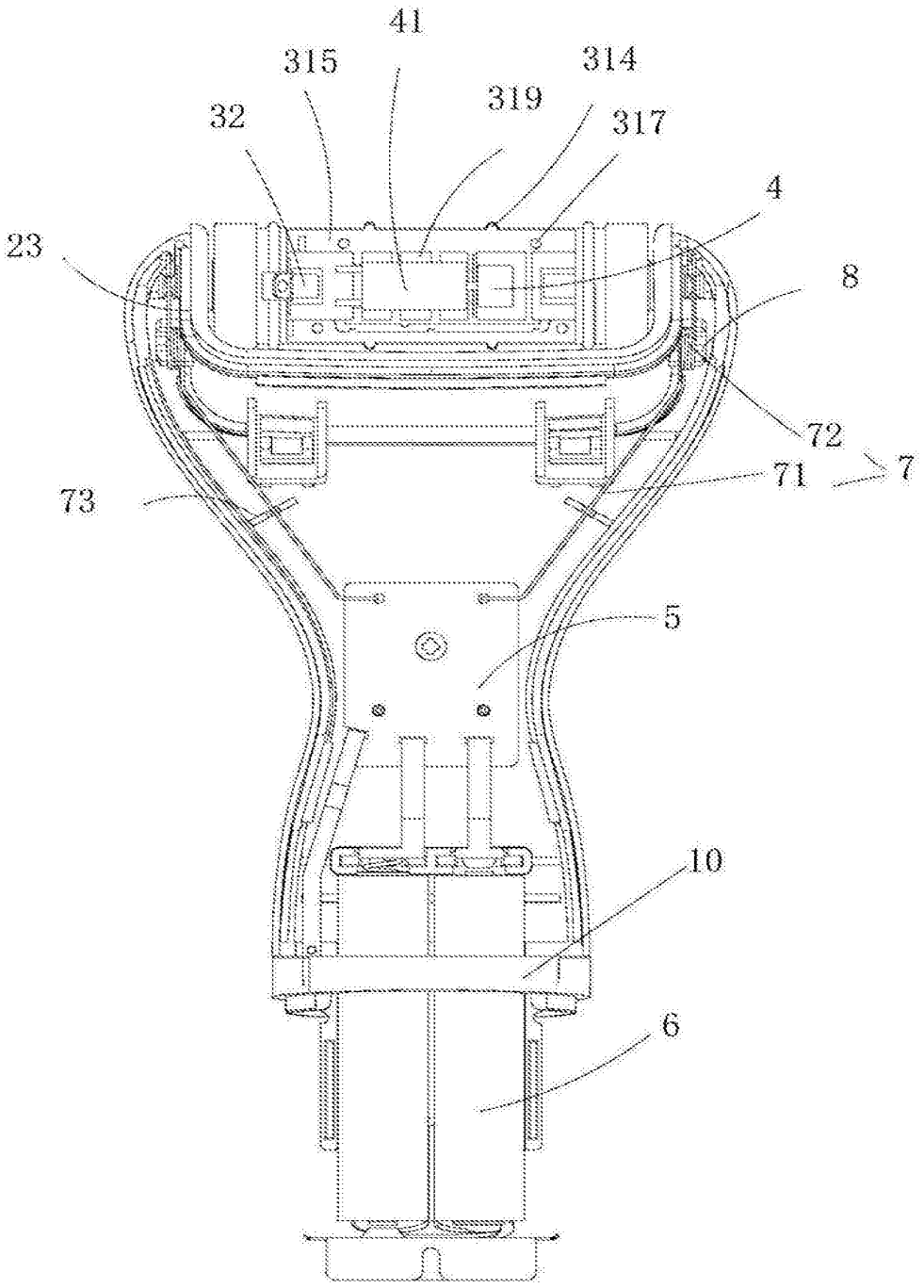


图4

Petitioner Therabody Ex-1004, 1343

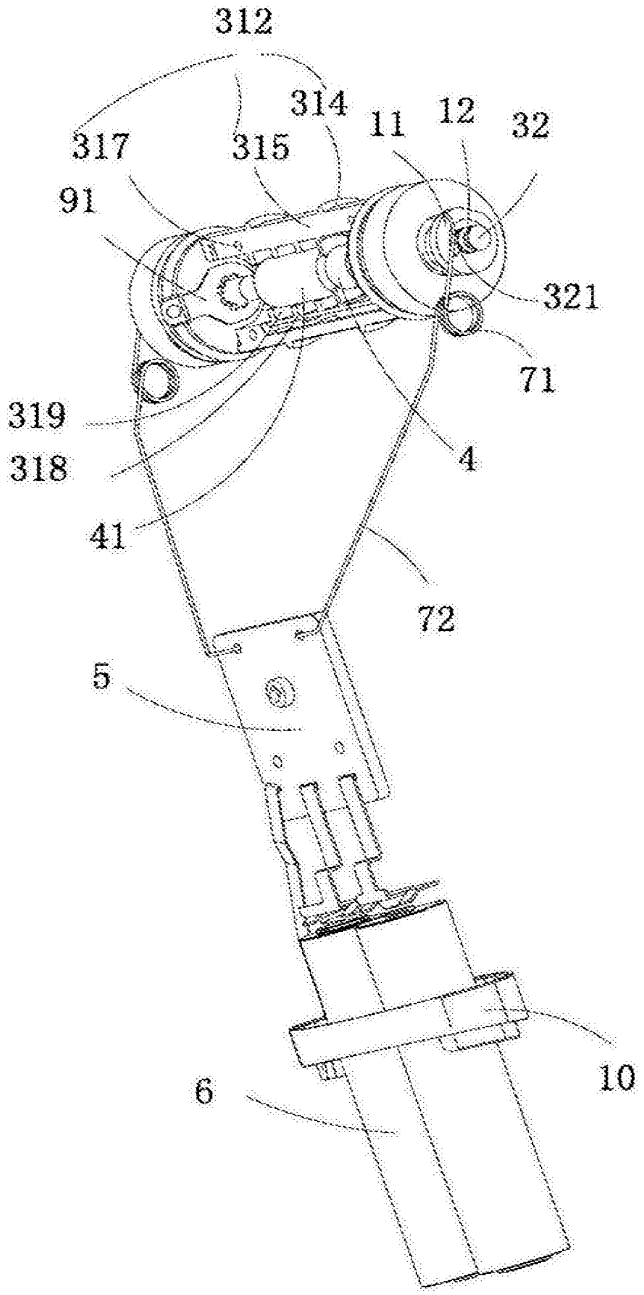


图5

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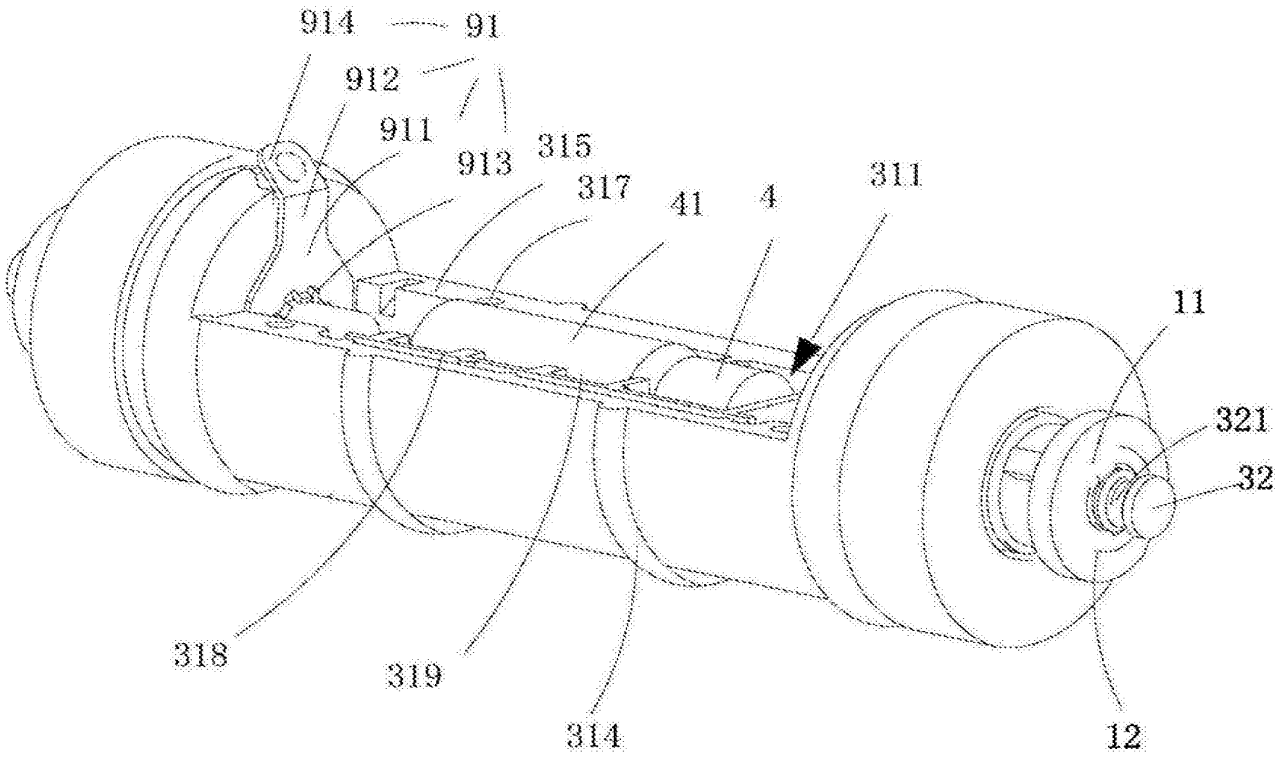


图6

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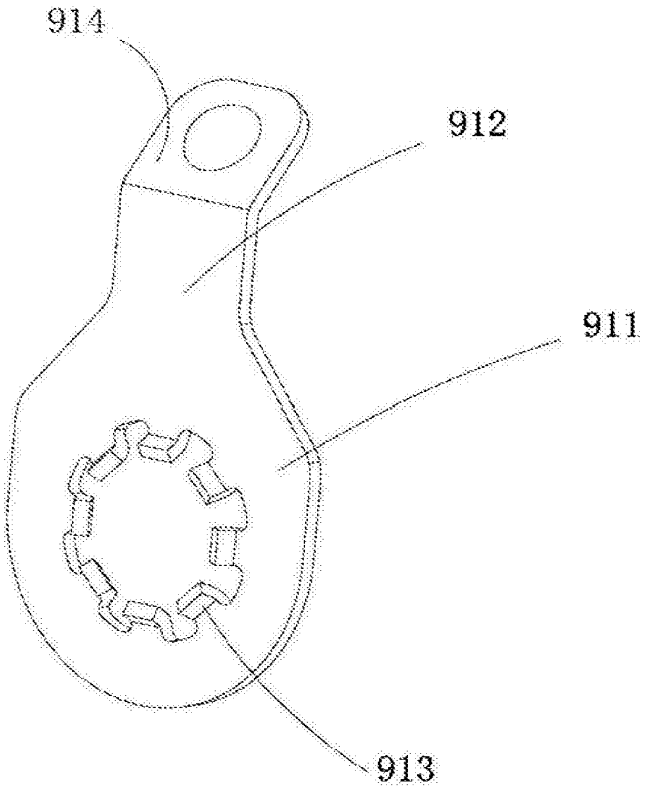


图7

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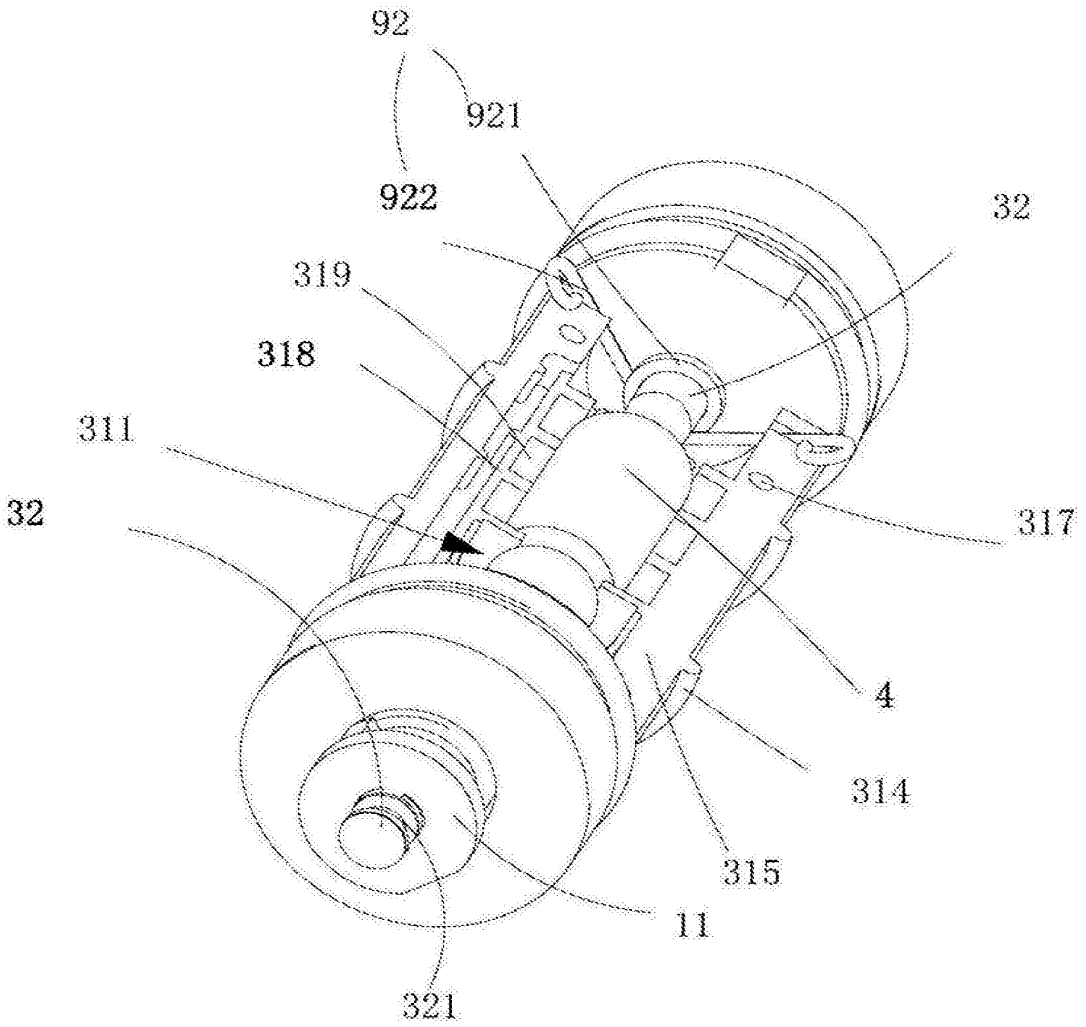


图8

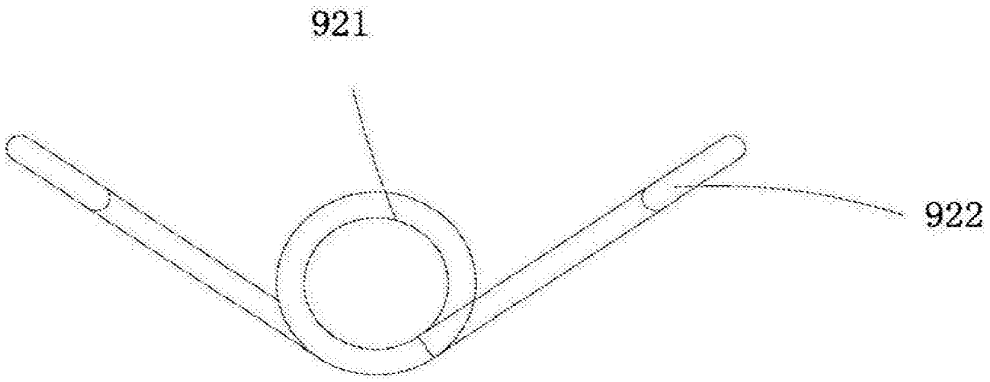


图9

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Espacenet

Bibliographic data: JPH034852 (A) — 1991-01-10

MASSAGE MACHINE

Inventor(s): FUKUOKA TOSHIO + (FUKUOKA TOSHIO)

Applicant(s): TERANISHI ELECTRIC WORKS + (TERANISHI DENKI SEISAKUSHO:KK)

Classification: **- international:** ***A61H23/02; A61H7/00; A61N1/32;*** (IPC1-7): A61H7/00; A61N1/32

- cooperative:

Application number: JP19890137997 19890531

Priority number(s): JP19890137997 19890531

Also published as: JP2781408 (B2)

Abstract of JPH034852 (A)

PURPOSE:To efficiently give a satisfactory influence to a human body from a standpoint different from that of a conventional massage machine by forming a treatment part and a grip part of a pair of electrodes, and providing a timer circuit to alternatively operate a driving circuit making a driving mechanism into a movable state, and a low frequency generating circuit.
CONSTITUTION:When a main switch 35 is set in a turning ON state, a timer circuit 39 is operated. While a light emitting diode 65 is emitted, a photo-DIAC 46 in a motor driving circuit 37 is turned on and an optical switch 45 is set in a turning ON state. With such a state, heads 3 and 4 start reciprocative vibration through a driving mechanism 5 and vibrating shafts 12 and 13 and a treating part 2 in contact with the human body

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executes massage by patting. On the other hand, while the light emitting diode 65 is quenched, the patting is stopped and a light emitting diode 66 is emitted, a low frequency voltage is continuously applied through the treatment part 2 and a grip part 31. Thus, the massage by patting and the application of the low frequency can be alternatively executed.

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DESCRIPTION JPH034852A

[0001]

Λ Hole shell negative [Industrial application field] The present invention relates to a pine surge machine. [Conventional Technique] Conventionally, as a pine surge machine, a pine surge machine having a structure that can be gripped by hand and having a gripping portion for that purpose and a treatment portion for pine surge has been known. With such a pine surge machine (the treatment part vibrates back and forth, the human body is batted, brushed, etc. to perform pine surge. In addition, the gripping part and the treatment part also function as an electrode pair, and a high potential generation circuit is interposed between the electrode pairs. A pine surge machine that applies a high potential to the human body through a pair has also been proposed by the applicant of the present application (Japanese Patent Publication No. 63-72403). This pine surge machine (by alkalizing the human body, it is also effective for headaches, insomnia, allergic diseases, etc. [Problems to be solved by the invention] As described above 1: Conventional pine surge machine; Therefore, from a different aspect from the Matsusurge machine, it was desired to have a positive effect on the human body, and it was expected that the effect would be more efficiently applied to the human body. In the latter pine surge machine, the treatment part that also functions as an electrode] The contact area with the human body becomes smaller or away from the human body due to its reciprocating vibration, and as a result, a high potential is effectively applied to the human body. This is because it may not be possible. It is an object of the present invention (Table) to solve the above-mentioned problems and to provide a pine surge machine that efficiently has a positive effect on the human body from a different aspect from the conventional pine surge machine. I ▦ ▪ The configuration of the present invention that achieves such an object will be described below. [Means for Solving the Problems] A pine surge machine having a treatment portion and a grip portion that reciprocally vibrate by a drive mechanism of the pine surge machine of the present invention, and the treatment portion and the grip portion have no electrode pair. A low-frequency generation circuit is interposed between the electrode pairs, and a drive circuit that makes the drive mechanism movable and a timer circuit that alternately operates the low-frequency generation circuit are provided. [Action] In the Matsusurge machine of the present invention having the above configuration (when the friend timer circuit moves the drive mechanism via the drive circuit, the application of low frequency voltage to the treatment unit is stopped, and the treatment unit vibrates reciprocatingly. .. Therefore, at this time, the pine surge is carried out by batting the human body of one friend.

On the other hand, when the timer circuit activates the low frequency generation circuit (the treatment part is stopped and the treatment part and the grip part that also function as an electrode pair are used to recover from fatigue and promote blood circulation. Neuralgia / myalgia debris. A low frequency voltage (frequency is about 3 to 1200 cycles), which is effective for such purposes, is applied to the human body. Since the timer circuit (upper drive circuit and low frequency generation circuit are operated alternately, pine surge such as batting and low frequency voltage application are alternately performed. Then, when the low frequency voltage is applied (because the treatment unit that also functions as an electrode does not reciprocate, the contact area with the human body can be kept substantially constant, and a constant low frequency voltage can be applied to the human body. [Example] Next, a preferred embodiment of the present invention will be described in detail with reference to the drawings. The schematic configuration of the pine surge machine which is an embodiment of the present invention is shown in FIGS. 1 @ 2 and 3. As shown in each of these figures, the pine surge m111 forms a substantially T-shape and vibrates reciprocally in the axial direction to reciprocate the heads 3 and 4 and the head 3 ° 4 having the treatment portion 2.4a at the tip. It is composed of a drive mechanism 5, a motor 6 that supplies a driving force to the drive mechanism 5, and a control circuit 7 that controls the motor 6. A plurality of protrusions 11 are arranged on the skin contact surface of the treatment unit 2 provided at the tip of the head 3 (mountain, a plurality of protrusions 11 so as to give an appropriate stimulus when directly in contact with the skin. On the other hand, the treatment portion 4 ai; J of the head 4, and any of the skin and clothes are smoothly molded so that pine surge can be performed. Both of these treatment sections are composed of 2.4a (upper, vinyl chloride containing carbon and the like, and other synthetic resins imparted with conductivity. Head 3.41L Each is connected to the vibration shaft 12 13 and vibrates integrally with the tag. It is connected to the vibration shaft 12,131 and the drive mechanism. The connection portion between the vibration shaft 12.13 and the heads 3 and 4 is covered with the head covers 18 and 1b. Drive mechanism 5 (Table is housed inside the housing 20. It meshes with the worm gear 21 (the wheel gear 22) that is pivotally supported by the spindle of the motor 6. A bush 24 is rotatably attached to the bin 23 erected on the side

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surface of the wheel gear 22. This butush 24 (yo is loosely fitted in a rectangular space formed on the side surface of the lever 25. Therefore, when the worm gear 21 and the wheel gear 22 rotate with the rotation of the motor 6, the lever 25 reciprocates while being pressed by the bush 24 via the bin 23. Vibration shafts 12.13 are provided on both end faces in the longitudinal direction of the lever 25, and heads 3 and 4 are attached to the tips of the levers 25 by being pressed against the coil springs 26.27.

Inside the grip portion 31 (above, a control circuit 7 for controlling the operation of the massage machine of the present embodiment is arranged. One terminal 7a it of the control circuit 7 and a neon lamp Ne are connected to the conductive case 6a of the motor 6 via a lead wire 32 interposed therebetween. The conductive treatment portions 2 and 4al of the heads 3 and 4 conduct to the motor case 6a via the vibration shaft 12 ° 13, the housing 20, and the motor mounting bracket 6b. On the other hand, the other terminal 7b of the control circuit 7 is connected to the grip electrode 33 provided on the surface of the grip portion 31 via the lead wire 34. マツサージ t 1 ! 11; E, The vibration state of the head 3.4 arranged on the side surface of the grip portion 31 is changed into three stages of "weak", "strong" (above on state) and "off" by sliding the knob 35a in the direction of arrow A. It is equipped with a main switch 35 for switching, and also has an AC type; a power cable 36 that receives power from the original. A diode 49 is connected between the contacts 35c and 35a of the switch 35. Next 1: The configuration of the control circuit 7 will be described with reference to FIG. The control circuit 7 (the motor drive circuit 37 that drives the motor 6, the low frequency generation circuit 38 that is connected in parallel to the motor drive circuit 37, and the motor drive circuit 37 / low frequency generation circuit 38 are alternately operated. It is composed of a timer circuit 39. The motor drive circuit 37 (composed of the diode 40, the capacitor 41 and the coil 42 in the table) is provided with a bridge rectifier circuit 44 connected to the AC power supply 43 of the OOv. It also includes a timer circuit 39 and an optical switch circuit 45 that is coupled by light to enable the motor drive circuit 37 to be energized, that is, a circuit including a photodiac 46, a triac 47, and a current limiting resistor 48. Further, it is connected to the motor drive circuit 37 (a main switch 35 that can manually turn on / off the connection state with the friend AC power supply 43. Therefore, only when the main switch 35 is on (that is, the knob 35a is set to the "weak" position 35c or the E strong "position 35d) and the optical switch circuit 45 is also turned on, that is, the photo DIAC 46 is illuminated. The motor 6 is rotationally driven only when a signal is incident. It differs as follows depending on the rotational state of the motor 6 (the upper knob 35a is set to the "strong" or "weak" position. When the knob 35a of the main switch 35 is set to the "off" position 35b to the "less than 1" position 35c, the diode 49 is interposed between the AC power supply 43 and the motor drive circuit 37, and half-wave rectification is performed. Become.

Therefore, half the power when full-wave rectification is supplied to the motor 6, and the motor 6 rotates relatively slowly. On the other hand, when set to the "strong" position 35d, the contacts 35b and 35d are connected, and the current from the AC power supply 43 flows directly into the bridge rectifier circuit 44. Therefore, the current is full-wave rectified, and the motor 6 rotates relatively fast. The low frequency generation circuit 38 (the timer circuit 39 and the phototransiter 50 coupled by light can be used as a boundary, and the front stage 51a and the rear stage 51b can be considered separately. The first stage 51a1. t. It consists of a transformer 52 connected to the AC power supply 43 via the main switch 35, a second bridge rectifier circuit connected to the output side of the transformer 52 and composed of four diodes 53, and a capacitor 54. With the front stage 51 a Lt and the main switch 35 of the low frequency generation circuit 38 turned on, a rectified and smoothed constant voltage is output from the AC power supply 43. A block oscillation circuit 56 composed of a low frequency generation circuit 38 rear stage 51bl & an oscillation transformer 55 (-second side turns 400T, secondary side turns 1200T), and a diode connected to one terminal on the secondary side of the oscillation transformer 55. It is composed of 57 and the above-mentioned neon lamp Ne connected to the other terminal. The block oscillation circuit 56 (Table: 4k oscillation transistor 58 and resistor 59 of the oscillation transformer 55 is provided. One end of the primary coil of the oscillating transformer (mountain resistor 59 is connected to the base of the oscillating transistor 58, and the other end is connected to the collector of the oscillating transistor 58. Then, one of the output terminals of the rectifier circuit of the front stage 51a is connected to the emitter of the oscillation transistor 58.-The other output terminal of the rectifier circuit of the front stage 51a is connected to the intermediate tap MT of the next coil via the phototransistor 50. Has been done. In the rear stage 51b of the low frequency generation circuit 38 having such a configuration (only when light is incident on the upper phototransistor 50, the rectified and smoothed current from the front stage 51a flows into the block oscillation circuit 56, and as a result, the oscillation transformer 55 and the oscillation transformer 55 The primary side circuit composed of the oscillating transistor 58 oscillates at about 1000 [Hz]. Along with this, a voltage of about 100 is generated on the secondary side of the oscillation transformer 55. One terminal on the secondary side of the oscillation transformer 55 (in the table, through the diode 57 for rectification, the grip electrode 33 that functions as a positive electrode, and the other terminal is a neon lamp on the treatment unit 2.4a that also functions as a negative electrode. It is connected via Ne.

Therefore, in a state where the treatment unit 2 or 4a is in contact with the human body and the grip portion 31 is gripped by hand (a closed circuit having a friend human body as a part is formed, a low frequency voltage is applied to the human body. It becomes. In the state where the low frequency voltage is applied to the human body, the neon lamp Ne blinks and functions as a pilot lamp. Timer circuit 39 (Friend AC power supply 43, resistor 60. A rectifier circuit consisting of a diode 61 and a capacitor 62, a Zena diode 63 connected in parallel to this rectifier circuit to stabilize the voltage, a timer IC 64 equipped with an external circuit for the purpose of determining the time constant, and two light emitting sources. It is a known circuit including a diode 65.66. In such a timer circuit 39, when the main switch 35 is on, a voltage stabilized by a rectifying smoothing tag Zener diode 63 is applied to the timer IC 64 and peripheral circuits by a rectifying circuit composed of a diode 61 and a capacitor 62. ... Timer 1c6411 The light emitting diode 65 and the light emitting diode 66 are made to emit light alternately according to the time constant of the peripheral circuit. In this embodiment, the light emitting diode 65 emits light alternately for 15 seconds, and the light emitting diode 66 emits light alternately for 3 seconds. When the light emitting diode 65 is lit, the phototriac 46 coupled with the light emitting diode 65 is turned on by this light, and when the light emitting diode 66 is ignited, the phototransistor 50 is turned on. Therefore, the turn-on side of the motor drive circuit 37 and the low frequency generation circuit 38 operates alternately. Next, the operation of the pine surge machine 1 having such a configuration will be described with reference to FIG. 1 @ FIG. Set the main switch 35 to the on state ("weak" or 1 strong "). Next 1: Hold the grip portion 31 by hand and bring one

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of the treatment portions 2 and 4a of the heads 3 and 4 into contact with the human body. For example, a case where the treatment unit 2 is brought into contact with the human body will be described. Since the main switch 35 is in the ON state, the timer circuit 39 operates, the light emitting diode 65 emits light for 15 seconds, and the light emitting diode 66 emits light for 3 seconds, and the pattern is alternately repeated. The photodiac 46 in the r81 motor drive circuit 37, where the light emitting diode 65 is emitting light, turns on, and the optical switch circuit 45 turns on. Therefore, the motor drive circuit 37 is energized, and the current from the AC power supply 43 is half-wave rectified or full-wave rectified.

Along with this, the heads 3 and 4 start reciprocating vibration via the drive mechanism 5 and the vibration shaft 12.13, and the treatment unit 2 in contact with the human body continues for the light emission time (15 seconds) of the light emitting diode 65. Then, the pine surge by putting is carried out. On the other hand, the light emitting diode 65 is extinguished, the putting is stopped, and the phototransistor 50 in the r81 low frequency generation circuit 38 in which the light emitting diode 66 is emitting light is turned on. As a result, the low frequency voltage is continuously applied to the human body through the treatment unit 2 and the grip portion 31 for the light emission time of the light emitting diode 66 (3 seconds in this embodiment). .. Since the application time of the low frequency voltage is set to 3 seconds, the user can continue to use the pine surge machine without worrying that the pine surge machine may have stopped. In this way, the pine surge by putting and the low frequency addition are alternately carried out. As described above, the pine surge machine of this embodiment (the putting of two types of treatment units 2 and 4a that can give different stimuli depending on the surface condition) promotes blood circulation, recovers from fatigue, neuralgia / myalgia. It is possible to apply a low frequency voltage of about 1000 [Hzt, which can exert the effect such as relaxation of the above, and also exert the effect different from this putting, to the user. Therefore, those effects can be doubled and exerted on the user. It also has the effect of being able to deal with gate that recovers particularly well by applying a low frequency voltage, such as peripheral nerve paralysis. The pine surge machine of this embodiment (which is extremely economical and rational) can exert such an effect by a single i + t. Moreover, since the pine surge and the low frequency voltage application by putting the 2 ° 4a of the treatment unit are alternately performed by the control of the timer circuit 39, the treatment units 2 and 4a functioning as electrodes are stopped when the low frequency voltage is applied. The fluctuation of the contact area with the human body is prevented. The low frequency voltage can be efficiently applied to the user. Although the examples of the present invention have been described above, the present invention is not limited to these examples, for example, by further adding a switch to the control circuit, batching only, low frequency addition only, putting and low. it goes without saying that it can be carried out in various embodiments as long as it does not deviate from the gist of the present invention, such as a configuration in which three operations of alternating with frequency application can be appropriately selected. A §§ dan 4 treatment As described in detail above, the pine surge machine of the present invention has the effects of promoting blood circulation, recovering from fatigue, relieving neuralgia and myalgia, etc. by putting on the human body due to the reciprocating motion of the treatment part. It can be exerted on the human body, and in addition, such an effect can be exerted on the human body by applying a low frequency voltage which is a stimulus different from putting or the like.

Therefore, it has the effect of doubling those effects and exerting them on the human body. It also has the effect of coping with diseases such as peripheral nerve paralysis, which recovers particularly well by applying a low frequency voltage. Further} :, Matsusurge machine of the present invention (above, since the above effect can be exhibited by a single machine, it is an extremely economical and rational machine. Moreover, since the pine surge by putting and the like are alternately applied to the low frequency voltage, the treatment part that functions as an electrode is stopped when the low frequency voltage is applied, and as a result, the fluctuation of the contact area with the human body is prevented. The voltage can be applied efficiently.

[0002]

A brief description of the drawing

[0003]

FIG. 1 is a vertical crossing plate of the pine surge machine according to an embodiment of the present invention, FIG. 2 is a cross-sectional plate thereof, FIG. Is.

] ... Mamatsu Surge tlL2 ... Treatment unit 3,4 ... Head, 5-... Driver (Otori 6 ... Motor, 7 ... Control circuit, 37 ... Motor drive circuit, 38 ... · Low frequency generation circuit, 39 ... Timer circuit

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1.

A massage machine having a treatment portion and a grip portion that vibrates reciprocally with the above device. The treatment portion and the grip portion form an electrode pair, and a low frequency generation circuit is interposed between the electrode pairs to form the drive mechanism. A massage machine provided with a timer circuit that alternately operates a drive circuit that makes the device movable and the low frequency generation circuit.

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(19)日本国特許庁（ＪＰ）　(12)特　許　公　報（Ｂ２）　(11)特許番号

第2781408号

(45)発行日　平成10年(1998)７月30日　(24)登録日　平成10年(1998)５月15日

(51)Int.Cl.[6]	識別記号	ＦＩ	
Ａ６１Ｈ　7/00	３００	Ａ６１Ｈ　7/00	３００Ｊ
23/02	３５４	23/02	３５４
Ａ６１Ｎ　1/32		Ａ６１Ｎ　1/32	

請求項の数１(全　8　頁)

(21)出願番号　特願平1－137997

(22)出願日　平成１年(1989)５月31日

(65)公開番号　特開平3－4852

(43)公開日　平成３年(1991)１月10日

審査請求日　平成７年(1995)12月20日

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最終頁に続く

(54)【発明の名称】　マッサージ機

(57)【特許請求の範囲】

【請求項１】駆動機構により往復振動する施療部と、把持部とを有するマッサージ機であって、
前記施療部と前記把持部とは電極対をなし、
該電極対間に低周波発生回路を介装し、
前記駆動機構を可動状態とする駆動回路と、前記低周波発生回路とを交互に作動するタイマ回路を設けたマッサージ機。

【発明の詳細な説明】

発明の目的

［産業上の利用分野］

本発明はマッサージ機に関する。

［従来の技術］

従来から、マッサージ機として、手で把持可能な構成であって、そのための把持部と、マッサージのための施療部とを備えたものが知られている。かかるマッサージ機では、施療部が往復振動して、人体をパッティング、ブラッシング等することによってマッサージを行なう。

また、把持部と施療部とを電極対としても機能させた上で、その電極対間に高電位発生回路を介装した構成とし、施療部によるマッサージの実施と同時にこの高電位発生回路から電極対を通して、人体に高電位を印加するマッサージ機も、本願出願人によって提案されている（実公昭63－72403号公報）。このマッサージ機は、人体をアルカリ化することによって、頭痛、不眠症、アレルギー性疾患等に対しても効果がある。

［発明が解決しようとする課題］

このように、従来のマッサージ機は、機械的、物理的刺激によって人体に良い影響をもたらすが、マッサージ機を利用する人々は、いろいろな症状・体質・状態にあ

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ることから、かかるマッサージ機とは異なる面から、人体に好影響を与えるものが望まれていた。

そして、その影響をより効率的に人体に付与するものが期待されていた。と言うのは、前記したもののうち後者のマッサージ機では、電極としても機能する施療部は、その往復振動のために、人体と接触面積が小さくなったり、人体から離れたりし、その結果高電位を有効に人体に付与しない場合があるからである。

本発明は、上記課題を解決し、従来のマッサージ機とは異なる面から人体に好影響を効率よく与えるマッサージ機を提供することを目的とする。

発明の構成

かかる目的を達成する本発明の構成について以下説明する。

［課題を解決するための手段］

本発明のマッサージ機は、駆動機構により往復振動する施療部と、把持部とを有するマッサージ機であって、

前記施療部と前記把持部とは電極対をなし、

該電極対間に低周波発生回路を介装し、

前記駆動機構を可動状態とする駆動回路と、前記低周波発生回路とを交互に作動するタイマ回路を設けたものである。

［作用］

上記構成を有する本発明のマッサージ機では、タイマ回路が駆動機構を介して駆動機構を可動させるときには、施療部への低周波電圧付与は停止し、施療部が往復振動する。そのため、このときには、人体がパッティング等されることによってマッサージが実施される。

一方、タイマ回路が低周波発生回路を作動させたときには、施療部は停止し、電極対としても機能する施療部と把持部とから、疲労回復、血行の促進、神経痛・筋肉痛の緩解等に効果のある低周波（振動数は３～1200サイクル程度）の電圧を人体に付与する。

タイマ回路は、駆動回路と低周波発生回路とを交互に作動させるので、パッティング等のマッサージと低周波電圧付与とが交互に実施される。そして、その低周波電圧付与時には、電極としても機能する施療部は往復振動していないため、人体との接触面積を実質一定に保つことができ、一定の低周波電圧を人体に付与できる。

［実施例］

次に本発明の好適な実施例を図面に基づいて詳細に説明する。本発明の一実施例であるマッサージ機の概略構成を第１図、第２図および第３図に示す。

これらの各図に示すように、マッサージ機１は、略Ｔ字型を成し、軸方向に往復振動し、先端部に施療部２、4aを有するヘッド3,4、ヘッド3,4を往復振動される駆動機構５、駆動機構５に駆動力を供給するモータ６およびこれを制御する制御回路７から構成されている。

ヘッド３の先端に設けられた施療部２の皮膚接触面には、直接皮膚に接触させたときに、適切な刺激を与えるように複数の突起11が配設されている。一方、ヘッド４の施療部4aは、皮膚および衣服の上からの何れでもマッサージできるように平滑に成形されている。これら両施療部２、4aは、カーボン等を含む塩化ビニル等、導電性を付与された合成樹脂から構成されている。ヘッド3,4は、各々、振動軸12,13に接続され、一体的に振動する。振動軸12,13は、駆動機構５に連結されている。なお、振動軸12,13とヘッド3,4の接続部はヘッドカバー1a,1bで覆われている。

駆動機構５は、ハウジング20内部に収納されている。モータ６の主軸に軸支されたウォームギヤ21は、ホイールギヤ22と噛合している。この、ホイールギヤ22の側面に立設されたピン23にはブッシュ24が回動自在に取り付けられている。このブッシュ24は、レバー25の側面に形成された長方形の空間部に遊嵌されている。従って、モータ６の回転に伴って、ウォームギヤ21、ホイールギヤ22が回転すると、ピン23を介し、ブッシュ24に押圧されてレバー25は往復振動する。

レバー25の長手方向両端面には、各々振動軸12,13が設けられており、その先端にはヘッド3,4がコイルスプリング26,27に押圧付勢されて取り付けられている。

把持部31の内側には、本実施例のマッサージ機の動作を制御する制御回路７が配設されている。制御回路７の一方の端子7aは、ネオンランプNeが介装されたリード線32を介してモータ６の導電性ケース6aに接続されている。ヘッド3,4の導電性を有する施療部2,4aは、振動軸12,13、ハウジング20、モータ取付ブラケット6bを介してモータケース6aに導通している。一方、制御回路７の他方の端子7bは、リード線34を介して把持部31表面に設けられた把持電極33に接続されている。

マッサージ機１は、把持部31側面に配設されヘッド3,4の振動状態を、つまみ35aを矢印Ａ方向に滑らせて「弱」、「強」（以上オン状態）「オフ」の３段階に切り換えるメインスイッチ35を備え、また交流電源からの供給を受ける電源ケーブル36を備えている。なお、スイッチ35の接点35c,35d間にはダイオード49が接続されている。

次に、制御回路７の構成を、第４図に従って説明する。制御回路７は、モータ６を駆動するモータ駆動回路37と、このモータ駆動回路37に並列に接続されている低周波発生回路38と、モータ駆動回路37・低周波発生回路38を交互に作動するタイマ回路39とから成る。

モータ駆動回路37は、ダイオード40、コンデンサ41及びコイル42から成り100Vの交流電源43につながるブリッジ整流回路44を備えている。またタイマ回路39と光によりカップリングされてこのモータ駆動回路37を通電可能な状態とする光スイッチ回路45、即ちフォトダイアック46とトライアック47と限流用の抵抗器48とから成る回路も備えている。更に、このモータ駆動回路37は、交流電源43との接続状態を手動でオン・オフすることができる

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メインスイッチ35と接続されている。従って、メインスイッチ35がオン状態（即ちつまみ35aが「弱」位置35cまたは「強」位置35dにセットされた状態）で、しかも光スイッチ回路45もオンとなったときのみ即ちフォトダイアック46に光信号が入射したときのみ、モータ６は回転駆動する。

モータ６の回転状態は、つまみ35aを「強」または「弱」のどちらの位置にセットするかにより、次のように異なる。

メインスイッチ35のつまみ35aを「オフ」位置35bから「弱」位置35cにセットすると、交流電源43とモータ駆動回路37との間にはダイオード49が介在することとなり、半波整流されることとなる。そのため、モータ６には全波整流される場合の半分の電力が供給され、比較的遅く回転する。一方、「強」位置35dにセットすると、接点35bと35dとが接続され、交流電源43からの電流は直接ブリッジ整流回路44に流れ込む。従って、電流は全波整流されることとなり、モータ６は比較的速く回転する。

低周波発生回路38は、タイマ回路39と光により結合されたフォトトランジスタ50を境にして、前段51aと後段51bとに分けて考えることができる。その前段51aは、交流電源43にメインスイッチ35を介してつながるトランス52と、このトランス52の出力側につながり４つのダイオード53から成る第２のブリッジ整流回路及びコンデンサ54から成る。かかる低周波発生回路38の前段51aは、メインスイッチ35がオンとされた状態で、交流電源43から整流平滑した定電圧を出力する。

低周波発生回路38の後段51bは、発振用トランス55（一次側巻数400T:二次側巻数1200T）等からなるブロック発振回路56と、その発振トランス55の二次側の一方の端子につながるダイオード57と、他方の端子につながる前述したネオンランプNeとからなる。

上記ブロック発振回路56は、発振用トランス55の他、発振用トランジスタ58と抵抗器59とを備える。発振用トランスの一次側コイルの一端は、抵抗器59を介して発振用トランジスタ58のベースに、他端は発振用トランジスタ58のコレクタに各々接続されている。そして、発振トランジスタ58のエミッタに、前段51aの整流回路の出力端子の一方が接続され、一次側コイルの中間タップMTに、フォトトランジスタ50を介して前段51aの整流回路の他方の出力端子が接続されている。

かかる構成の低周波発生回路38の後段51bでは、フォトトランジスタ50に光が入射したときのみ、前段51aからの整流平滑化された電流が、ブロック発振回路56に流れ込み、その結果発振トランス55と発振トランジスタ58で構成された一次側回路がおよそ1000［Hz］で発振する。それに伴って、発振トランス55の二次側におよそ100程度の電圧が発生する。

発振トランス55の二次側の一方の端子は、整流用のダイオード57を介して、プラス極として機能する把持電極33に、他方の端子はマイナス極としても機能する施療部２・4aにネオンランプNeを介して接続されている。従って、施療部２または4aを人体に接触させ且つ把持部31を手で把持している状態では、人体を一部とする閉回路が構成され、人体内に低周波電圧が付与されることとなる。なお、低周波電圧が人体に付与されている状態で、ネオンランプNeは点滅しパイロットランプとして機能する。

タイマ回路39は、交流電源43に対し、抵抗器60,ダイオード61及びコンデンサ62から成る整流回路と、この整流回路に並列に接続され、電圧を安定するツェナダイオード63と、時定数決定等の目的を持った外付回路を備えるタイマIC64と、２つの発光ダイオード65,66とからなる公知の回路である。

かかるタイマ回路39では、メインスイッチ35がオンの状態のとき、ダイオード61とコンデンサ62から成る整流回路によって整流平滑化され、ツェナダイオード63によって安定化された電圧がタイマIC64と周辺回路に付与される。タイマIC64は、周辺回路の時定数に従って、発光ダイオード65と発光ダイオード66とを交互に発光させる。本実施例では、発光ダイオード65は15秒間、発光ダイオード66は３秒間交互に発光する。発光ダイオード65が点灯するとこれとカップリングされたはフォトトライアック46がこの光でターンオンし、発光ダイオード66が点火するとフォトトランジスタ50がターンオンする。従って、モータ駆動回路37と、低周波発生回路38のうちターンオンした側が交互に動作することとなる。

次に、このような構成のマッサージ機１の作動について、第１図、第４図に基づいて説明する。

メインスイッチ35をオンの状態（「弱」、または「強」）にセットする。次に、手で把持部31を持ち、ヘッド3,4の施療部2,4aの何れか一方を人体に接触させる。例えば、施療部２を人体に接触させた場合について説明する。

メインスイッチ35がオンの状態となっているので、タイマ回路39が作動し、発光ダイオード65が15秒間発光し、発光ダイオード66が３秒間発光するパターンが交互に繰り返される。

発光ダイオード65が発光している間、モータ駆動回路37内のフォトダイアック46がターンオンし、光スイッチ回路45がオンの状態となる。従って、モータ駆動回路37が通電状態となり、メインスイッチ35の設定に従って、交流電源43からの電流が半波整流あるいは全波整流され、モータ６が回転する。これに伴い、駆動機構５、振動軸12,13を介してヘッド3,4が往復振動を開始し、人体に接触している施療部２が、発光ダイオード65の発光時間（15秒間）だけ継続してパッティングによるマッサージを実施する。

一方、発光ダイオード65が消光して、パッティングが

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停止し、発光ダイオード66が発光している間、低周波発生回路38内のフォトトランジスタ50がターンオンする。その結果、施療部２と把持部31を介して人体内への低周波電圧が付与がされ、発光ダイオード66の発光時間（本実施例では３秒間）だけ継続して低周波電圧が付与される。なお、低周波電圧の付与時間を３秒間に設定したので、使用者がマッサージ機が停止したのではないかという不安感を抱くことなく、引き続いてマッサージ機を使用することができる。

この様にして、パッティングによるマッサージと、低周波付与とが交互に実施される。

以上説明したように本実施例のマッサージ機は、表面状態の違いにより付与する刺激を異なるものとすることができる２種類の施療部2,4aのパッティングによって、血行促進、疲労回復、神経痛・筋肉痛の緩解等の効能を発揮することができ、しかもこのパッティングとは違った面からかかる効能を発揮する1000［Hz］程度の低周波電圧をも使用者に付与することができる。従って、それら効能を倍加して使用者に及ぼすことができる。また、低周波電圧付与によって特に良く回復する疾患、例えば末梢神経まひにも併せて対処できるという効果もある。

かかる効果を単一の機械によって発揮することができる本実施例のマッサージ機は、極めて経済的且つ合理的なものである。しかも、施療部の2,4aのパッティングによるマッサージと低周波電圧付与とをタイマ回路39の制御により交互に行なうので、低周波電圧付与時には、電極として機能する施療部2,4aが停止する結果、人体との接触面積の変動が防止され、低周波電圧を効率よく使用者に付与することができる。

以上本発明の実施例について説明したが、本発明はこうした実施例に何等限定されるものではなく、例えば制御回路に更にスイッチを加えて、パッティングのみ、低周波付与のみ、パッティングと低周波付与との交互実施の３つの動作を適宜選択できる構成等、本発明の要旨を逸脱しない範囲において、種々なる態様で実施し得ることは勿論である。

発明の効果

以上詳記したように本発明のマッサージ機によれば、その施療部の往復運動に伴う人体へのパッティング等によって、血行促進、疲労回復、神経痛・筋肉痛の緩解等の効能を人体に及ぼすことができ、加えてパッティング等とは違った刺激である低周波電圧の付与によっても、かかる効能を人体に及ぼすことができる。従って、それら効能を倍加して人体に及ぼすことができるという効果を奏する。また、低周波電圧付与によって特に良く回復する末梢神経まひ等の疾患にも併せて対処できるという効果もある。

更に、本発明のマッサージ機は、上記効果を単一の機械によって発揮することができるため、極めて経済的且つ合理的な機械である。

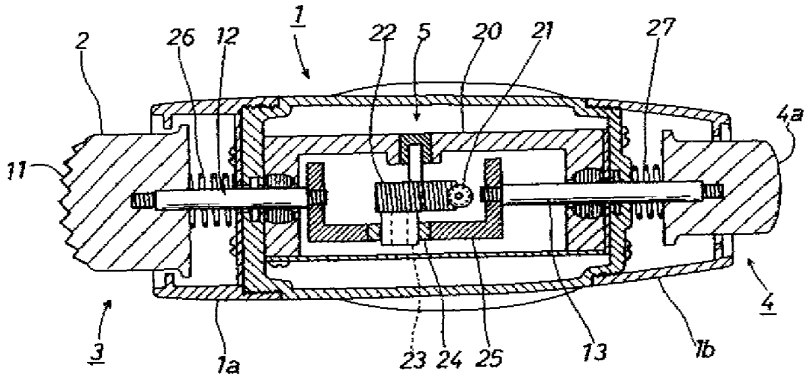
しかも、パッティング等によるマッサージと低周波電圧付与とを交互に行なうので、低周波電圧付与時には、電極として機能する施療部は停止し、その結果、人体との接触面積の変動が防止され、低周波電圧を効率よく付与することができる。

【図面の簡単な説明】

第１図は本発明一実施例のマッサージ機の縦断面図、第２図は同じくその横断面図、第３図は同じくその施療部の分解図、第４図は同じくその制御回路の構成を示す回路図である。

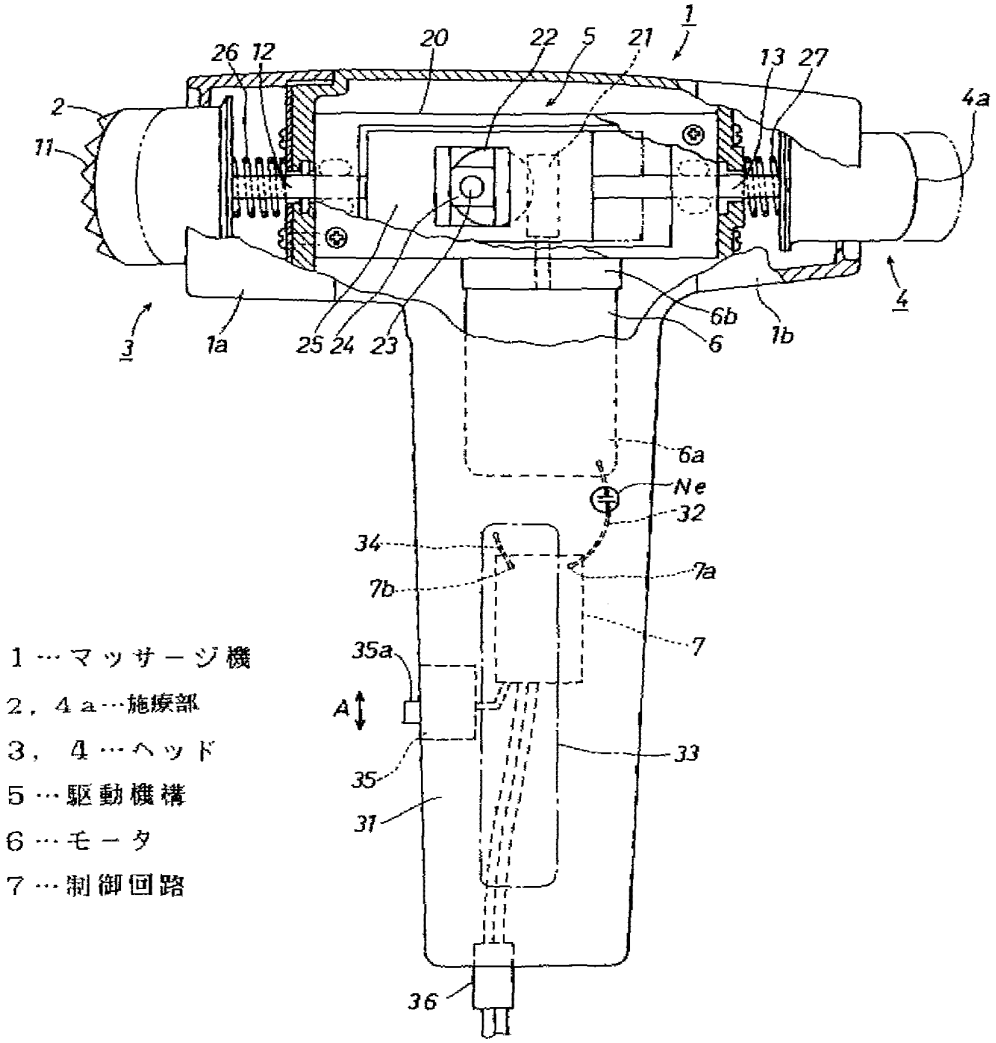
１……マッサージ機、２……施療部、3,4……ヘッド、５……駆動機構、６……モータ、７……制御回路、37……モータ駆動回路、38……低周波発生回路、39……タイマ回路

【第２図】



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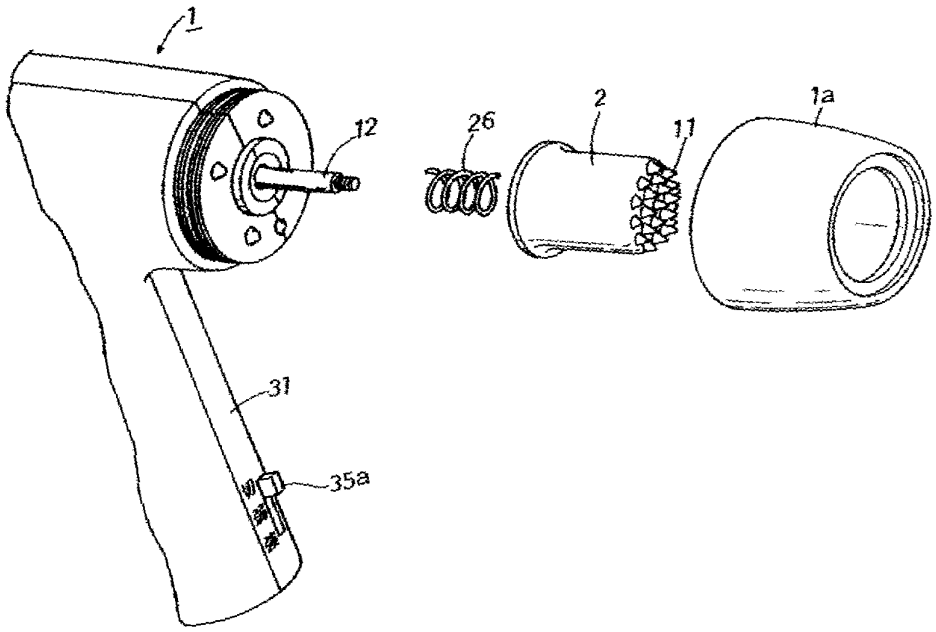
【第１図】



１…マッサージ機
２，４ａ…施療部
３，４…ヘッド
５…駆動機構
６…モータ
７…制御回路

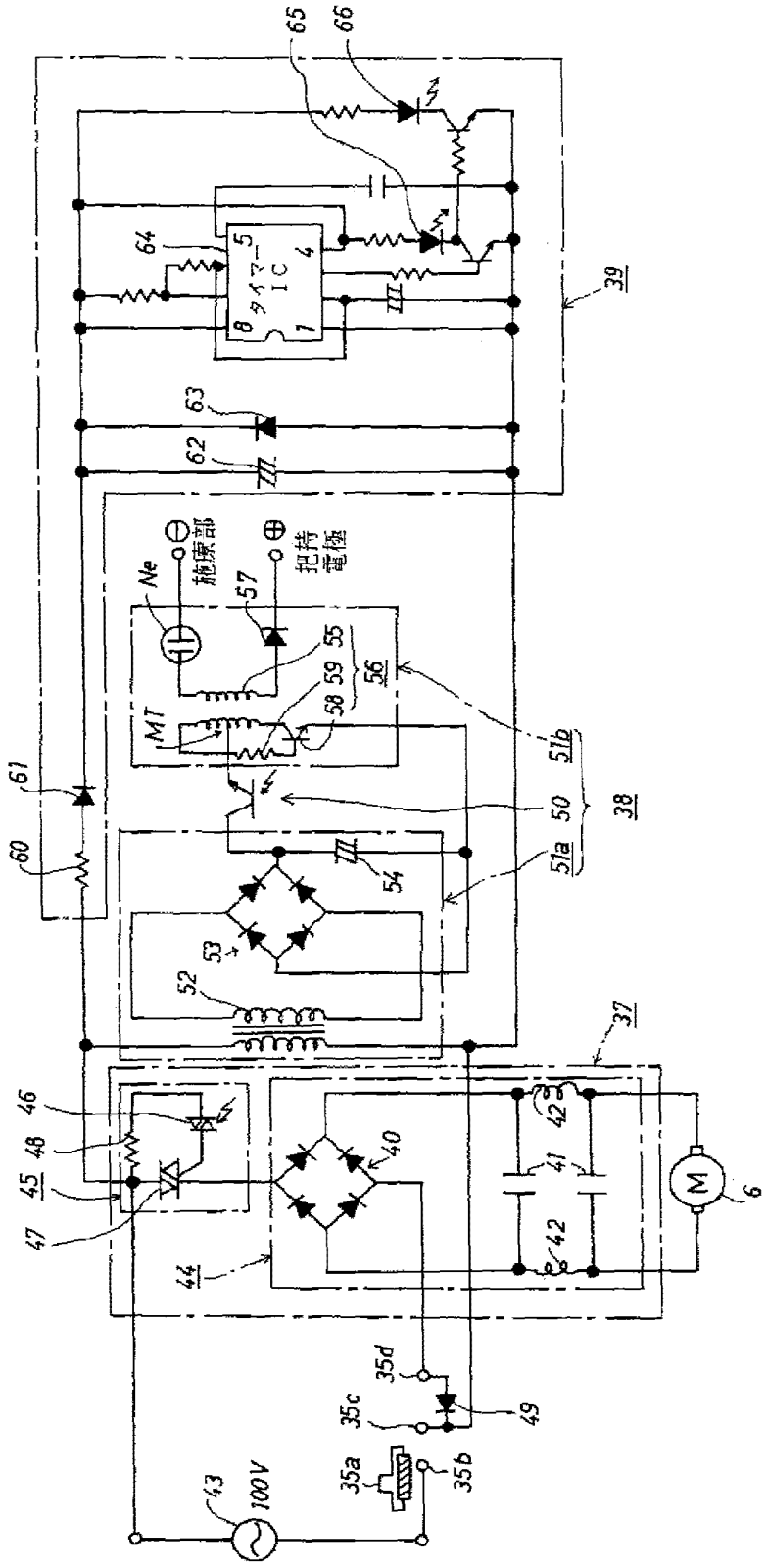
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【第３図】



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【第４図】



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フロントページの続き

(58)調査した分野(Int.Cl.[6]，ＤＢ名)
A61H　7/00　300
A61H　23/02　350
A61N　1/32

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 018211CONPCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2018/053352	International filing date *(day/month/year)* 28 September 2018 (28.09.2018)	Priority date *(day/month/year)* 22 February 2018 (22.02.2018)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant HYPER ICE, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 27 August 2020 (27.08.2020)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yukari Nakamura e-mail: pct.team7@wipo.int

Form PCT/IB/373 (January 2004)

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
SHOUSE, Emily A.

Patterson Intellectual Property Law, PC 1600 Division Street, Suite 500 Nashville, Tennessee 37203 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **14 May 2019 (14.05.2019)**

Applicant's or agent's file reference
018211CONPCT

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2018/053352	**28 September 2018 (28.09.2018)**	22 February 2018 (22.02.2018)

International Patent Classification (IPC) or both national classification and IPC
A61H 23/00(2006.01)i, A61H 23/02(2006.01)i

Applicant
HYPER ICE, INC.

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	14 May 2019 (14.05.2019)	HAN, Inho Telephone No. +82-42-481-3362

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2018/053352

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:
      ☐ in the form of an Annex C/ST.25 text file.
      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2018/053352

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-17	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-17	NO
Industrial applicability (IA)	Claims	1-17	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: WO 2009-014727 A1 (ACTIVATOR METHODS INTERNATIONAL, LIMITED) 29 January 2009
D2: CN 202536467 U (GUO, X.) 21 November 2012
D3: US 2011-0017742 A1 (SAUSEN, K. A. et al.) 27 January 2011

I. Novelty and Inventive Step (PCT Article 33(2) and (3))

D1, which is considered to represent the most relevant state of the art, discloses a portable chiropractic adjustor instrument for applying an adjustment energy to a patient, the portable chiropractic adjuster comprising: a housing having a thrust transfer structure for transferring an axial thrust force through the housing to the plunger mechanism (see claim 1; figure 10); a DC motor disposed within the housing for rotatably driving the camming structure in response to the trigger being engaged (see paragraphs [0034]-[0035]; claim 1); a gear mechanism comprising a plurality of gears for assisting with the transfer of force from the motor to further components of the instrument (see paragraph [0037]; figures 8, 11); a thrust transfer mechanism comprising a suitable structure(s) for contacting the gear mechanism and converting the rotational forces conveyed by the motor to the gear mechanism into an axial force directed away from the motor and toward the patient (see paragraph [0039]; figure 13); a plunger mechanism (see paragraphs [0042]-[0043]; figure 8); and a tip disposed at an end of the plunger for contact with the patient (see paragraph [0043]; figure 8), wherein the instrument may have an ergonomic handle which is comfortable and convenient to grip, and the battery may be disposed in the handle (see paragraphs [0033]-[0034]; figure 2).

Continued on Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Box No. V

1. Claims 1-6

The subject-matter of claim 1 differs from D1 in a crank and a reciprocating linkage (difference 1) and a battery assembly receiving enclosure extending from the main enclosure and a battery assembly removably secured to the battery assembly receiving enclosure such that a first portion of the battery assembly is positioned within the battery assembly receiving enclosure and a second portion of the battery assembly extends from the battery assembly receiving enclosure (difference 2). However, regarding the difference 1, considering the gear mechanism (see paragraph [0037]; figures 8, 11) and the thrust transfer mechanism (see paragraph [0039]; figure 13) of D1, the feature is intended to convert the rotational motion of the motor into a reciprocating motion and can be easily conceived by a person skilled in the art. In addition, the difference 2 is disclosed in D2 considering a vibrating wrinkle removing beautifying pen including a middle shell (4) (see claim 1; figures 1-2) and a battery case (5) (see claim 1; figures 1-2). Therefore, claim 1 lacks an inventive step according to the combination of D1 and D2.

The additional features of claims 2-4, relating to at least one engagement ledge and at least one tab (a first tab, a second tab), are not disclosed in D1 and D2. However, the features are for battery assembly engagement, and are disclosed in D3 considering that once the tab member (120) is fully inserted, the flat edge (126) of the locking portion (124) engages the ledge surface (118) of the aperture (116), thereby locking and preventing the tab member (120) from sliding out of the groove (114) (see paragraph [0027]; figures 5-7). Therefore, claims 2-4 lack an inventive step according to the combination of D1-D3.

The additional feature of claim 5, relating to a button having a portion that engages the at least one tab, is not disclosed in D1-D3. However, the feature is merely a design option for a person skilled in the art. Therefore, claim 5 lacks an inventive step according to the combination of D1-D3.

The additional feature of claim 6, relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art. Therefore, claim 6 lacks an inventive step

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Supplemental Box

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according to the combination of D1 and D2.

2. Claims 7-15

Claim 7 relates to a method of massaging a body part using a battery-powered portable massage device and has substantially the same technical features as claim 1, differing only in the category. Accordingly, the same reasoning as in claim 1 applies to claim 7. Therefore, claim 7 also lacks an inventive step according to the combination of D1 and D2.

The additional feature of claim 8 corresponds to the disclosure D1 in the handle (see paragraph [0033]) or D2 in a battery case (5) (see paragraph [0011]; figure 2).

The additional feature of claim 9, relating to an outer cylindrical cover of the battery assembly comprising neoprene, is not disclosed in D1 and D2. However, the feature is merely a design option for a person skilled in the art.

The additional feature of claim 10, relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art.

The additional features of claims 11-12 relating to the form of the chargeable battery assembly, are not disclosed in D1 and D2. However, a person skilled in the art would easily conceive the idea of employing the features.

Therefore, claims 8-12 also lack an inventive step according to the combination of D1 and D2.

The additional features of claims 13-14, relating to a mating engagement comprising a first tab and a second tab, are not disclosed in D1 and D2. However, the features are for battery assembly engagement, and are disclosed in D3 considering that once the tab member (120) is fully inserted, the flat edge (126) of the locking portion (124) engages the ledge surface (118) of the aperture (116), thereby locking and preventing the tab member (120) from sliding out of

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Supplemental Box

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the groove (114) (see paragraph [0027]; figures 5-7). Therefore, claims 13-14 lack an inventive step according to the combination of D1-D3.

The additional feature of claim 15, relating to a biased button, is not disclosed in D1-D3. However, the feature is merely a design option for a person skilled in the art. Therefore, claim 15 lacks an inventive step according to the combination of D1-D3.

3. Claims 16-17

Claim 16 relates to a battery-powered percussive massage device, but it shares similar technical features with claim 1. Thus, the same reasoning in claim 1 applies to claim 16. Therefore, claim 16 also lacks an inventive step according to the combination of D1 and D2.

The additional feature of claim 17 relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art. Therefore, claim 17 lacks an inventive step according to the combination of D1 and D2.

Ⅱ. Industrial Applicability (PCT Article 33(4))

Claims 1-17 are industrially applicable.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 018211CONPCT	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2018/053352**	International filing date *(day/month/year)* **28 September 2018 (28.09.2018)**	(Earliest) Priority Date *(day/month/year)* 22 February 2018 (22.02.2018)

Applicant

HYPER ICE, INC.

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **3** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **3**
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figures is to be published with the abstract.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/053352

A. CLASSIFICATION OF SUBJECT MATTER

A61H 23/00(2006.01)i, A61H 23/02(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)
A61H 23/00; A45D 34/04; A61H 1/00; A61H 23/02; A61N 5/02; B65D 45/16; F16B 17/00

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: battery, percussive, massage, motor, reciprocating, piston, ledge, tab

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2009-014727 A1 (ACTIVATOR METHODS INTERNATIONAL, LIMITED) 29 January 2009 See paragraphs [0032]-[0043]; claims 1-10; figures 2-15.	1-17
Y	CN 202536467 U (GUO, X.) 21 November 2012 See paragraph [0011]; claim 1; figures 1-2.	1-17
Y	US 2011-0017742 A1 (SAUSEN, K. A. et al.) 27 January 2011 See paragraph [0027]; figures 5-7.	2-5,13-15
A	KR 20-0311328 Y1 (PARK, J. T.) 01 May 2003 See the whole document.	1-17
A	US 6228042 B1 (DUNGAN, T. E.) 08 May 2001 See the whole document.	1-17
A	US 2006-0293711 A1 (KELLER, T. S. et al.) 28 December 2006 See the whole document.	1-17

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
14 May 2019 (14.05.2019)	**14 May 2019 (14.05.2019)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea
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HAN, Inho
Telephone No. +82-42-481-3362

Form PCT/ISA/210 (second sheet) (January 2015)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/053352

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009-014727 A1	29/01/2009	CN 101801326 A	11/08/2010
		CN 101801326 B	19/06/2013
		EP 2180866 A1	05/05/2010
		JP 2010-534110 A	04/11/2010
		US 2009-0270915 A1	29/10/2009
CN 202536467 U	21/11/2012	None	
US 2011-0017742 A1	27/01/2011	CN 102469850 A	23/05/2012
		WO 2011-011648 A1	27/01/2011
KR 20-0311328 Y1	01/05/2003	None	
US 6228042 B1	08/05/2001	None	
US 2006-0293711 A1	28/12/2006	US 2009-0005812 A1	01/01/2009
		WO 2007-001690 A1	04/01/2007

Petitioner Therabody Ex-1004, 1371

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
SHOUSE, Emily A.

Patterson Intellectual Property Law, PC 1600 Division Street, Suite 500 Nashville, Tennessee 37203 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **14 May 2019 (14.05.2019)**

Applicant's or agent's file reference
018211CONPCT

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2018/053352	**28 September 2018 (28.09.2018)**	22 February 2018 (22.02.2018)

International Patent Classification (IPC) or both national classification and IPC
A61H 23/00(2006.01)i, A61H 23/02(2006.01)i

Applicant
HYPER ICE, INC.

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	14 May 2019 (14.05.2019)	HAN, Inho Telephone No. +82-42-481-3362

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2018/053352

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:
      ☐ in the form of an Annex C/ST.25 text file.
      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2018/053352

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-17	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-17	NO
Industrial applicability (IA)	Claims	1-17	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: WO 2009-014727 A1 (ACTIVATOR METHODS INTERNATIONAL, LIMITED) 29 January 2009
D2: CN 202536467 U (GUO, X.) 21 November 2012
D3: US 2011-0017742 A1 (SAUSEN, K. A. et al.) 27 January 2011

I. Novelty and Inventive Step (PCT Article 33(2) and (3))

D1, which is considered to represent the most relevant state of the art, discloses a portable chiropractic adjustor instrument for applying an adjustment energy to a patient, the portable chiropractic adjuster comprising: a housing having a thrust transfer structure for transferring an axial thrust force through the housing to the plunger mechanism (see claim 1; figure 10); a DC motor disposed within the housing for rotatably driving the camming structure in response to the trigger being engaged (see paragraphs [0034]-[0035]; claim 1); a gear mechanism comprising a plurality of gears for assisting with the transfer of force from the motor to further components of the instrument (see paragraph [0037]; figures 8, 11); a thrust transfer mechanism comprising a suitable structure(s) for contacting the gear mechanism and converting the rotational forces conveyed by the motor to the gear mechanism into an axial force directed away from the motor and toward the patient (see paragraph [0039]; figure 13); a plunger mechanism (see paragraphs [0042]-[0043]; figure 8); and a tip disposed at an end of the plunger for contact with the patient (see paragraph [0043]; figure 8), wherein the instrument may have an ergonomic handle which is comfortable and convenient to grip, and the battery may be disposed in the handle (see paragraphs [0033]-[0034]; figure 2).

Continued on Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Box No. V

1. Claims 1-6

The subject-matter of claim 1 differs from D1 in a crank and a reciprocating linkage (difference 1) and a battery assembly receiving enclosure extending from the main enclosure and a battery assembly removably secured to the battery assembly receiving enclosure such that a first portion of the battery assembly is positioned within the battery assembly receiving enclosure and a second portion of the battery assembly extends from the battery assembly receiving enclosure (difference 2). However, regarding the difference 1, considering the gear mechanism (see paragraph [0037]; figures 8, 11) and the thrust transfer mechanism (see paragraph [0039]; figure 13) of D1, the feature is intended to convert the rotational motion of the motor into a reciprocating motion and can be easily conceived by a person skilled in the art. In addition, the difference 2 is disclosed in D2 considering a vibrating wrinkle removing beautifying pen including a middle shell (4) (see claim 1; figures 1-2) and a battery case (5) (see claim 1; figures 1-2). Therefore, claim 1 lacks an inventive step according to the combination of D1 and D2.

The additional features of claims 2-4, relating to at least one engagement ledge and at least one tab (a first tab, a second tab), are not disclosed in D1 and D2. However, the features are for battery assembly engagement, and are disclosed in D3 considering that once the tab member (120) is fully inserted, the flat edge (126) of the locking portion (124) engages the ledge surface (118) of the aperture (116), thereby locking and preventing the tab member (120) from sliding out of the groove (114) (see paragraph [0027]; figures 5-7). Therefore, claims 2-4 lack an inventive step according to the combination of D1-D3.

The additional feature of claim 5, relating to a button having a portion that engages the at least one tab, is not disclosed in D1-D3. However, the feature is merely a design option for a person skilled in the art. Therefore, claim 5 lacks an inventive step according to the combination of D1-D3.

The additional feature of claim 6, relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art. Therefore, claim 6 lacks an inventive step

Continued on The Next Page

Petitioner Therabody Ex-1004, 1375

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Previous Page

according to the combination of D1 and D2.

2. Claims 7-15

Claim 7 relates to a method of massaging a body part using a battery-powered portable massage device and has substantially the same technical features as claim 1, differing only in the category. Accordingly, the same reasoning as in claim 1 applies to claim 7. Therefore, claim 7 also lacks an inventive step according to the combination of D1 and D2.

The additional feature of claim 8 corresponds to the disclosure D1 in the handle (see paragraph [0033]) or D2 in a battery case (5) (see paragraph [0011]; figure 2).

The additional feature of claim 9, relating to an outer cylindrical cover of the battery assembly comprising neoprene, is not disclosed in D1 and D2. However, the feature is merely a design option for a person skilled in the art.

The additional feature of claim 10, relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art.

The additional features of claims 11-12 relating to the form of the chargeable battery assembly, are not disclosed in D1 and D2. However, a person skilled in the art would easily conceive the idea of employing the features.

Therefore, claims 8-12 also lack an inventive step according to the combination of D1 and D2.

The additional features of claims 13-14, relating to a mating engagement comprising a first tab and a second tab, are not disclosed in D1 and D2. However, the features are for battery assembly engagement, and are disclosed in D3 considering that once the tab member (120) is fully inserted, the flat edge (126) of the locking portion (124) engages the ledge surface (118) of the aperture (116), thereby locking and preventing the tab member (120) from sliding out of

Continued on The Next Page

Petitioner Therabody Ex-1004, 1376

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Previous Page

the groove (114) (see paragraph [0027]; figures 5-7). Therefore, claims 13-14 lack an inventive step according to the combination of D1-D3.

The additional feature of claim 15, relating to a biased button, is not disclosed in D1-D3. However, the feature is merely a design option for a person skilled in the art. Therefore, claim 15 lacks an inventive step according to the combination of D1-D3.

3. Claims 16-17

Claim 16 relates to a battery-powered percussive massage device, but it shares similar technical features with claim 1. Thus, the same reasoning in claim 1 applies to claim 16. Therefore, claim 16 also lacks an inventive step according to the combination of D1 and D2.

The additional feature of claim 17 relating to the shape of the battery assembly receiving enclosure and the battery assembly, is not explicitly disclosed in D1 and D2. However, considering the housing and the handle (see paragraph [0034]; figure 10) of D1 and the middle shell (4) and the battery case (5) (see claim 1; figures 1-2) of D2, the feature is merely a design option for a person skilled in the art. Therefore, claim 17 lacks an inventive step according to the combination of D1 and D2.

Ⅱ. Industrial Applicability (PCT Article 33(4))

Claims 1-17 are industrially applicable.

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근육 마사지기

Details | Publ. Full Text | Registr. Details | Administrative Actions

Details | Biographical Information | Essentials of creation | Legal Status | Multiple Design Info.

All Images View

[M001]



(21) Application No(Date)	3020190018853(2019.04.22)
(71) Applicant	DONGGUAN XIQIN Electrical Appliance Co., Ltd.
(11) Publication No(Date)	(2020.01.29) Full-doc Down
(65) Open Pub. No(Date)	
(11) Registration No(Date)	3010427980000(2020.01.20)
(30) Priority No.(Date)	
Legal Status	Registered
Examination Status(Date)	Decision to grant (General)(2020.01.09)
Retroacted Section(Date)	(2019.04.22)
Trial Info	
Original Application No.	
Related Application No.	
Design Type	Basic Public
(52) Design Class.	J716BA
(51) Locarno Class.	28-03

Petitioner Therabody Ex-1004, 1378

(19) 대한민국특허청(KR)
(12) 등록디자인공보(S)

(45) 공고일자 2020년01월29일
(11) 등록번호 30-1042798
(24) 등록일자 2020년01월20일

(52) 분류 J7-16BA
(51) 국제분류 28-03
(21) 출원번호 30-2019-0018853
(22) 출원일자 2019년04월22일

(73) 디자인권자

동관 시퀸 일렉트릭 어플리안스 컴퍼니 리미티드

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(72) 창작자

후 다슈이

중국, 523075, 관둥, 둥관, 중탕 타운, 후안총 빌리지, 인더스트릭스 3

(74) 대리인

특허법인에이아이피

담당심사관 : 이진홍

(54) 명칭 근육 마사지기

디자인도면

물품류

28

디자인의 대상이 되는 물품

근육 마사지기

디자인의 설명

1. 본 물품의 재질은 합성수지재 및 금속재이다.

2. 본 디자인의 대상이 되는 물품은 근육 마사지기로서, 참고도면 1.1 내지 1.4에 도시된 바와 같이 선단부에 탈착가능한 마사지 헤드를 부착하고, 내부 모터가 마사지 헤드를 앞뒤로 구동하도록 하여 인체의 여러 부분에 진동 마사지를 수행하는 것이다.

3. 도면 1.1은 디자인의 전체적인 형상을 표현하는 도면이고, 도면 1.2는 디자인의 정면 부분을, 도면 1.3은 디자인의 배면 부분을, 도면 1.4는 디자인의 좌측면을, 도면 1.5는 디자인의 우측면을, 도면 1.6은 디자인의 평면을, 도면 1.7은 디자인의 저면을 각각 표현하는 도면이다.

4. 참고도면 1.1 내지 1.4는 본 물품의 사용 상태를 나타내는 참고도이다.

디자인 창작 내용의 요점

"근육 마사지기"의 형상과 모양의 결합을 디자인 창작내용의 요점으로 한다.

Petitioner Therabody Ex-1004, 1380

도면 1.1



Petitioner Therabody Ex-1004, 1381

도면 1.2



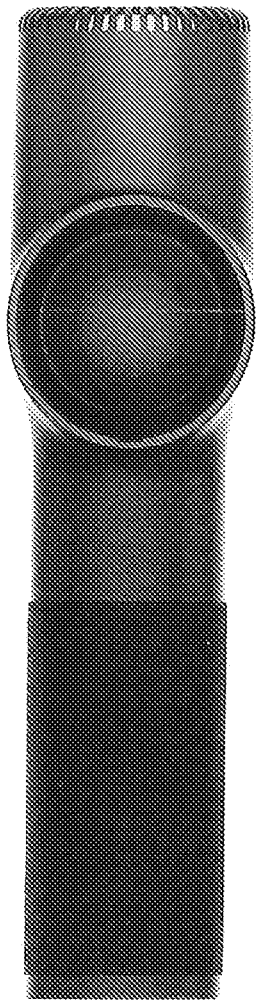
Petitioner Therabody Ex-1004, 1382

도면 1.3



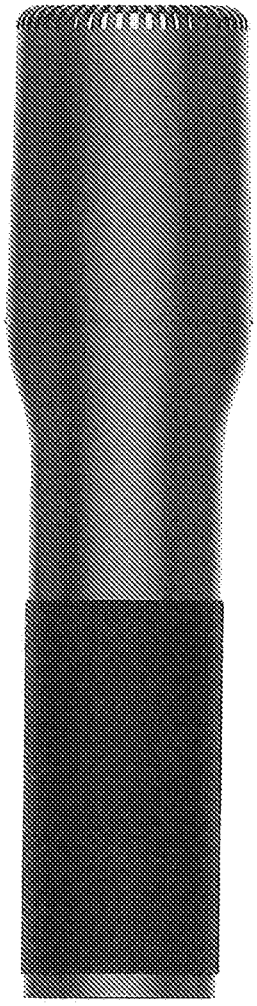
Petitioner Therabody Ex-1004, 1383

도면 1.4

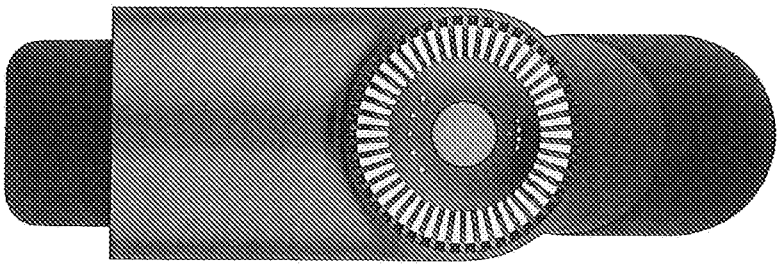


Petitioner Therabody Ex-1004, 1384

도면 1.5

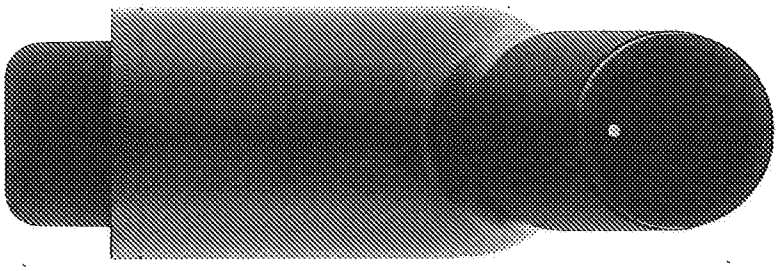


도면 1.6



Petitioner Therabody Ex-1004, 1385

도면 1.7



참고도면1.1



Petitioner Therabody Ex-1004, 1386

도면1.2



Petitioner Therabody Ex-1004, 1387

도면



도면4



本功能使用Google Translate翻譯軟體，其翻譯結果僅供參考，本局**不保證其翻譯結果之準確、完整或適用於特定目的。**
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TIPO does not guarantee the translation is accurate, complete, reliable or fit for specific purposes.
Select Language

DTD版本：1.0.0

設計說明書

※申請案號：108302323

【設計名稱】(中文/英文)

肌肉按摩棒(一)

【物品用途】

[0001] 本設計物品，係一肌肉按摩棒的外觀設計。

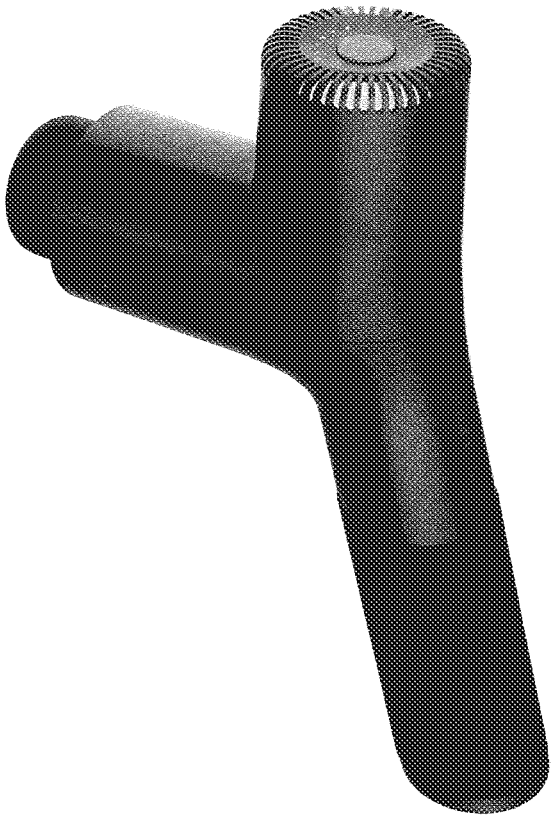
【設計說明】

[0002] 如使用狀態參考圖，前端設置按摩頭，於底部向下設具成為握把供人手握持，該握把內部設有一馬達，驅動按摩頭做前後運動，達成對人體各個部位進行震動按摩，其整體外觀呈現簡明之立體美感。

設計圖式

(指定之代表圖，請單獨置於圖式第１頁)

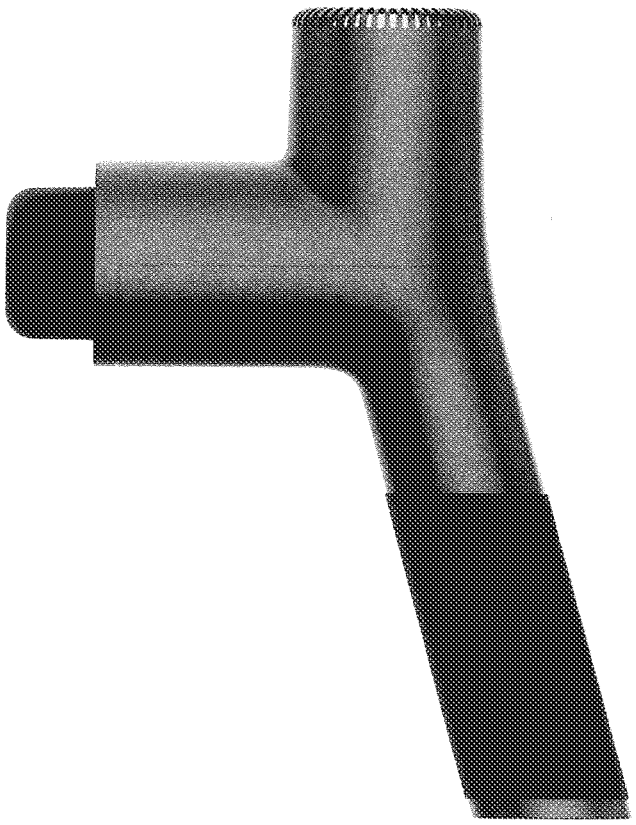
Petitioner Therabody Ex-1004, 1390



立體圖(代表圖)

立體圖(代表圖)

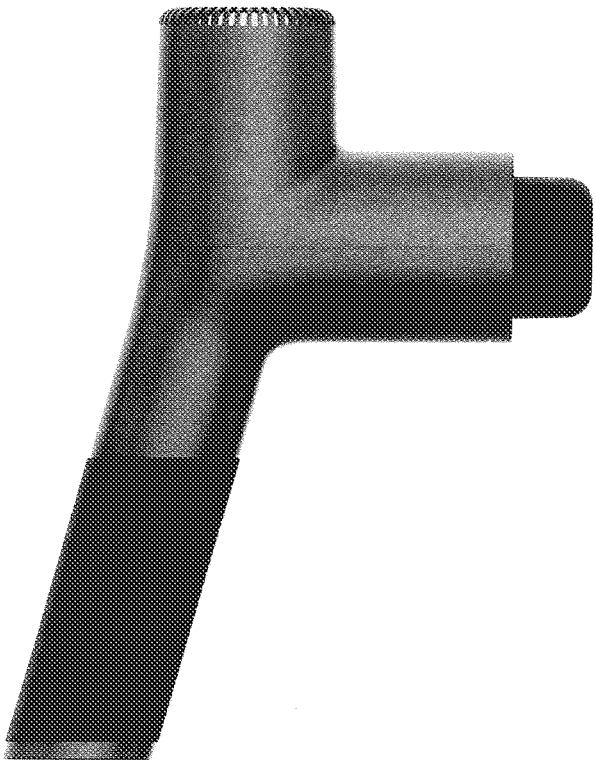
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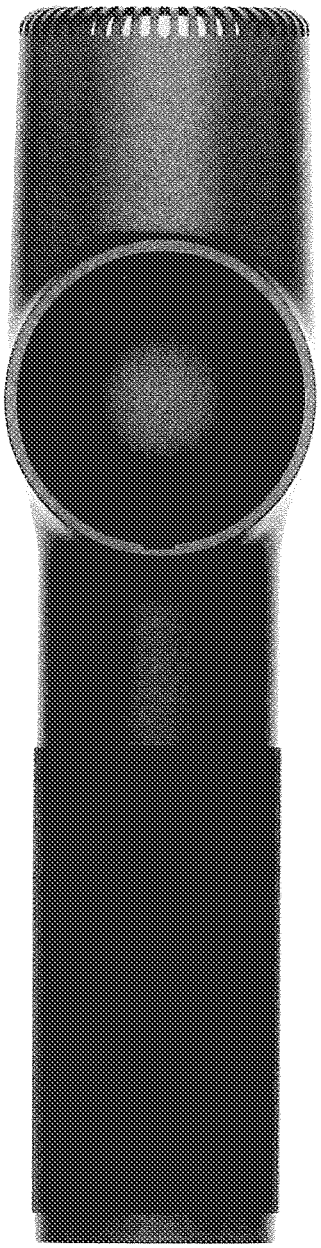
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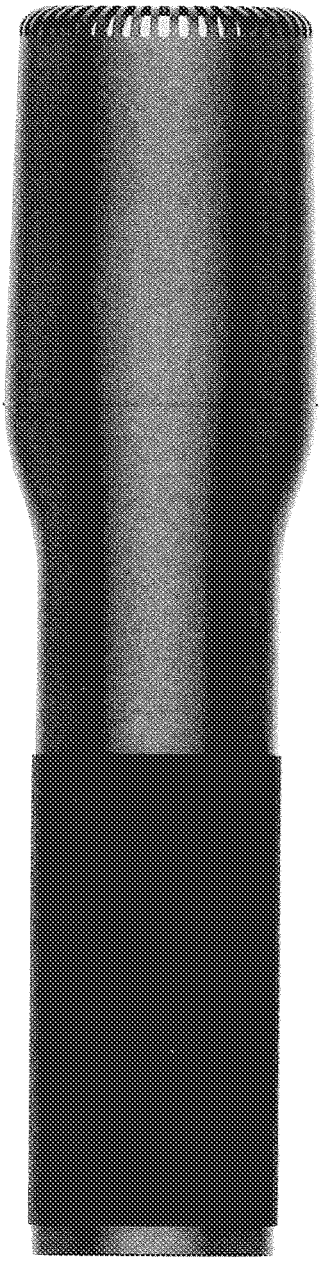
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左側視圖

左側視圖

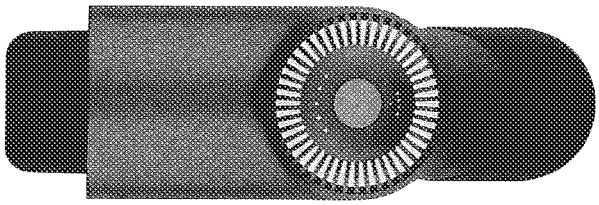
Petitioner Therabody Ex-1004, 1394



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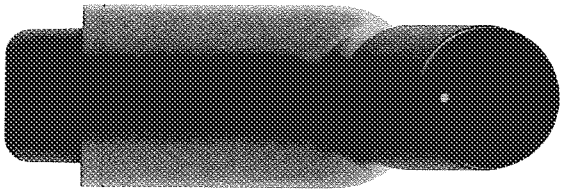
右側視圖

Petitioner Therabody Ex-1004, 1395



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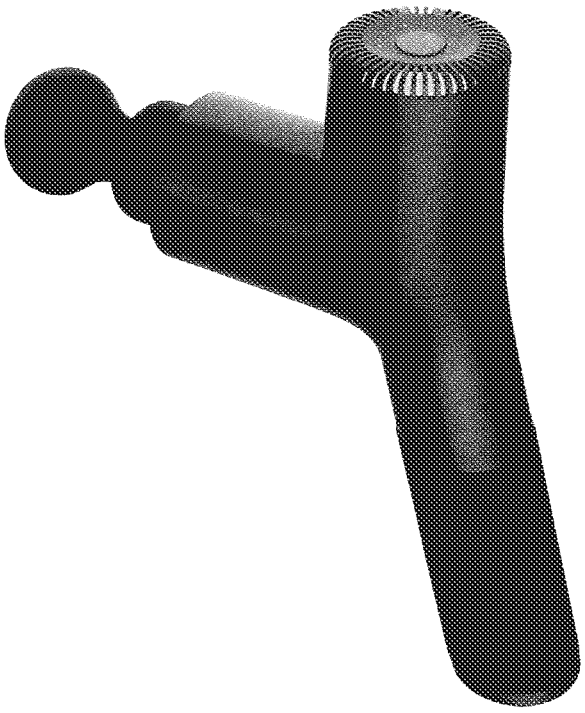
俯視圖



仰視圖

仰視圖

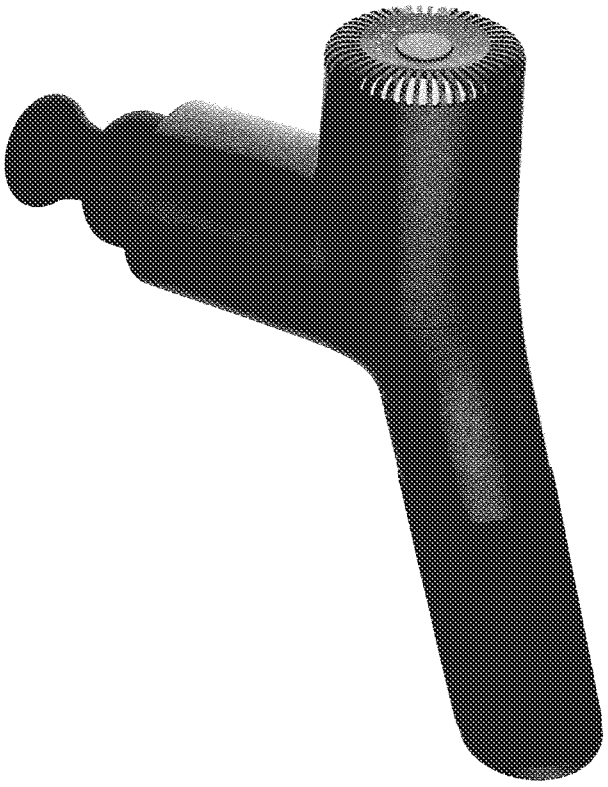
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使用狀態參考圖(1)

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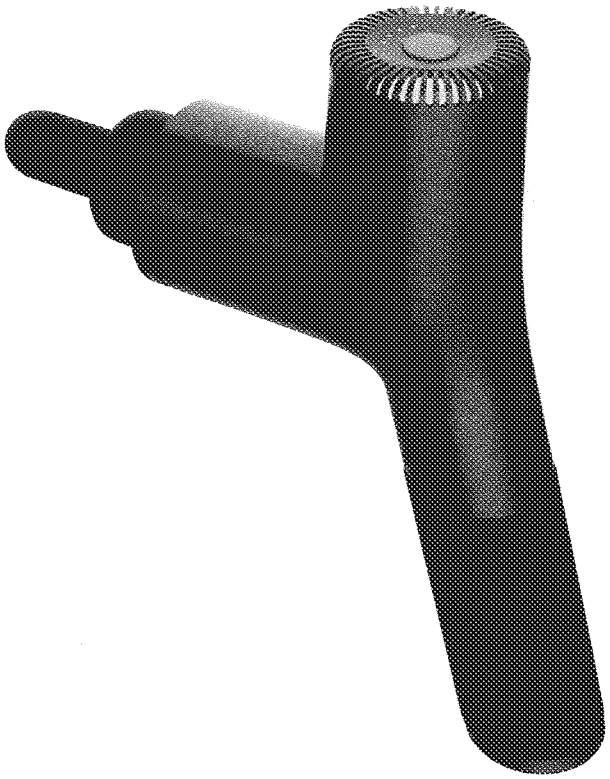
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使用狀態參考圖(2)

使用狀態參考圖(2)

Petitioner Therabody Ex-1004, 1398



使用狀態參考圖(3)

使用狀態參考圖(3)

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使用狀態參考圖(4)

使用狀態參考圖(4)

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English

DTD version: 1.0.0

design manual

※Application case number: 108302323

【Design Name】(Chinese/English)

Muscle massage stick (1)

【Item use】

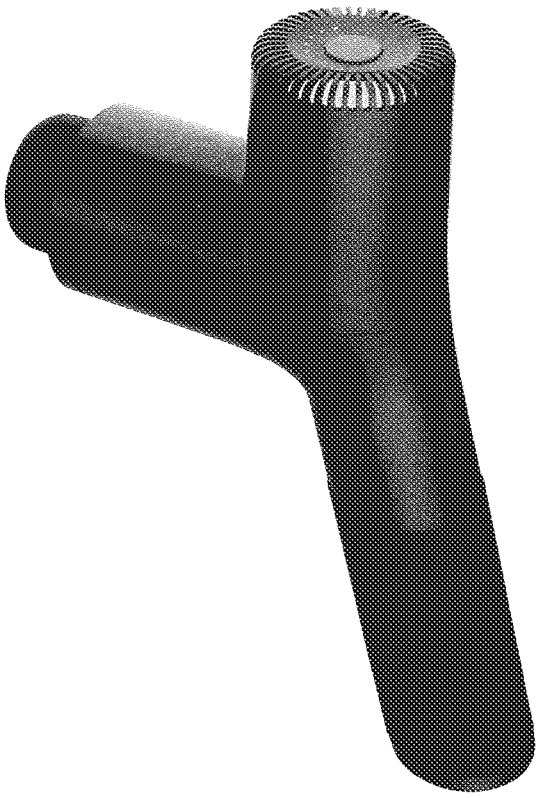
[0001] This design item is the appearance design of a muscle massage stick.

【Design Notes】

[0002] For example, refer to the figure for the state of use. The front end is equipped with a massage head, and the bottom is set down as a grip for human hands to hold. The grip is equipped with a motor to drive the massage head back and forth to achieve vibration massage on various parts of the human body. The overall appearance presents a concise three-dimensional beauty.

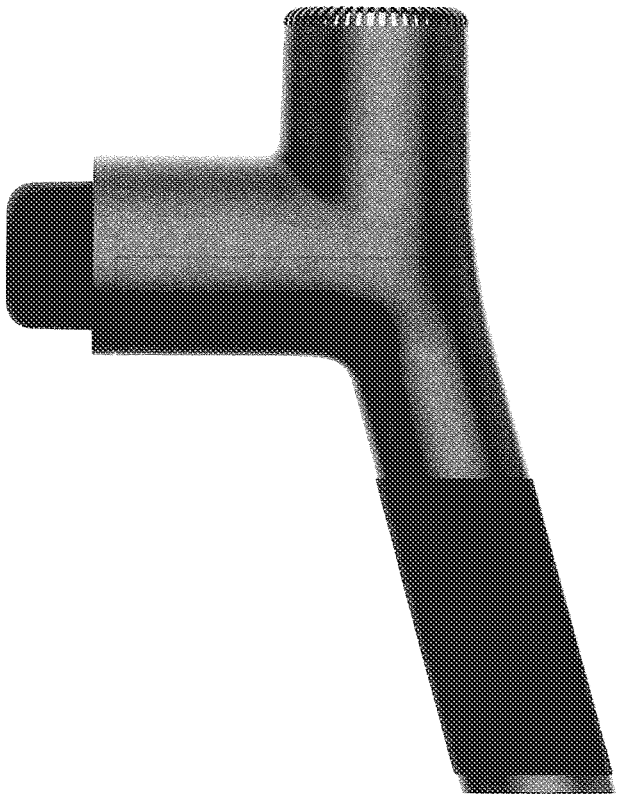
Design schema

(The designated representative diagram, please put it on page 1 of the diagram separately)



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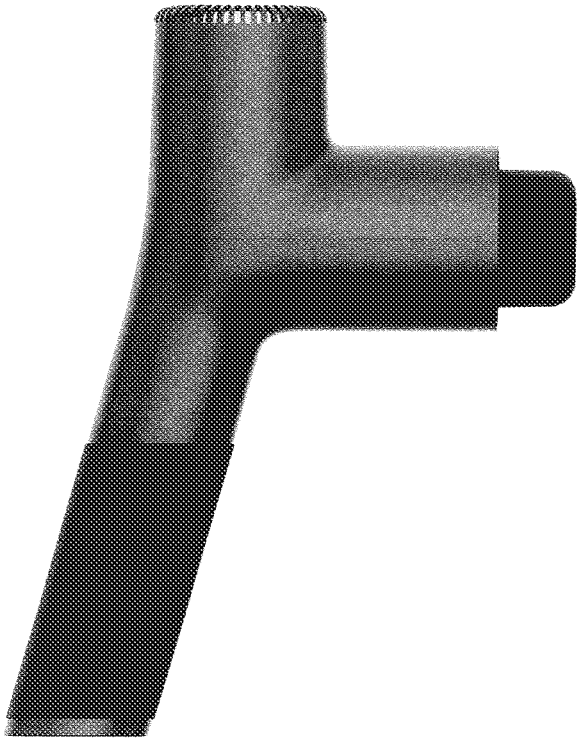
Three-dimensional diagram (representative diagram)



前視圖

Front view,

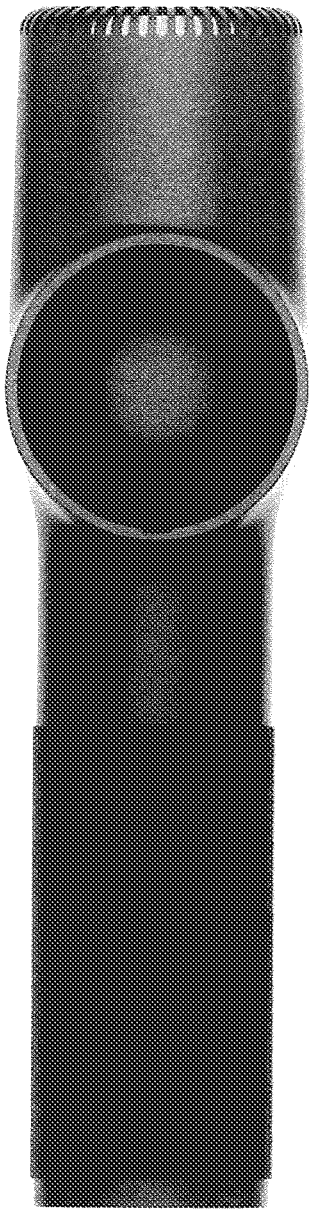
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後視圖

rear view,

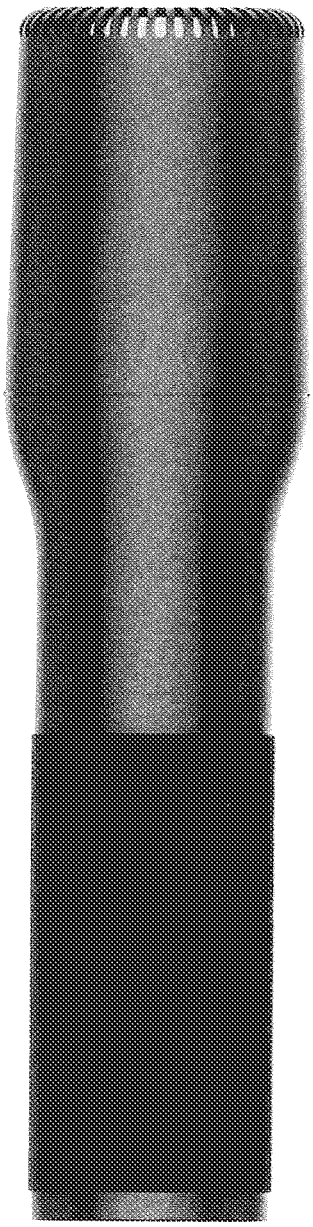
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左側視圖

left side view,

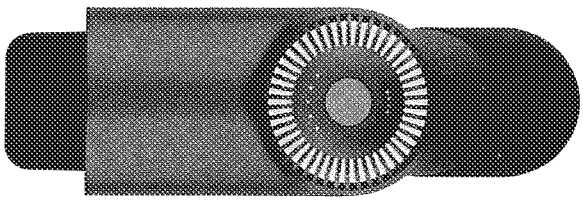
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右側視圖

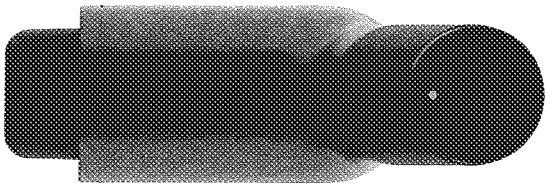
right side view,

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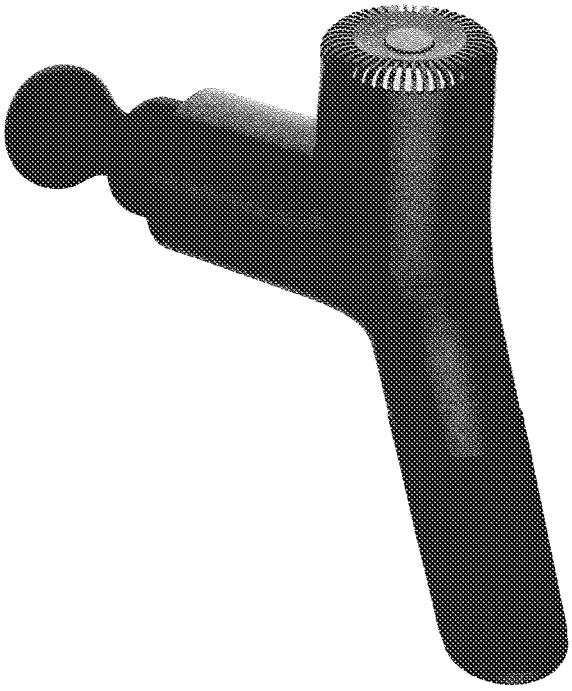
俯視圖

top view,



仰視圖

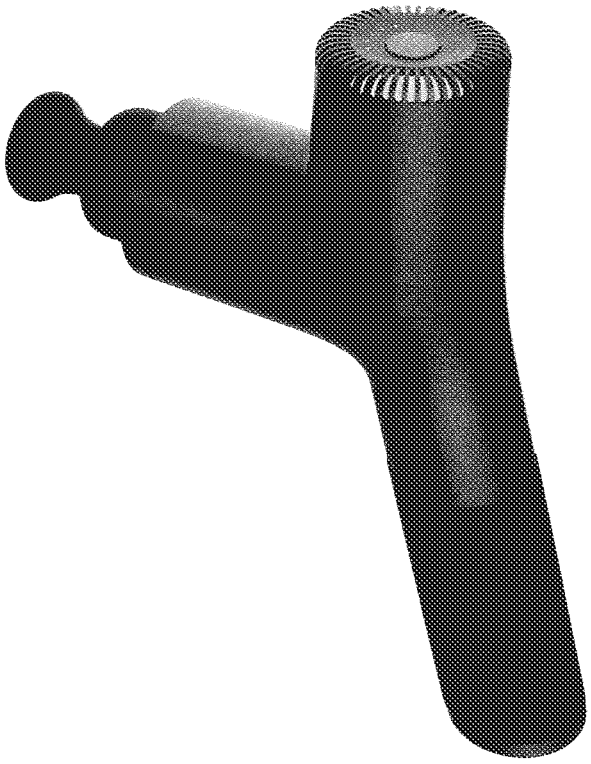
bottom view,



使用狀態參考圖(1)

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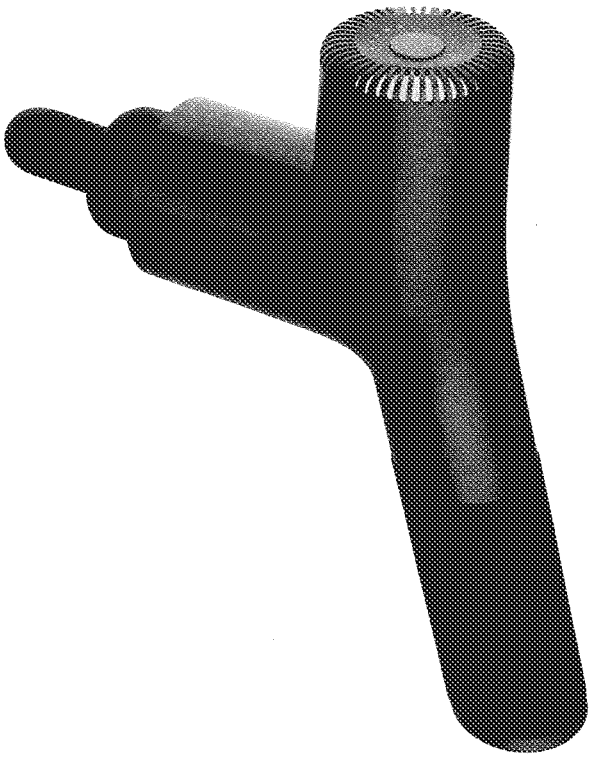
reference diagram for use state (1)



使用狀態參考圖(2)

reference diagram for use state (2)

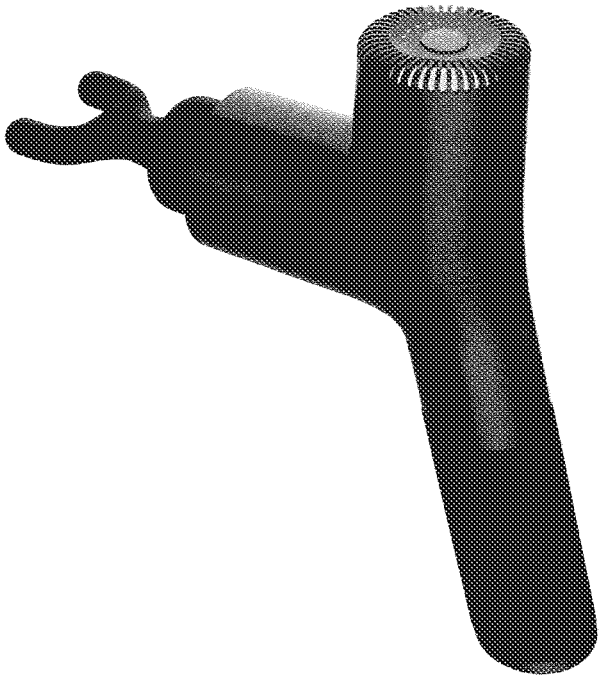
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使用狀態參考圖(3)

reference diagram for use state (3)

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使用狀態參考圖(4)

reference diagram for use state (4)

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Espacenet

Bibliographic data: WO2020227230 (A1)

— 2020-11-12

PERCUSSIVE MASSAGE DEVICE WITH FORCE METER

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Applicant(s): THERAGUN INC [US] ± (THERAGUN, INC)

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Classification: - international: ***A61H23/00; A61H23/02***

- cooperative: **A61H1/00 (EP)**; **A61H1/006 (EP)**; **A61H23/006 (EP, US)**; **A61H23/02 (US)**; **A61H23/0254 (EP, US)**; **G01L5/0038 (EP, US)**; **H02K11/0094 (US)**; **H02K11/26 (EP, US)**; **H02K7/145 (US)**; **H02P23/0077 (EP)**; **H02P29/40 (EP, US)**; A61H2201/0153 (EP); A61H2201/1215 (EP); A61H2201/1253 (EP); A61H2201/149 (EP); A61H2201/1635 (EP); A61H2201/1669 (EP); A61H2201/5005 (EP); A61H2201/5007 (EP, US); A61H2201/5025 (EP); A61H2201/5043 (US); A61H2201/5046 (EP); A61H2201/5061 (EP, US); A61H2201/5097 (EP); A61H2230/50 (EP); H02K7/06 (EP); H02K7/145 (EP)

Application number: WO2020US31347 20200504
Global Dossier

Priority number(s): US201962899098P 20190911 ; US201962844424P 20190507 ; US202016796143 20200220 ; US201962912392P 20191008

Also published as: AU2020267386 (A1) AU2020267386 (B2) CN113301881 (A) EP3893831 (A1) US10940081 (B2) more

Abstract of WO2020227230 (A1)

A percussive massage device with a force meter that includes a housing, an electrical source, a motor positioned in the housing, a switch for activating the

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motor, and a controller configured to obtain a voltage of the motor, generate a lookup table correlating voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table.

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 November 2020 (12.11.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/227230 A1

(51) International Patent Classification:
A61H 23/02 (2006.01) *A61H 23/00* (2006.01)

(21) International Application Number:
PCT/US2020/031347

(22) International Filing Date:
04 May 2020 (04.05.2020)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

62/844,424	07 May 2019 (07.05.2019)	US
62/899,098	11 September 2019 (11.09.2019)	US
62/912,392	08 October 2019 (08.10.2019)	US
16/796,143	20 February 2020 (20.02.2020)	US

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

(54) Title: PERCUSSIVE MASSAGE DEVICE WITH FORCE METER

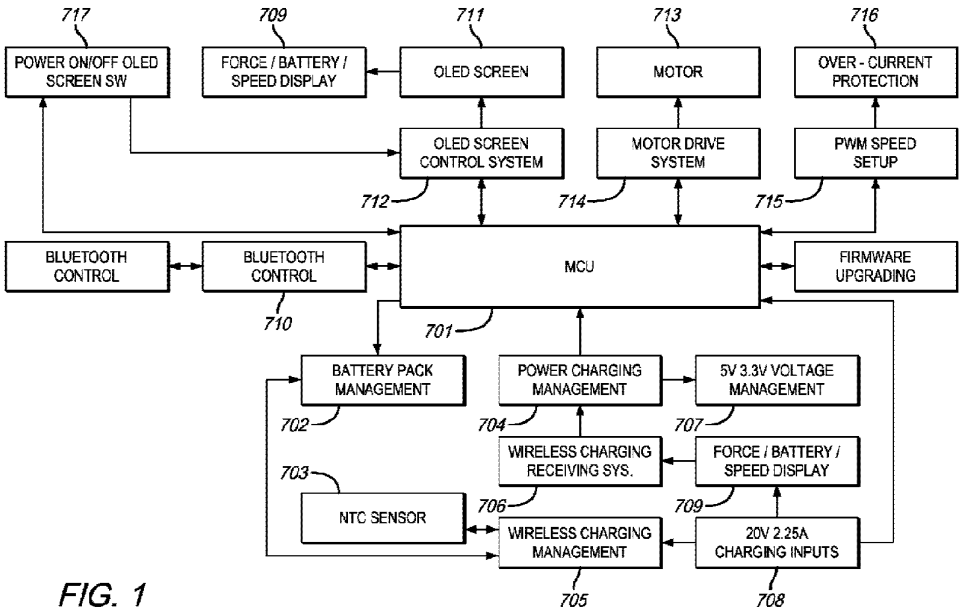


FIG. 1

(57) Abstract: A percussive massage device with a force meter that includes a housing, an electrical source, a motor positioned in the housing, a switch for activating the motor, and a controller configured to obtain a voltage of the motor, generate a lookup table correlating voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table.

[Continued on next page]

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GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

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PERCUSSIVE MASSAGE DEVICE WITH FORCE METER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/844,424, filed May 7, 2019, U.S. Provisional Application No. 62/899,098, filed September 11, 2019 and U.S. Provisional Application No. 62/912,392, filed October 8, 2019, the entireties of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a percussive massage device with a force meter.

BACKGROUND OF THE INVENTION

[0003] Percussive massage devices have become increasingly popular in recent years. However, when using the device, it is often difficult for users to know if they are applying the proper amount of pressure or force. The present invention addresses this issue.

SUMMARY OF THE PREFERRED EMBODIMENTS

[0004] In accordance with a first aspect of the present invention there is provided a percussive massage device with a force meter that includes a housing, an electrical source, a motor positioned in the housing, a switch for activating the motor, and a controller configured to obtain a voltage of the motor, generate a lookup table correlating voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table. In a preferred embodiment, the lookup table is generated by determining a maximum magnitude of force configured to be applied by the percussive massage device, determining a maximum magnitude of voltage configured to be applied to the percussive massage device from a power source, dividing the maximum magnitude of force into equal force increments, and dividing the maximum magnitude of voltage into equal voltage increments. The number of equal force increments and the number of equal voltage increments is the same. Preferably, the percussive massage device

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includes a battery pack and a display configured to depict an amount of force applied by the percussive massage device. In a preferred embodiment, the display includes a series of LEDs. In a preferred embodiment, the percussive massage device includes an organic light-emitting diode screen.

[0005] In a preferred embodiment, the motor is a brushless direct-current (BLDC) motor. Preferably, the percussive massage device includes a voltage-sensing resistor electrically coupled to the BLDC motor and the controller.

[0006] In accordance with another aspect of the present invention there is provided a method of displaying force of a percussive massage device that includes obtaining a voltage of a motor of the percussive massage device, generating a lookup table correlating voltage to force applied by the percussive massage device, and displaying a force magnitude corresponding to the obtained voltage using the lookup table. In a preferred embodiment, the lookup table correlating voltage to force is linear. Preferably, the lookup table is generated by determining a maximum magnitude of force configured to be applied by the percussive massage device, determining a maximum magnitude of voltage configured to be applied to the percussive massage device from a power source, dividing the maximum magnitude of force into equal force increments, and dividing the maximum magnitude of voltage into equal voltage increments, wherein the number of equal force increments and the number of equal voltage increments is the same.

[0007] In a preferred embodiment, the method includes obtaining a maximum power source voltage of the percussive massage device, setting the maximum power source voltage to be the maximum magnitude of voltage, dividing the maximum magnitude of voltage into equal voltage increments, wherein the number of equal force increments and the number of equal voltage increments is the same, generating an updated lookup table correlating voltage to force applied by the percussive massage device corresponding to the range of

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voltages determined by the maximum power source voltage, and displaying a calibrated force magnitude corresponding to the power source voltage using the updated lookup table. In a preferred embodiment, the method includes obtaining at least two power source voltages each corresponding to a magnitude of force, wherein the magnitude of force is determined from the displayed force magnitude, measuring a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power source voltages, and generating an updated lookup table correlating voltage to force applied by the percussive massage device corresponding to the measured magnitudes of force.

[0008] In a preferred embodiment, the method includes displaying a calibrated force magnitude corresponding to the measured magnitudes of force using the updated lookup table. Preferably, the lookup table is updated for each magnitude of force capable of being displayed on the percussive massage device.

[0009] In accordance with another aspect of the present invention there is provided a method of displaying force of a percussive massage device that includes obtaining a current magnitude of a battery pack of the percussive massage device, obtaining a voltage magnitude of the battery pack, determining a power magnitude using the current magnitude and voltage magnitude of the battery pack, generating a lookup table correlating power magnitude to force magnitude applied by the percussive massage device, and displaying a force magnitude corresponding to the obtained power magnitude using the lookup table. In a preferred embodiment, the force magnitude is displayed utilizing a series of LEDs which are activated corresponding with the force magnitude. Preferably, the lookup table is generated by determining a maximum power magnitude to be input into the percussive massage device, determining a minimum power magnitude of the percussive massage device when no load is applied to the percussive massage device, determining a

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maximum force magnitude configured to be applied to the percussive massage device from a power source, dividing the maximum power magnitude into equal power increments, and dividing the maximum force magnitude into equal force increments. The number of equal power increments and the number of equal force increments is the same. Preferably, the maximum power magnitude is a maximum effective power magnitude derived from a total effective power.

[0010] In a preferred embodiment, the method includes determining at least two power magnitudes using current and voltage measurements of the battery pack, each corresponding to a magnitude of force. The magnitude of force is determined from the displayed force magnitude. Measuring a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power magnitudes, and generating an updated lookup table correlating power to force applied by the percussive massage device corresponding to the measured magnitudes of force. In a preferred embodiment, the method includes displaying a calibrated force magnitude corresponding to the measured magnitudes of force using the updated lookup table. Preferably, the lookup table is updated for each magnitude of force capable of being displayed on the percussive massage device.

[0011] It will be appreciated that the inventive features discussed herein can be used with any type of percussive massage device. For example, the force meter and other features taught herein can be used with the percussive massage devices disclosed in U.S. Patent No. 10,357,425 and U.S. Patent Application No. 16/675,772, filed November 6, 2019, the entireties of which are incorporated herein by reference.

[0012] In an embodiment, a non-transitory computer-readable medium has stored thereon software instructions that, when executed by a processor, cause the processor to obtain a voltage of a motor of the percussive massage device, generate a lookup table correlating

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voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table.

[0013] In an embodiment, the lookup table is generated by determining a maximum magnitude of force configured to be applied by the percussive massage device, determining a maximum magnitude of voltage configured to be applied to the percussive massage device from a power source, dividing the maximum magnitude of force into equal force increments, and dividing the maximum magnitude of voltage into equal voltage increments. In an embodiment, the number of equal force increments and the number of equal voltage increments is the same.

[0014] In another embodiment, a non-transitory computer-readable medium has stored thereon software instructions that, when executed by a processor, cause the processor to obtain a maximum power source voltage of the percussive massage device, set the maximum power source voltage to be the maximum magnitude of voltage, and divide the maximum magnitude of voltage into equal voltage increments, generate an updated lookup table correlating voltage to force applied by the percussive massage device corresponding to the range of voltages determined by the maximum power source voltage, and display a calibrated force magnitude corresponding to the power source voltage using the updated lookup table.

[0015] In another embodiment, a non-transitory computer-readable medium has stored thereon software instructions that, when executed by a processor, cause the processor to obtain at least two power source voltages each corresponding to a magnitude of force, wherein the magnitude of force is determined from the displayed force magnitude, measure a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power source voltages; and generate an updated lookup table

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correlating voltage to force applied by the percussive massage device corresponding to the measured magnitudes of force.

[0016] In an embodiment, a non-transitory computer-readable medium has stored thereon software instructions that, when executed by a processor, cause the processor to obtain a current magnitude of a battery pack of the percussive massage device, obtain a voltage magnitude of the battery pack, determine a power magnitude using the current magnitude and voltage magnitude of the battery pack, generate a lookup table correlating power magnitude to force magnitude applied by the percussive massage device, and display a force magnitude corresponding to the obtained power magnitude using the lookup table.

[0017] In an embodiment, a non-transitory computer-readable medium has stored thereon software instructions that, when executed by a processor, cause the processor to determine at least two power magnitudes using current and voltage measurements of the battery pack, each corresponding to a magnitude of force, wherein the magnitude of force is determined from the displayed force magnitude, measure a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power magnitudes, and generate an updated lookup table correlating power to force applied by the percussive massage device corresponding to the measured magnitudes of force.

[0018] In a preferred embodiment, the motor, in one embodiment, converts power from the power source into motion. In some embodiments, the motor is an electric motor. The electric motor may be any type of electric motor known in the art, including, but not limited to, a brushed motor, a brushless motor, a direct current (DC) motor, an alternating current (AC) motor, a mechanical-commutator motor, an electronic commutator motor, or an externally commutated motor.

[0019] In some embodiments, the actuated output or output shaft reciprocates at a rate of approximately 65 Hz. The actuated output, in some embodiments, reciprocates at a rate

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over 50 Hz. The reciprocating treatment device, in some embodiments, provides reciprocation at a rate ranging between 50 Hz and 80 Hz. In some embodiments, the actuated output has a maximum articulation rate of between 50 Hz and 80 Hz. In another embodiment, the actuated output has an articulation rate of between 30 Hz and 80 Hz. In certain embodiments, the actuated output has an articulation rate of approximately 37 Hz. In one embodiment, the actuated output has an articulation rate of approximately 60 Hz. In a preferred embodiment, the actuated output articulates or reciprocates at a frequency of between about 15 Hz and about 100 Hz. In a more preferred embodiment, the actuated output articulates or reciprocates at a frequency of between about 25 Hz and about 48 Hz. In the most preferred embodiment, the actuated output articulates or reciprocates at a frequency of between about 33 Hz and about 42 Hz. Any chosen range within the specified ranges is within the scope of the present invention.

[0020] The actuated output may move through a predetermined range of reciprocation. For example, the actuated output may be configured to have an amplitude of one half inch. In another embodiment, the actuated output may be configured to have an amplitude of one quarter inch. As will be appreciated by one skilled in the art, the actuated output may be configured to have any amplitude deemed therapeutically beneficial.

[0021] In some embodiments, the actuated output may be adjustable through a variable range of reciprocation. For example, the reciprocating treatment device may include an input to adjust the reciprocation amplitude from one quarter of an inch through a range of up to one inch. In a preferred embodiment, the actuated output moves through an amplitude of between about 0.15 inches and about 1.0 inches. In a more preferred embodiment, the actuated output articulates or reciprocates at a frequency of between about 0.23 inches and about 0.70 inches. In the most preferred embodiment, the actuated output articulates or

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reciprocates at a frequency of between about 0.35 inches and about 0.65 inches. Any chosen range within the specified ranges is within the scope of the present invention.

[0022] It will be appreciated that the device operates most effectively within the combined frequency and amplitude ranges. When developing the invention, the inventor determined that if the frequency and amplitude are above the ranges set forth above the device can cause pain and below the ranges the device is ineffective and does not provide effective therapeutic relief or massage. Only when the device operates within the disclosed combination of frequency and amplitude ranges does it provide efficient and therapeutically beneficial treatment to the muscles targeted by the device.

[0023] In certain embodiments, the reciprocating treatment device includes one or more components to regulate the articulation rate of the actuated output in response to varying levels of power provided at the power input. For example, the reciprocating treatment device may include a voltage regulator (not shown) to provide a substantially constant voltage to the motor over a range of input voltages. In another embodiment, the current provided to the motor may be regulated. In some embodiments, operation of the reciprocating treatment device may be restricted in response to an input voltage being below a preset value.

[0024] In a preferred embodiment, the percussive massage device includes a brushless motor. It will be appreciated that the brushless motor does not include any gears and is quieter than geared motors.

[0025] The device includes a push rod or shaft that is connected directly to the motor by a pin. In a preferred embodiment, the push rod is L-shaped or includes an arc shape. Preferably, the point where the push rod is connected to the pin is offset from reciprocating path that the distal end 40 of the push rod (and the massage attachment) travel. This capability is provided by the arc or L-shape. It should be appreciated that the push rod is designed such

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that it can transmit the force diagonally instead of vertically so the motor can be located at or near the middle of the device, otherwise a protrusion would be necessary to keep the shaft in the center with the motor offset therefrom (and positioned in the protrusion). The arc also allows the push rod to have a close clearance with the motor and allows the outer housing to be smaller than similar prior art devices, therefore making the device lower profile. Preferably two bearings are included at the proximal end of the push rod where it connects to the motor to counteract the diagonal forces and preventing the push rod for moving and touching the motor.

[0026] In a preferred embodiment, the device includes a touch screen for stopping, starting, activating, etc. The touch screen can also include other functions. Preferably, the device includes a thumbwheel or rolling button positioned near the touch screen/on off button to allow the user to scroll or navigate through the different functions. Preferably, the device also includes variable amplitude or stroke. For example, the stroke can change or be changed between about 8-16 mm.

[0027] In a preferred embodiment, the device is associated with and can be operated by an app or software that runs on a mobile device such as a phone, watch or tablet (or any computer). The app can connect to the device via bluetooth or other connection protocol. The app can have any or all of the following functions. Furthermore, any of the functions discussed herein can be added to the touch screen/scroll wheel or button(s) capability directly on the device. If the user walks or is located too far away from the device, the device will not work or activate. The device can be turned on an off using the app as well as the touch screen or button on the device. The app can control the variable speeds (e.g., anywhere between 1750-3000 RPM). A timer so the device stops after a predetermined period of time. The app can also include different treatment protocols associated therewith. This will allow the user to choose a protocol or area of the body they want to work on. When the

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start of the protocol is selected, the device will run through a routine. For example, the device may run at a first RPM for a first period of time and then run at a second RPM for a second period of time and/or at a first amplitude for a first period of time and then run at a second amplitude for a second period of time. The routines can also include prompts (e.g., haptic feedback) for letting the user to know to move to a new body part. These routines or treatments can be related to recovery, blood flow increase, performance, etc. and can each include a preprogrammed routine. The routines can also prompt or instruct the user to switch treatment structures (AmpBITS) or positions of the arm or rotation head. The prompts can include sounds, haptic feedback (e.g., vibration of the device or mobile device), textual instructions on the app or touch screen, etc. For example, the app may instruct the user to start with the ball treatment structure with the arm in position two. Then the user hits start and the device runs at a first frequency for a predetermined amount of time. The app or device then prompts the user to begin the next step in the routine and instructs the user to change to the cone treatment structure and to place the arm in position 1. The user hits start again and the device runs at a second frequency for a predetermined amount of time.

[0028] In a preferred embodiment, the app includes near field communication ("NFC") capability or other capability that allows the user's mobile device with the app thereon to scan an identifier, such as a barcode or a QR code that prompts the app to display certain information, such as the routines discussed above. In use, a user will be able to tap or place their mobile device near an NFC tag (or scan a QR code) on a piece of gym equipment and the app will show instructions, content or a lesson that is customized for using the device with that piece of equipment. For example, on a treadmill, the user scans the QR code or NFC tag and the app recognizes that the user is about to use the treadmill. The app can then provide instructions for how to use the device in conjunction with the treadmill and

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can initiate a preprogrammed routine for using the treadmill. For example, the user can be instructed to start with the left quad. Then, after a predetermined period of time (e.g., 15 seconds), the device vibrates or provides other haptic feedback. The user then switches to their left quad and after a predetermined period of time the device again vibrates. The user can then begin using the treadmill. Any routine is within the scope of the present invention. In an embodiment, the device and/or app (i.e., the mobile device containing the app) can also communicate (via bluetooth or the like) with the gym equipment (e.g., treadmill).

[0029] The device can also include a torque or force meter to let the user know how much force they are applying. The display associated with the force meter shows how much force is being applied on the muscle. The force meter allows for a more precise and effective treatment. The device includes a torque measuring sensor and display. Depending on the muscle the device is being used on and the benefit the user is looking to get (prepare, perform, recover) the force that should be applied varies. By having a torque sensor, the user is able to get a more precise and personalized treatment. The app and the touchscreen can provide the force information to the user. The force meter can be integrated with the routines and the user can be provided feedback with whether they are applying too much or too little pressure. The device can also include a thermal sensor or thermometer that can determine the temperature of the user's muscle and to provide feedback to the device and/or app. The haptic feedback can also provide feedback for too much pressure or force.

[0030] In a preferred embodiment, the percussive massage device includes a motor mount for mounting the brushless motor within the housing and for distributing forces from the motor as it operates to the housing. The motor is secured to a first side of the motor mount and the second or opposing side of the motor mount is secured to the housing. The motor mount includes a plurality of arms that space the motor from the housing and define a reciprocation space in which the push rod and associated components (counterweight, etc.)

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reciprocate. Threaded fasteners connect the motor mount to the housing. In a preferred embodiment, dampening members or feet are received on the shaft of the threaded fastener. The dampening members each include an annular slot defined therein. The annular slots receive housing. This prevents direct contact of the threaded fasteners with the housing and reduces sound from vibrations. The threaded fasteners are received in openings in tabs at the end of the arms.

[0031] In a preferred embodiment, the motor is housed in a motor housing that is rotatable within the main housing. The motor housing is basically the equivalent of the gear box housing in related embodiments. In a preferred embodiment, there are opposite openings in the outside of the motor housing that expose the motor on one side and the motor mount on the other. The openings provide ventilation for the motor and allow the motor mount to connect directly to the main housing.

[0032] In a preferred embodiment, the device includes a touch screen as well as button(s) for operating the device. For example, the device can include a touch screen, a center button for turning the device on and off and a ring/rocker button that provides the ability to scroll left and right (e.g., to the preset treatments discussed herein) and up and down (e.g., to control the speed or frequency). The screen can also be a non-touch screen.

[0033] In another preferred embodiment, any of the devices taught herein can include the ability to vary the amplitude, thus providing a longer or shorter stroke depending on the application or needs of the user. The amplitude variability can also be part of the routines or presets discussed herein. For example, the device can include a mechanical switch that allows the eccentricity of the connector to be modified (e.g., between 4mm and 8mm). The mechanism can include a push button and a slider. The pin structure has a spring that lets it fall back into the locked position.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0034] The invention may be more readily understood by referring to the accompanying drawings in which:

[0035] FIG. 1 is a block diagram showing interconnected components of a percussive massage device with a force meter;

[0036] FIG. 2 is a circuit diagram of a microcontroller unit with pin outputs in accordance with one embodiment;

[0037] FIG. 3 is a circuit diagram used for battery voltage detection in accordance with one embodiment;

[0038] FIG. 4 is a circuit diagram for detection and measurement of voltage of the motor of the percussive massage device in accordance with one embodiment;

[0039] FIG. 5 is a flow diagram showing a method of detecting force applied by the percussive massage device in accordance with a preferred embodiment;

[0040] FIG. 6 is a flow diagram showing a method of generating a lookup table correlating voltage to force in accordance with a preferred embodiment;

[0041] FIG. 7 is a graph plotting a lookup table for use by a method of detecting force applied by the percussive massage device that was generated by correlating voltage to force in accordance with a preferred embodiment;

[0042] FIG. 8 is a flow diagram showing a method of calibrating a lookup table according to a preferred embodiment;

[0043] FIG. 9 is a graph plotting a lookup table generated by a method of detecting force applied by the percussive massage device against a lookup table calibrated by using a method of calibrating a lookup table according to a preferred embodiment;

[0044] FIG. 10 is a flow diagram showing a method of calibrating a lookup table;

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[0045] FIG. 11 is a graph plotting a lookup table after being calibrated in accordance with a preferred embodiment;

[0046] FIG. 12 is a flow diagram showing a method of detecting force applied by a percussive massage device in accordance with a preferred embodiment;

[0047] FIG. 13 is a flow diagram showing a method of generating a lookup table correlating power to force in accordance with a preferred embodiment;

[0048] FIG. 14 is a graph plotting a lookup table for use by a method of detecting force of that was generated by correlating power to force in accordance with a preferred embodiment;

[0049] FIG. 15 is a flow diagram showing a method of calibrating a lookup table in accordance with a preferred embodiment;

[0050] FIG. 16 is a graph plotting a lookup table after being calibrated in accordance with a preferred embodiment;

[0051] FIG. 17 is a perspective view of a percussive massage device in accordance with a preferred embodiment of the present invention;

[0052] FIG. 18 is a perspective view of the percussive massage device of FIG. 17 with a portion of the housing removed; and

[0053] FIG. 19 is a perspective view of the motor.

[0054] Like numerals refer to like parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0055] The following description and drawings are illustrative and are not to be construed as limiting. Numerous specific details are described to provide a thorough understanding of the disclosure. However, in certain instances, well-known or conventional details are not described in order to avoid obscuring the description. References to one or an embodiment

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in the present disclosure can be, but not necessarily are references to the same embodiment; and, such references mean at least one of the embodiments.

[0056] Reference in this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the-disclosure. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Moreover, various features are described which may be exhibited by some embodiments and not by others. Similarly, various requirements are described which may be requirements for some embodiments but not other embodiments.

[0057] The terms used in this specification generally have their ordinary meanings in the art, within the context of the disclosure, and in the specific context where each term is used. Certain terms that are used to describe the disclosure are discussed below, or elsewhere in the specification, to provide additional guidance to the practitioner regarding the description of the disclosure. For convenience, certain terms may be highlighted, for example using italics and/or quotation marks: The use of highlighting has no influence on the scope and meaning of a term; the scope and meaning of a term is the same, in the same context, whether or not it is highlighted.

[0058] It will be appreciated that the same thing can be said in more than one way. Consequently, alternative language and synonyms may be used for any one or more of the terms discussed herein. No special significance is to be placed upon whether or not a term is elaborated or discussed herein. Synonyms for certain terms are provided. A recital of one or more synonyms does not exclude the use of other synonyms. The use of examples anywhere in this specification including examples of any terms discussed herein is illustrative only, and is not intended to further limit the scope and meaning of the

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disclosure or of any exemplified term. Likewise, the disclosure is not limited to various embodiments given in this specification.

[0059] Without intent to further limit the scope of the disclosure, examples of instruments, apparatus, methods and their related results according to the embodiments of the present disclosure are given below. Note that titles or subtitles may be used in the examples for convenience of a reader, which in no way should limit the scope of the disclosure. Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure pertains. In the case of conflict, the present document, including definitions, will control.

[0060] It will be appreciated that terms such as "front," "back," "top," "bottom," "side," "short," "long," "up," "down," "aft," "forward," "inboard," "outboard" and "below" used herein are merely for ease of description and refer to the orientation of the components as shown in the figures. It should be understood that any orientation of the components described herein is within the scope of the present invention.

[0061] FIGS. 1-19 show embodiments in accordance with a percussion massage device with a force meter. FIG. 1 is a block diagram showing interconnected components of a percussive massage device with a force meter 700. In an embodiment, the percussive massage device with force meter 700 includes a microcontroller unit 701, a battery pack management unit 702, an NTC sensor 703, a power charging management unit 704, a wireless charging management unit 705, a wireless charging receiving system 706, a voltage management unit 707 (5V 3.3V Voltage Management in drawings), battery charging inputs 708 (20V 2.25A Charging Inputs in drawings), a display 709 (Force/Battery/Speed Display in drawings), a wireless control unit 710 (Bluetooth Control in drawings), an OLED screen 711, an OLED screen control system 712, a motor 713, a motor drive system 714, a PWM speed setup unit 715, an over-current protection unit 716, and a power switch unit 717

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(Power On/Off OLED Screen SW in drawings). In the embodiment shown in accordance with FIG. 1, each block in the diagram is shown as a separate component. In alternative embodiments, however, certain components may be combined without departing from the scope of the present disclosure.

[0062] The microcontroller unit 701, in an embodiment, is a microcontroller unit including a processor, a memory, and input/output peripherals. In other embodiments, however the microcontroller unit 701 is an ST Microelectronics STM32F030K6 series of microcontroller units, STM32F030C8T6 series of microcontrollers, STM32F030CCT6 series of microcontrollers, or an equivalent microcontroller.

[0063] One of ordinary skill would understand that the memory of the microcontroller unit 701 is configured to store machine-readable code for processing by the processor of the microcontroller unit 701. Various other configurations may exist depending on whether the designer of the percussive massage device with force meter 700 desires to implement the machine-readable code in software, firmware, or both. In an embodiment, the machine-readable code is stored on the memory and configured to be executed by a processor of the microcontroller 701. In an embodiment, the machine-readable code is stored on computer-readable media.

[0064] The battery pack management unit 702, in an embodiment, is implemented in firmware or software and configured to be used in connection with the microcontroller unit 701. In this embodiment, the firmware or software is stored in memory (not shown) and configured to be obtainable by the microcontroller unit 701. The battery pack management unit 702 may also be a combination of firmware, software, and hardware, in another embodiment. The battery pack management unit 702 is coupled with the NTC sensor 703. The NTC sensor 703 is a negative temperature coefficient thermistor used by the battery pack management unit 702 to sense temperature of the battery pack. For example, the NTC sensor 703 is a

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thermistor with B value of 3950 +/- 1%, and a resistance of 10 kΩ. In another example, the thermistor has a resistance of 100 kΩ. One of ordinary skill in the art would recognize that a thermistor is a resistor whose resistance is dependent upon temperature. In other embodiments, however, the NTC sensor 703 may be another type of temperature sensing device or component used in connection with the battery pack management unit 702.

[0065] The power charging management unit 704, in an embodiment, is implemented in firmware or software and configured to be used in connection with the microcontroller unit 701. Similarly to the battery pack management unit 702, the power charging management unit 704 firmware or software is stored in memory (not shown) and configured to be obtainable by the microcontroller unit 701. The power charging management unit 704 may also be a combination of firmware, software, and hardware, in another embodiment. In various embodiments, the power charging management unit 704 is configured to charge a battery pack via a direct connection or through an external charger, such as when configured to be operable with rechargeable batteries.

[0066] The wireless charging management unit 705, in an embodiment, is coupled to the battery pack management unit 702 and the battery charging inputs 708. In other embodiments, the battery or battery pack is charged using other conventional methodologies, such as, for example, charging the battery or battery pack using a wire or cord coupled to the battery charging inputs 708.

[0067] The wireless charging receiving system 706, in an embodiment, is coupled to the power charging management unit 704 and the display 709. The wireless charging receiving system 706 includes one or more of firmware, software, and hardware. In an embodiment, the wireless charging receiving system 706 is configured to receive information pertaining to battery capacity, charging metrics, and other information pertaining to wireless charging, and to pass along the information to the power charging management unit 704.

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The wireless charging receiving system 706 preferably includes a wireless charging pad used to charge the percussive massage device with force meter 700. One of ordinary skill in the art would understand that a variety of wireless charging devices may be utilized to wirelessly charge the percussive massage device with force meter 700. As one example, the Qi wireless charging standard and related devices may be utilized to wirelessly charge the percussive massage device with force meter 700.

[0068] The voltage management unit 707, in an embodiment, is a DC voltage regulator that steps down 5 volt to 3.3 volt power for use by the microcontroller unit 701. The voltage management unit 707 may also perform additional functions for management of 3.3 volt power for use by the microcontroller unit 701. In an embodiment, the voltage management unit 707 is implemented using a series of electronic components such as, for example, implementing a resistive divider using electronic components. In another embodiment, the voltage management unit 707 is a stand-alone voltage regulator module and/or device designed to step down voltage from 5 volts to 3.3 volts. One of ordinary skill in the art would understand the various methodologies and devices available to step down 5 volts to 3.3 volts.

[0069] The battery charging inputs 708, in an embodiment, are interfaces by which a wire or cord may be inserted for charging the percussive massage device with force meter 700. For example, a standardized barrel connector is the battery charging inputs 708. In another example, the battery charging inputs 708 is a USB connector. Other more specialized charging methodologies may require a particular battery charging input not described above.

[0070] The display 709, in an embodiment, displays a series of LEDs depicting an amount of force applied by the percussive massage device with force meter 700. In an alternative embodiment, the display 709 displays a series of LEDs depicting the current battery or

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battery pack charge of the percussive massage device with force meter 700. In yet another embodiment, the display 709 displays a series of LEDs depicting the current speed of the percussive massage device with force meter 700. One of ordinary skill in the art would recognize that while LEDs have been specified in the above-referenced embodiments, other embodiments not using LEDs are within the scope of this disclosure, such as, for example, liquid crystal displays, OLEDs, CRT displays, or plasma displays. One of ordinary skill in the art would also understand that it may be advantageous in an embodiment utilizing a battery or battery pack to use low-power options to ensure battery power longevity. In an embodiment, the display 709 is a 128x64 pixel OLED display.

[0071] The wireless control unit 710 is a wireless connectivity device that may be implemented in a wireless microcontroller unit. In an embodiment, the wireless control unit 710 is a Bluetooth transceiver module configured to couple, via Bluetooth, to a remote device. In an embodiment, the Bluetooth module is a Bluetooth Low-Energy (BLE) module configured to be run in broadcast mode. The wireless control unit 710 is coupled to the microcontroller unit 701. In an embodiment, the remote device is a smartphone having an embedded Bluetooth module. In an alternative embodiment, the remote device is a personal computer having Bluetooth connectivity. In other embodiments, other wireless connectivity standards besides the Bluetooth wireless standard may be utilized. One of ordinary skill in the art would recognize that low-power wireless control modules may be advantageous when the percussive massage device with force meter 700 is utilizing a battery or battery pack.

[0072] The OLED screen 711 and the OLED screen control system 712, in an embodiment, are configured to display substantially the same information as the display 709 referenced above. The OLED screen 711 is coupled to the OLED screen control system 511. The OLED screen control system 712 is coupled to the microcontroller unit 701, the OLED

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screen 711, and the power switch unit 717. In an embodiment, the display 709 and the OLED screen 711 may be redundant and it may only be necessary to utilize one or the other.

[0073] The motor 713, in an embodiment, is a brushless direct current (BLDC) motor. The motor 713 and the motor drive system 714, in an embodiment, are configured to vary the speed (i.e., rotational motion) that may be converted to reciprocal motion. In other embodiments, the motor 713 is a brushed DC motor, a brushed AC motor, or a brushless AC motor. One of ordinary skill in the art would understand that choosing a brushless or brushed motor, or direct current or alternating current, may vary depending on the application and intended size, battery power, and use.

[0074] The PWM speed setup unit 715, in an embodiment, is used to control pulse width modulation utilized to drive the motor 713. The PWM speed setup unit 715 is coupled to the microcontroller unit 701 and the over-current protection unit 716. One of ordinary skill in the art would understand that pulse width modulation is one way to vary the average power applied to the motor 713, resulting in varying speed as desired. In alternative embodiments, one of ordinary skill in the art would understand that there are a variety of methods to vary the speed of a brushless DC motor. For example, voltage to the motor 713 may be controlled in other non-PWM methods.

[0075] The over-current protection unit 716, in an embodiment, may be a feature of an integrated system-in-package to prevent damage caused by high currents to the motor. In other embodiments, the over-current protection unit 716 is implemented using a series of electronic components configured to protect the motor from excessively high current.

[0076] The power switch unit 717, in an embodiment, is configured to turn on and turn off the percussive massage device with force meter 700. The power switch unit 717 is coupled to

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the OLED screen control system 712 and the microcontroller unit 701. In an embodiment, the power switch unit 717 is the switch 404.

[0077] FIG. 2 shows a circuit diagram of the microcontroller unit 701 with pin outputs. In this embodiment, the STM32F030K6 series of microcontroller units is utilized. The circuit diagram depicts +3.3 volt power being provided to the VDD inputs of the microcontroller unit 701. Input PA3 is labeled "Motor_VOL", the voltage of the motor 713. Input PA2 is "bt_v", the battery or battery pack voltage. The microcontroller unit is configured to receive analog voltage on inputs PA2 and PA3 and to convert it to digital voltage using the microcontroller's analog-to-digital converter. In this embodiment, the analog-to-digital converter is a 12-bit ADC. One of ordinary skill in the art would understand that other microcontrollers may utilize voltage sensing and analog-to-digital converters to perform similar functions. In yet other embodiments, an analog-to-digital converter module separate from a microcontroller may be utilized.

[0078] FIG. 3 shows a circuit diagram used for battery voltage detection. In this embodiment, +BT, the positive battery terminal 518, is coupled to a circuit consisting of a P-channel MOSFET 519, an N-Channel MOSFET 520, 0.1 μF capacitor 521, 100 kΩ resistors 522, 523, 68 kΩ resistor 524, 1 kΩ resistors 525, 526, and 10 kΩ resistors 527, 528. The circuit is configured to provide an input analog voltage of the battery or battery pack, or bt_v, to the microcontroller unit 701 of FIG. 2. In other embodiments, voltage of the battery or battery pack may be achieved using a voltage reader coupled to the terminals of the battery or battery pack.

[0079] FIG. 4 shows a circuit diagram for detection and measurement of voltage of the motor 713 of the percussive massage device. In this embodiment, voltage sensing resistor 529 is coupled in parallel with the microcontroller unit 701, and coupled to the motor 713. In an embodiment, the voltage sensing resistor has a value of 0.0025 Ω. The circuit depicted in

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FIG. 4 is configured to provide the Motor_VOL input into the microcontroller unit 701 of FIG. 2. In an embodiment, the input analog voltage is amplified. In another embodiment, the voltage of the motor 713 is measured or sensed using a separate series of electronic components or a standalone device and input into a microprocessor for use with the method of displaying a force on the percussive massage device.

[0080] FIG. 5 is a flow diagram showing a method 800 of detecting force applied by the percussive massage device in accordance with a preferred embodiment. At Step 802, a voltage magnitude V is obtained. In an embodiment, voltage magnitude V is an analog voltage obtained by using the circuit disclosed in FIG. 2. In that circuit, a block curve signal from the motor 713 (i.e., a Hall effect sensor) is simulated in the circuit as current using the resistor R, which is placed in parallel with the microcontroller unit 701. In other embodiments, voltage that corresponds to the current operating speed of the motor 713 may be generated in a variety of other ways. The voltage magnitude V may be input to a microcontroller unit 701 that converts analog voltage to digital voltage using an analog-to-digital converter, such as that implemented in the STM32F030K6 microcontroller unit. The STM32F030K6 microcontroller unit coverts analog voltage magnitude to a digital code corresponding to the 12-bit ADC (i.e., 0 to 4096). The digital code represents a voltage magnitude corresponding to the original voltage magnitude V obtained.

[0081] At Step 804, a lookup table is generated that correlates voltage V to force magnitude F. In an embodiment, the lookup table is generated using a method 900 of generating a lookup table correlating voltage to force. For example, the force magnitude F may be expressed in pounds of force. In an alternative embodiment, the force magnitude F may be expressed in Newtons of force.

[0082] At Step 806, the force magnitude F corresponding to voltage magnitude V is displayed on the percussive massage device with force meter 700. In an embodiment, a series of LED

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lights may be utilized to depict varying amounts of force as the force is being applied by the percussive massage device with force meter 700. Thus, as the amount of force magnitude F increases, more LEDs on the series of LED lights will be lit. Preferably, the series of LED lights consists of 12 LED lights.

[0083] FIG. 6 is a flow diagram showing a method 900 of generating a lookup table correlating voltage to force. At Step 902, a maximum magnitude of force, F_{MAX}, is determined. The magnitude of F_{MAX} may be determined by assessing the maximum desired force to apply using the percussive massage device with force meter 700. As an example, F_{MAX} is 60 pounds of force.

[0084] At Step 904, a maximum magnitude of voltage, V_{MAX}, is determined. The magnitude of V_{MAX} may be determined by assessing the maximum theoretical voltage change possible by the percussive massage device with force meter 700. As an example, V_{MAX} is 1.8 volts.

[0085] At Step 906, F_{MAX} is divided into equal increments. Using the above example from Step 902, 60 pounds of force is divided into 60 one-pound increments.

[0086] At Step 908, V_{MAX} is divided into the same amount of increments as determined in Step 906 above. Thus, using the above example from Step 904, 1.8 volts is divided into 60 0.3-volt increments.

[0087] At Step 910, a lookup table (LUT) is generated that correlates the increments of pounds of force with the increments of voltage. This necessarily creates a linear relationship between force and voltage. FIG. 7 is a graph plotting the LUT for use by the method of detecting force of FIG. 5 that was generated using the specific example identified in FIG. 6. The graph depicts calculated force that was calculated using the method 900.

[0088] A problem may arise in that the theoretical maximum voltage assumption at Step 904 in the method 900 is inaccurate. It may also be the case that as the percussive massage device

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with force meter 700 is used, the maximum available voltage degrades over time. In other words, the battery or battery pack voltage may decrease.

[0089] Accordingly, a method 1000 of calibrating the LUT generated by method 900 may be advantageous. FIG. 8 is a flow diagram showing a method 1000 of calibrating a LUT. At Step 1002, battery pack voltage BV is obtained. In an embodiment, battery pack voltage magnitude BV is an analog voltage obtained by using the circuit disclosed in FIG. 3. In that circuit, the battery pack voltage magnitude BV may be input to a microcontroller unit 701 that converts analog voltage to digital voltage using an analog-to-digital converter, such as that implemented in the STM32F030K6 microcontroller unit. The STM32F030K6 microcontroller unit coverts analog voltage magnitude to a digital code corresponding to the 12-bit ADC (i.e., 0 to 4096). The digital code represents a voltage magnitude corresponding to the original battery pack voltage magnitude BV obtained.

[0090] At Step 1004, V_{MAX} is set to the actual battery voltage magnitude BV output. As an example, may decrease from 1.8 volts to 1.74 volts, a 0.6 volt decrease. At Step 1006, the LUT linear correlation is adjusted to reflect the lower V_{MAX}. FIG. 9 is a graph plotting the LUT calculated by the method 900 against the LUT calibrated by using the method 1000. The LUT resulting from method 1000 depicts a calibrated force rather than a calculated force.

[0091] FIG. 10 is a flow diagram showing a method 1100 of calibrating a LUT. The method 1100 may be performed after the method 900, or entirely separately from the method 900. At Step 1102, battery pack voltage BV is measured. In an embodiment, the measurement is done without applying any force from the percussive massage device with force meter 700. In an embodiment, the battery pack voltage BV is measured using an external voltage meter. In another embodiment, the battery pack and/or microcontroller unit 701 have embedded solutions for directly measuring battery pack voltage BV.

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[0092] At Step 1104, the display on the percussive massage device with force meter 700 that displays the force magnitude F is read to determine the force magnitude F corresponding to the measured battery pack voltage BV.

[0093] At Step 1106, a force meter is used to measure actual force being applied. In an embodiment, the force meter is a push/pull force meter. The direct measurement of force allows calibration of the LUT by comparing the displayed force magnitude F with the measured actual force. At Step 1108, the LUT is updated with a corrected force corresponding with the measured battery pack voltage BV. After Step 1108, Steps 1102-1106 are repeated for each successive voltage increment. In the embodiment depicted in accordance with the method 900, Steps 1102-1106 are repeated for every 3-volt increment. FIG. 11 is a graph plotting the LUT calculated by the method 1100 after all 3-volt increments had been updated.

[0094] FIG. 12 is a flow diagram showing a method 1200 of detecting force applied by a percussive massage device in accordance with a preferred embodiment. At Step 1202, current magnitude C of a battery pack is obtained. In an embodiment, current magnitude C is input into the microcontroller unit 701. At Step 1204, voltage magnitude BV of a battery pack is obtained. In an embodiment, voltage magnitude BV is input into the microcontroller unit 701. At Step 1206, power is calculated using the product of C and BV. In an embodiment, the microcontroller unit 701 is configured to calculate power by multiplying C and BV. At Step 1208, a lookup table is generated that correlates power magnitude P to force magnitude F. In an embodiment, the lookup table is generated using a method 1300 of generating a lookup table correlating power to force. For example, the power magnitude P may be expressed in watts. In an alternative embodiment, force magnitude F may be expressed in pounds of force or Newtons of force.

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[0095] At Step 1210, the force magnitude F corresponding to power magnitude P is displayed on the percussive massage device with force meter 700. In an embodiment, a series of LED lights may be utilized to depict varying amounts of force as the force is being applied by the percussive massage device with force meter 700. Thus, as the amount of force magnitude F increases, more LEDs on the series of LED lights will be lit. Preferably, the series of LED lights consists of 12 LED lights.

[0096] FIG. 13 is a flow diagram showing a method 1300 of generating a lookup table correlating power to force. At Step 1302, a maximum magnitude of power, F_{MAX}, is determined. A theoretical maximum magnitude of power, however, is not a reasonable assumption if the total effective power may be calculated. Equation 1 may be utilized to determine Total Maximum Effective Power (EP_{MAX}).

$$Equation\ 1: Total\ EP_{MAX} = P_{MAX} \times Total\ EP$$

[0097] Equation 2 may be utilized to calculate Total EP, which is then input into Equation 1 above.

$$Equation\ 2: Total\ EP = EP_{BATTERY} \times EP_{PCBA} \times EP_{MOTOR}$$

where Total EP, $EP_{BATTERY}$, EP_{PCBA}, and EP_{MOTOR} are all expressed in percentages, and where PCBA is a printed circuit board assembly.

[0098] In an embodiment, EP (Battery) is 85%, EP (PCBA) is 95%, and EP (Motor) is 75%. Thus, using Equation 2, Total EP is 85% * 95% * 75% = 60.5625%.

[0099] In this embodiment, P_{MAX} is calculated by multiplying the maximum voltage V_{MAX} and the maximum amperage C_{MAX} of the battery pack such as in Equation 3. P_{MAX} is then input into Equation 1.

$$P_{MAX} = V_{MAX} \times C_{MAX}$$

[00100] In this embodiment, V_{MAX} is 16.8 volts and C_{MAX} is 20 amperes. Thus, P_{MAX} is 336 watts.

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[00101] Turning back now to Equation 1, if P_{MAX} is 336 watts and Total EP is 60.5625%, then Total EP_{MAX} is 203 watts.

[00102] At Step 1304, a minimum amount of power P_{MIN}, is determined. It will be recognized by one of ordinary skill in the art that the power without any force being applied (i.e., no load) will be non-zero. Thus, P_{MIN} of 12 watts is assumed. One of ordinary skill will also understand that the value of is equivalent to the rated power without load, which may be derived from V_{MAX} and C_{MIN}.

[00103] At Step 1306, a maximum magnitude of force, F_{MAX}, is determined. The magnitude of F_{MAX} may be determined by assessing the maximum desired force to apply using the percussive massage device with force meter 700. As an example, F_{MAX} is 60 pounds of force.

[00104] At Step 1308, Total EP_{MAX} is divided into equal increments. In an embodiment, Total EP_{MAX} is divided in 3 watt increments per one pound of force, starting at P_{MIN} (12 watts). It will be recognized by one of ordinary skill in the art that if F_{MAX} is 60 pounds of force, the total desired force output of the percussive massage device with force meter 700, then 60 pounds of force correlates to 189 watts, within the calculated Total EP_{MAX}.

[00105] At Step 1310, a LUT is generated that correlates the increments of pounds of force with the increments of power in watts. This necessarily creates a linear relationship between force and voltage. FIG. 14 is a graph plotting the LUT for use by the method of detecting force of FIG. 12 that was generated using the specific example identified in FIG. 11. The graph depicts calculated force that was calculated using the method 1200.

[00106] Similarly to the method 900, a problem may arise in that the measured voltage of the battery pack at Step 1204 in the method 1200 is inaccurate. It may also be the case that as the percussive massage device with force meter 700 is used, the maximum available

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voltage degrades over time. In other words, the battery or battery pack voltage may decrease.

[00107] FIG. 15 is a flow diagram showing a method 1400 of calibrating a LUT. The method 1100 may be performed after the method 900 or the method 1200, or entirely separately from the method 900 or the method 1200. At Step 1402, current magnitude C of a battery pack is obtained. In an embodiment, current magnitude C is input into the microcontroller unit 701.

[00108] At Step 1404, battery pack voltage BV is measured. In an embodiment, the measurement is done without applying any force from the percussive massage device with force meter 700. In an embodiment, the battery pack voltage BV is measured using an external voltage meter. In another embodiment, the battery pack and/or microcontroller unit 701 have embedded solutions for directly measuring battery pack voltage BV. At Step 1406, power is calculated using the product of C and BV. In an embodiment, the microcontroller unit 701 is configured to calculate power by multiplying C and BV.

[00109] At Step 1408, the display on the percussive massage device with force meter 700 that displays the force magnitude F is read to determine the force magnitude F corresponding to the calculated power. At Step 1410, a force meter is used to measure actual force being applied. In an embodiment, the force meter is a push/pull force meter. The direct measurement of force allows calibration of the LUT by comparing the displayed force magnitude F with the measured actual force. At Step 1412, the LUT is updated with a corrected force corresponding with the measured power. After Step 1412, Steps 1402-1410 are repeated for each power or force increment. In the embodiment depicted in accordance with the method 900, Steps 1402-1410 are repeated for every 3-watt increment. FIG. 16 is a graph plotting the LUT calculated by the method 1400 after all 3-watt increments had been updated.

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[00110] FIGS. 17-19 show an exemplary percussive massage device 400 that embodies the features disclosed herein, and, in particular, in FIGS. 1-16. Generally, the percussive massage device 400 includes a housing 402, an electrical source or battery pack 404, a motor 406 positioned in the housing 402, and a switch 404 for activating the motor 406. The electronics (see printed circuit board 408 in FIG. 18) includes the controller that is configured to obtain a voltage of the motor, generate a lookup table correlating voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table. The display can be screen 410.

[00111] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to." As used herein, the terms "connected," "coupled," or any variant thereof, means any connection or coupling, either direct or indirect, between two or more elements; the coupling of connection between the elements can be physical, logical, or a combination thereof. Additionally, the words "herein," "above," "below," and words of similar import, when used in this application, shall refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description of the Preferred Embodiments using the singular or plural number may also include the plural or singular number respectively. The word "or" in reference to a list of two or more items, covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

[00112] The above-detailed description of embodiments of the disclosure is not intended to be exhaustive or to limit the teachings to the precise form disclosed above. While specific

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embodiments of and examples for the disclosure are described above for illustrative purposes, various equivalent modifications are possible within the scope of the disclosure, as those skilled in the relevant art will recognize. Further, any specific numbers noted herein are only examples: alternative implementations may employ differing values, measurements or ranges.

[00113] The teachings of the disclosure provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various embodiments described above can be combined to provide further embodiments. Any measurements described or used herein are merely exemplary and not a limitation on the present invention. Other measurements can be used. Further, any specific materials noted herein are only examples: alternative implementations may employ differing materials.

[00114] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference in their entirety. Aspects of the disclosure can be modified, if necessary, to employ the systems, functions, and concepts of the various references described above to provide yet further embodiments of the disclosure.

[00115] These and other changes can be made to the disclosure in light of the above Detailed Description of the Preferred Embodiments. While the above description describes certain embodiments of the disclosure, and describes the best mode contemplated, no matter how detailed the above appears in text, the teachings can be practiced in many ways. Details of the system may vary considerably in its implementation details, while still being encompassed by the subject matter disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the disclosure should not be taken to imply that the terminology is being redefined herein to be restricted to any specific characteristics, features or aspects of the disclosure with which that terminology is

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associated. In general, the terms used in the following claims should not be construed to limit the disclosures to the specific embodiments disclosed in the specification unless the above Detailed Description of the Preferred Embodiments section explicitly defines such terms. Accordingly, the actual scope of the disclosure encompasses not only the disclosed embodiments, but also all equivalent ways of practicing or implementing the disclosure under the claims.

[00116] Accordingly, although exemplary embodiments of the invention have been shown and described, it is to be understood that all the terms used herein are descriptive rather than limiting, and that many changes, modifications, and substitutions may be made by one having ordinary skill in the art without departing from the spirit and scope of the invention.

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CLAIMS

What is claimed is:

1. A percussive massage device comprising:

a housing,

an electrical source,

a motor positioned in the housing,

a switch for activating the motor, and

a controller configured to obtain a voltage of the motor, generate a lookup table correlating voltage to force applied by the percussive massage device, and display a force magnitude corresponding to the obtained voltage using the lookup table.

2. The percussive massage device of claim 1, wherein the lookup table is generated by determining a maximum magnitude of force configured to be applied by the percussive massage device, determining a maximum magnitude of voltage configured to be applied to the percussive massage device from a power source, dividing the maximum magnitude of force into equal force increments, and dividing the maximum magnitude of voltage into equal voltage increments, wherein the number of equal force increments and the number of equal voltage increments is the same.

3. The percussive massage device of claim 1, further comprising a battery pack.

4. The percussive massage device of claim 1, further comprising a display configured to depict an amount of force applied by the percussive massage device.

5. The percussive massage device of claim 4, wherein the display comprises a series of LEDs.

6. The percussive massage device of claim 1, further comprising an organic light-emitting diode screen.

7. The percussive massage device of claim 1, wherein the motor is a brushless direct-current (BLDC) motor.

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8. The percussive massage device of claim 7, further comprising a voltage-sensing resistor electrically coupled to the BLDC motor and the controller.

9. A method of displaying force of a percussive massage device, the method comprising the steps of:

obtaining a voltage of a motor of the percussive massage device,

generating a lookup table correlating voltage to force applied by the percussive massage device, and

displaying a force magnitude corresponding to the obtained voltage using the lookup table.

10. The method of claim 9, wherein the motor is a brushless direct current motor.

11. The method of claim 9, wherein the lookup table correlating voltage to force is linear.

12. The method of claim 9, wherein the lookup table is generated by determining a maximum magnitude of force configured to be applied by the percussive massage device, determining a maximum magnitude of voltage configured to be applied to the percussive massage device from a power source, dividing the maximum magnitude of force into equal force increments, and dividing the maximum magnitude of voltage into equal voltage increments, wherein the number of equal force increments and the number of equal voltage increments is the same.

13. The method of claim 9, further comprising:

obtaining a maximum power source voltage of the percussive massage device,

setting the maximum power source voltage to be the maximum magnitude of voltage,

dividing the maximum magnitude of voltage into equal voltage increments, wherein the number of equal force increments and the number of equal voltage increments is the same,

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generating an updated lookup table correlating voltage to force applied by the percussive massage device corresponding to the range of voltages determined by the maximum power source voltage, and

displaying a calibrated force magnitude corresponding to the power source voltage using the updated lookup table.

14. The method of claim 9, further comprising:

obtaining at least two power source voltages each corresponding to a magnitude of force, wherein the magnitude of force is determined from the displayed force magnitude,

measuring a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power source voltages, and

generating an updated lookup table correlating voltage to force applied by the percussive massage device corresponding to the measured magnitudes of force.

15. The method of claim 11, further comprising:

displaying a calibrated force magnitude corresponding to the measured magnitudes of force using the updated lookup table.

16. The method of claim 11, wherein the lookup table is updated for each magnitude of force capable of being displayed on the percussive massage device.

17. A method of displaying force of a percussive massage device, the method comprising the steps of:

obtaining a current magnitude of a battery pack of the percussive massage device,

obtaining a voltage magnitude of the battery pack,

determining a power magnitude using the current magnitude and voltage magnitude of the battery pack,

generating a lookup table correlating power magnitude to force magnitude applied by the percussive massage device, and

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displaying a force magnitude corresponding to the obtained power magnitude using the lookup table.

18. The method of claim 17, wherein the force magnitude is displayed utilizing a series of LEDs which are activated corresponding with the force magnitude.

19. The method of claim 17, wherein the lookup table is generated by determining a maximum power magnitude to be input into the percussive massage device, determining a minimum power magnitude of the percussive massage device when no load is applied to the percussive massage device, determining a maximum force magnitude configured to be applied to the percussive massage device from a power source, dividing the maximum power magnitude into equal power increments, and dividing the maximum force magnitude into equal force increments, wherein the number of equal power increments and the number of equal force increments is the same.

20. The method of claim 19, wherein the maximum power magnitude is a maximum effective power magnitude derived from a total effective power.

21. The method of claim 19, further comprising:

determining at least two power magnitudes using current and voltage measurements of the battery pack, each corresponding to a magnitude of force, wherein the magnitude of force is determined from the displayed force magnitude,

measuring a magnitude of force exerted by the percussive massage device using an external force meter for each of the at least two power magnitudes, and

generating an updated lookup table correlating power to force applied by the percussive massage device corresponding to the measured magnitudes of force.

22. The method of claim 21, further comprising:

displaying a calibrated force magnitude corresponding to the measured magnitudes of force using the updated lookup table.

23. The method of claim 21, wherein the lookup table is updated for each magnitude of force capable of being displayed on the percussive massage device.

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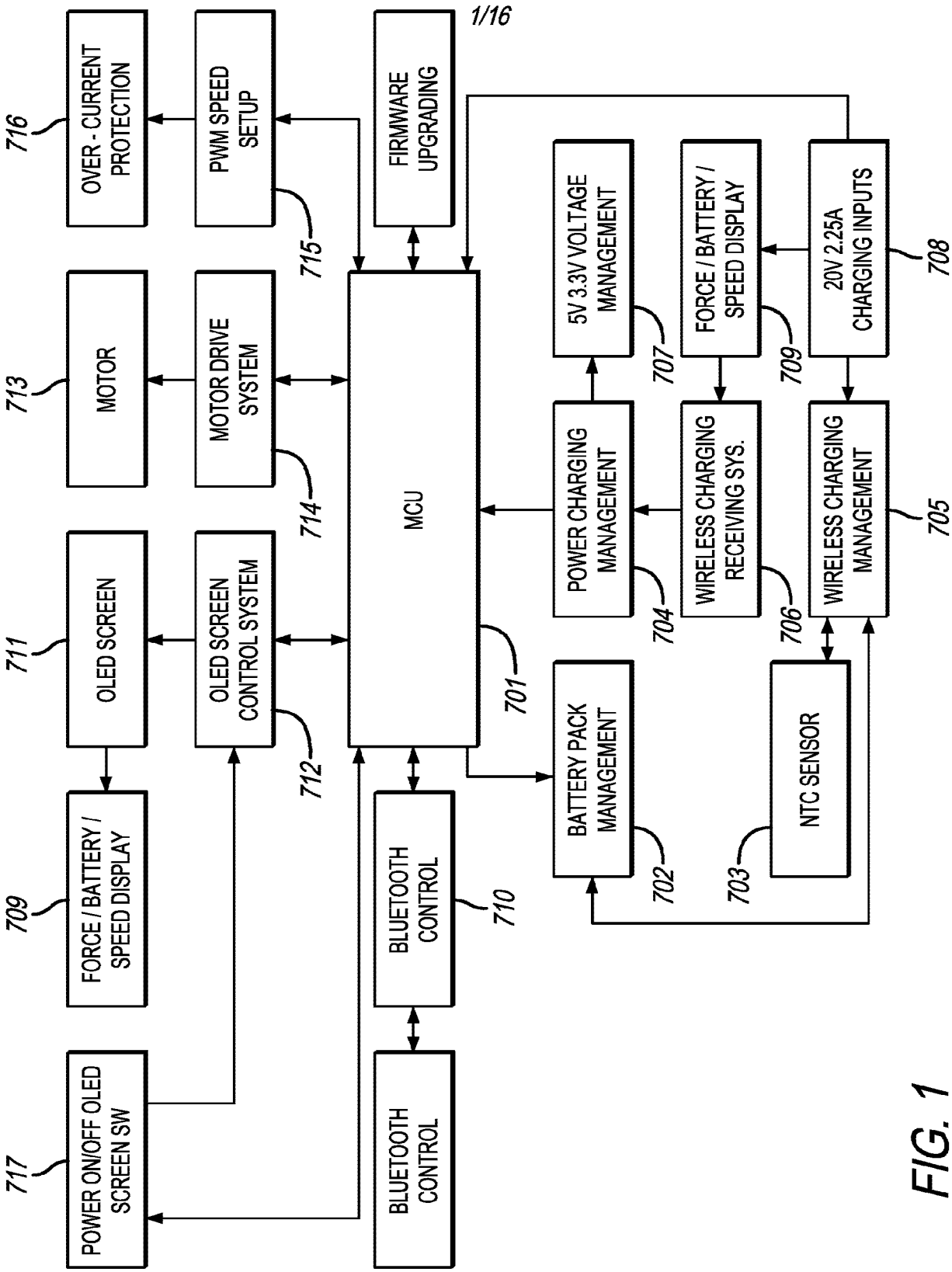

1/16
OVER - CURRENT PROTECTION
716
PWM SPEED SETUP
715
FIRMWARE UPGRADING
MOTOR
713
MOTOR DRIVE SYSTEM
714
MCU
5V 3.3V VOLTAGE MANAGEMENT
707
FORCE / BATTERY / SPEED DISPLAY
709
20V 2.25A CHARGING INPUTS
708
OLED SCREEN
711
OLED SCREEN CONTROL SYSTEM
712
POWER CHARGING MANAGEMENT
704
WIRELESS CHARGING RECEIVING SYS.
706
WIRELESS CHARGING MANAGEMENT
705
701
FORCE / BATTERY / SPEED DISPLAY
709
BLUETOOTH CONTROL
710
BATTERY PACK MANAGEMENT
702
NTC SENSOR
703
POWER ON/OFF OLED SCREEN SW
717
BLUETOOTH CONTROL

FIG. 1

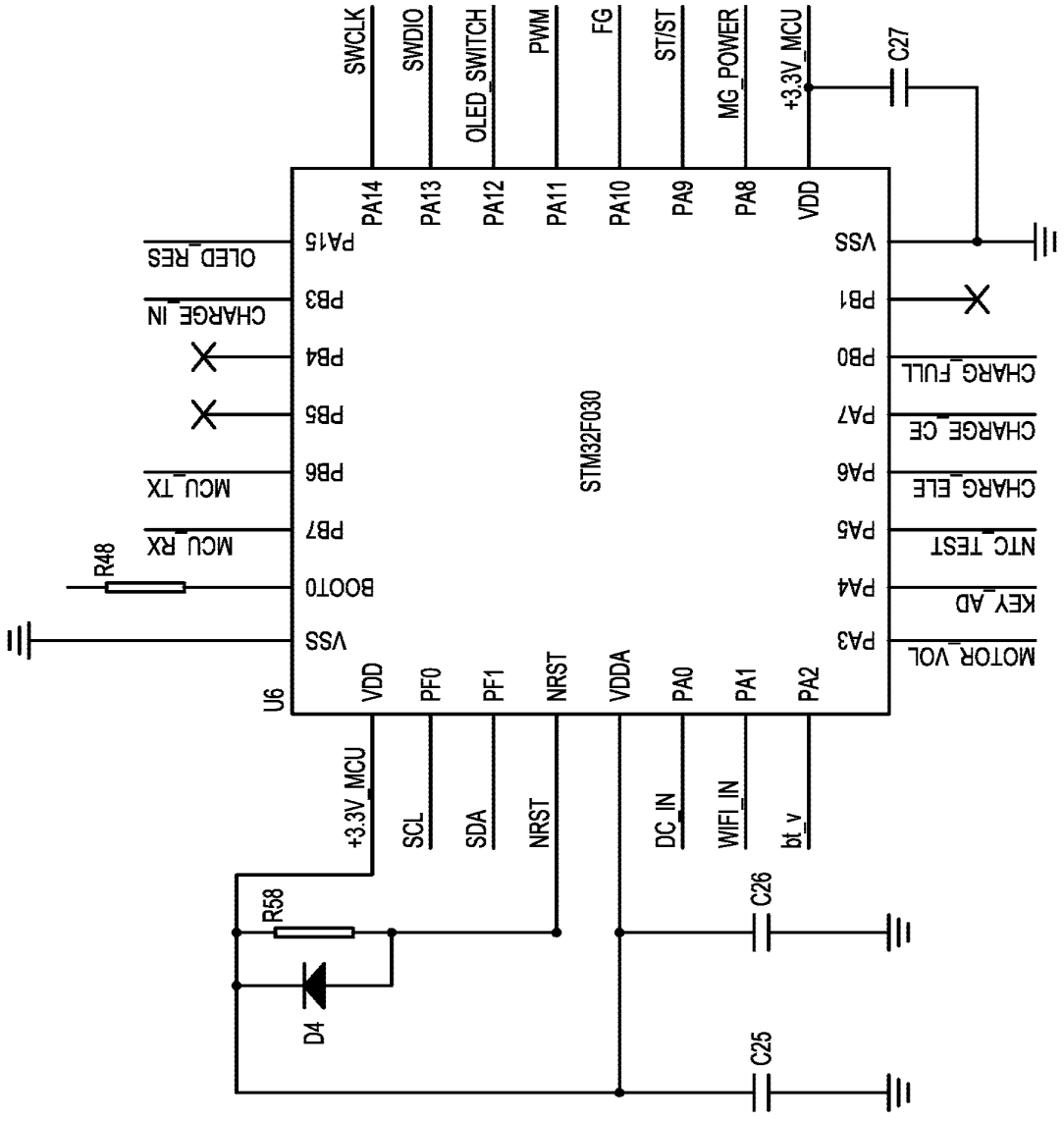

SWCLK
SWDIO
OLED_SWITCH
PWM
FG
ST/ST
MG_POWER
+3.3V_MCU
C27
PA14
PA13
PA12
PA11
PA10
PA9
PA8
VDD
PA15
PB3
PB4
PB5
PB6
PB7
BOOT0
VSS
OLED_RES
CHARGE_IN
MCU_TX
MCU_RX
R48
STM32F030
VSS
PB1
PB0
PA7
PA6
PA5
PA4
PA3
CHARG_FULL
CHARGE_CE
CHARG_ELE
NTC_TEST
KEY_AD
MOTOR_VOL
U6
VDD
PF0
PF1
NRST
VDDA
PA0
PA1
PA2
+3.3V_MCU
SCL
SDA
NRST
DC_IN
WIFI_IN
bt_v
R58
D4
C26
C25

FIG. 2

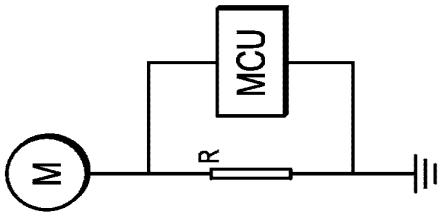


FIG. 4

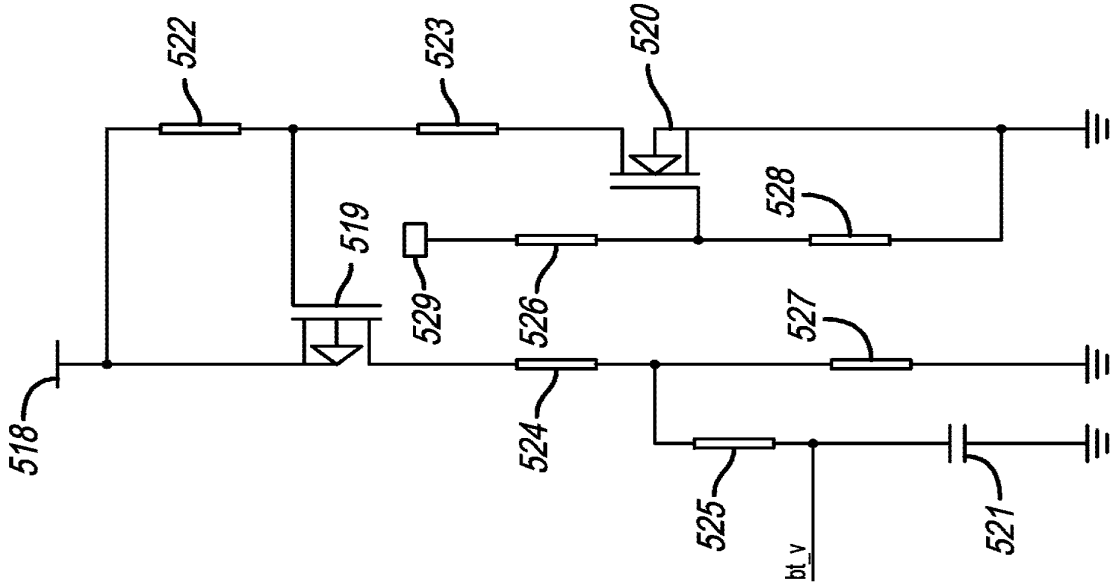


FIG. 3

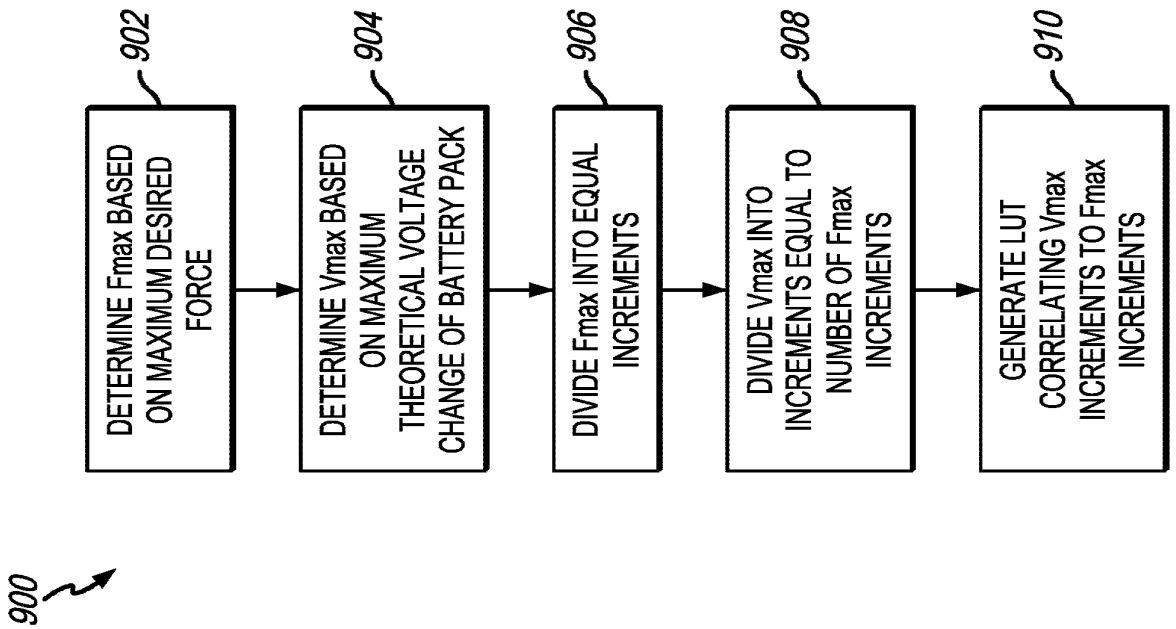

900
902
DETERMINE Fmax BASED ON MAXIMUM DESIRED FORCE
904
DETERMINE Vmax BASED ON MAXIMUM THEORETICAL VOLTAGE CHANGE OF BATTERY PACK
906
DIVIDE Fmax INTO EQUAL INCREMENTS
908
DIVIDE Vmax INTO INCREMENTS EQUAL TO NUMBER OF Fmax INCREMENTS
910
GENERATE LUT CORRELATING Vmax INCREMENTS TO Fmax INCREMENTS

FIG. 6

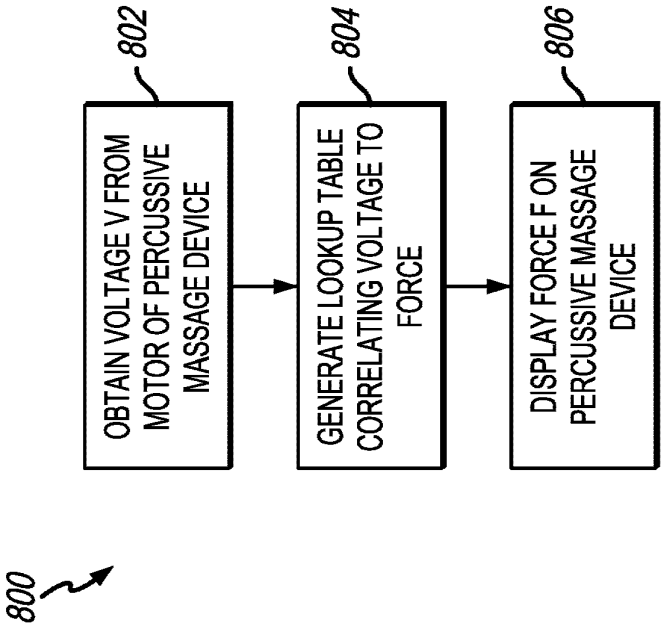

800
802
OBTAIN VOLTAGE V FROM MOTOR OF PERCUSSIVE MASSAGE DEVICE
804
GENERATE LOOKUP TABLE CORRELATING VOLTAGE TO FORCE
806
DISPLAY FORCE F ON PERCUSSIVE MASSAGE DEVICE

FIG. 5

POWER (W)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
FORCE (LB)	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.6	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.9	0.93	0.96	0.99	1.02	1.05	1.08	1.11	1.14	1.17	1.2	1.23	1.26	1.29	1.32	1.38	1.38	1.41	1.44	1.47

POWER (W)	50	51	52	53	54	55	56	57	58	59	60
FORCE (LB)	1.5	1.53	1.56	1.59	1.62	1.65	1.68	1.71	1.74	1.77	1.8

LOOKUP OF FORCE METER

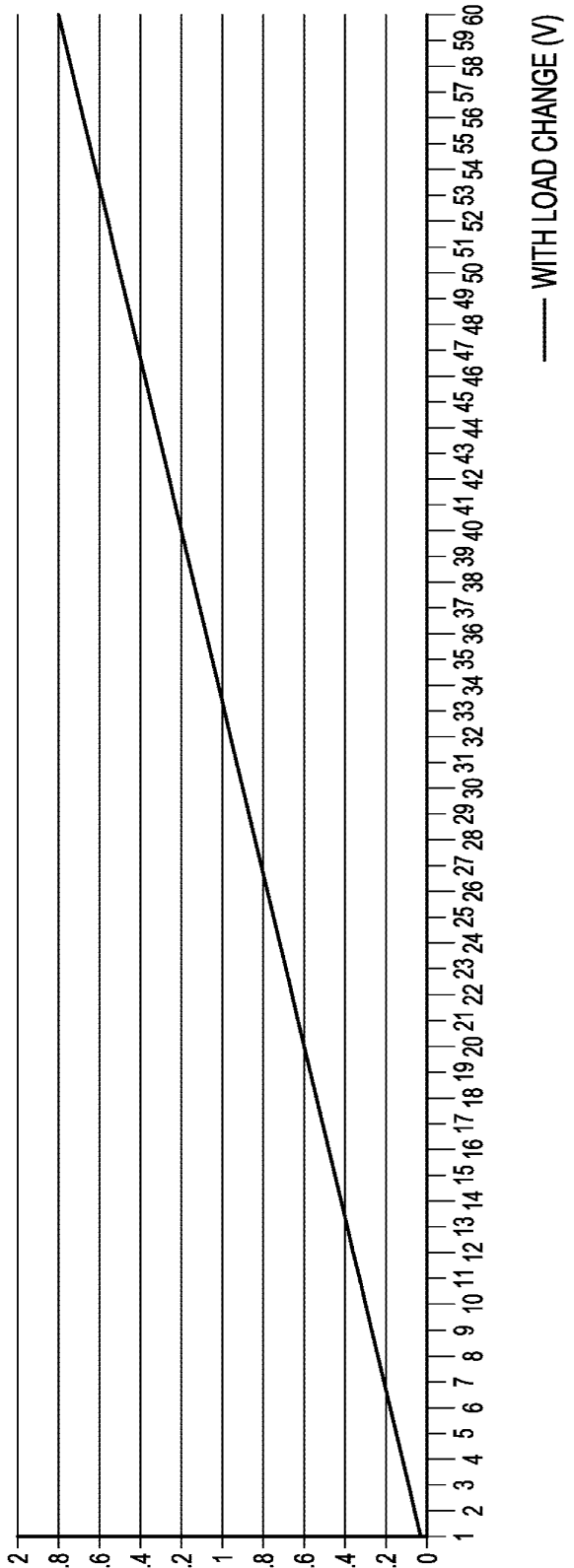


FIG. 7

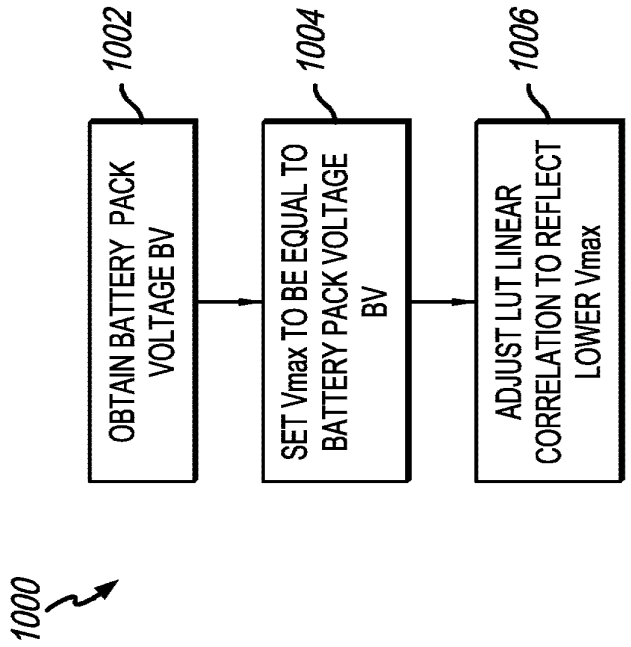

1000
1002
OBTAIN BATTERY PACK VOLTAGE BV
1004
SET Vmax TO BE EQUAL TO BATTERY PACK VOLTAGE BV
1006
ADJUST LUT LINEAR CORRELATION TO REFLECT LOWER Vmax

FIG. 8

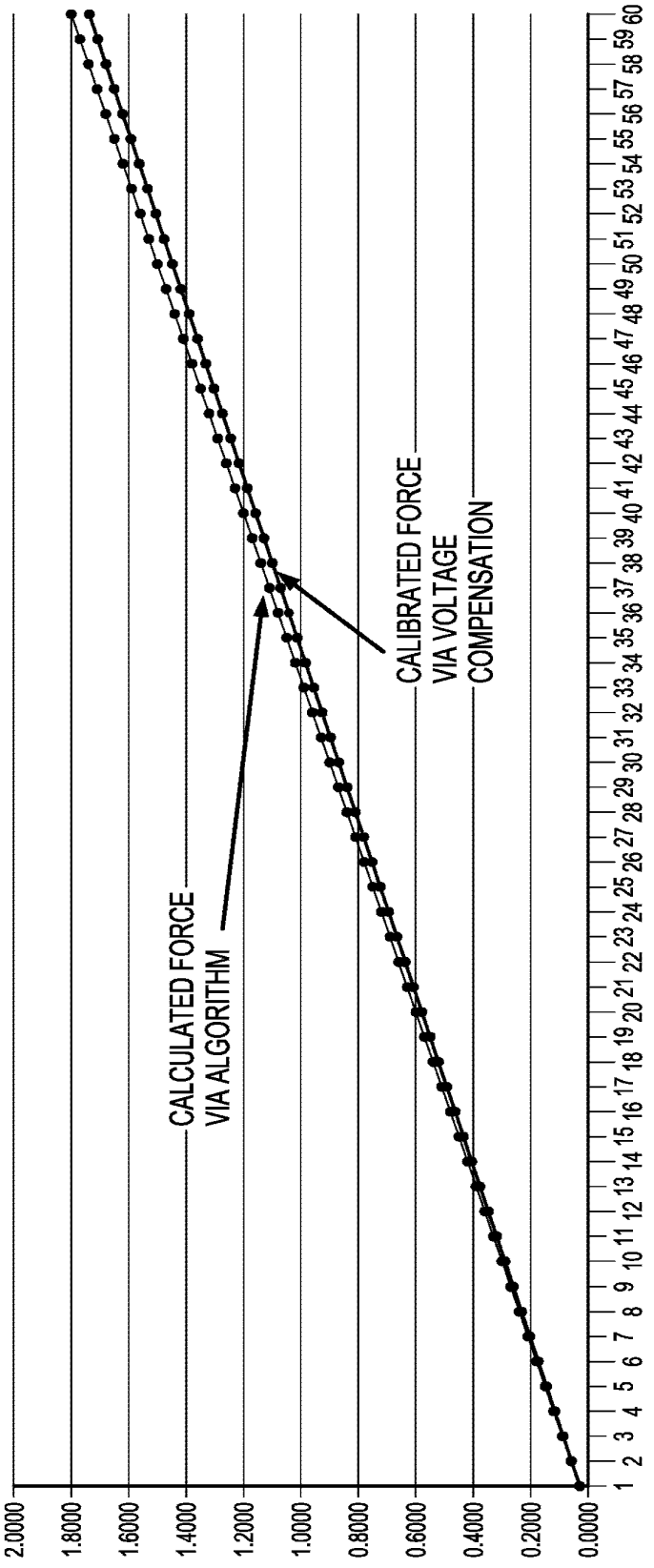

CALCULATED FORCE
VIA ALGORITHM
CALIBRATED FORCE
VIA VOLTAGE
COMPENSATION
2.0000
1.8000
1.6000
1.4000
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

FIG. 9

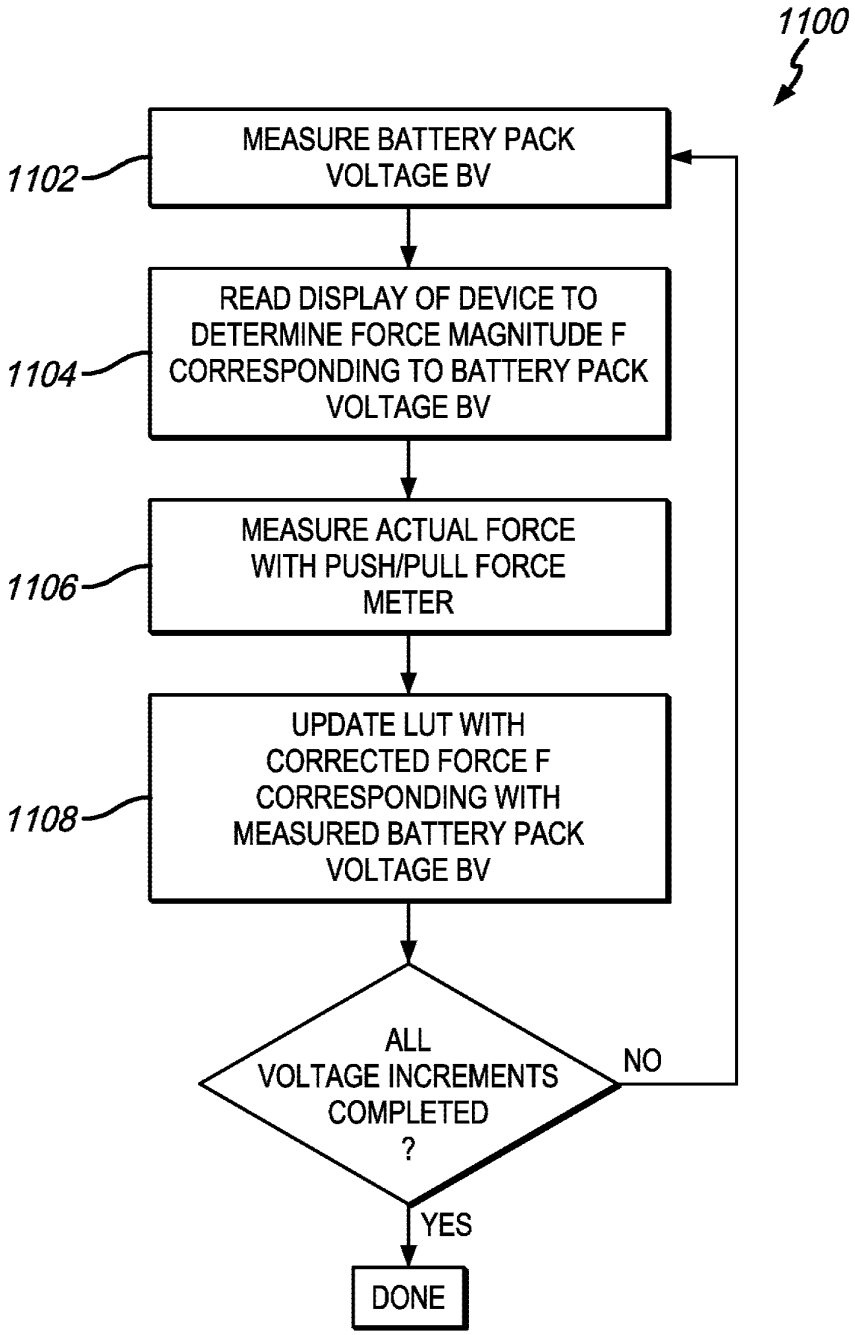

1100
1102
MEASURE BATTERY PACK VOLTAGE BV
1104
READ DISPLAY OF DEVICE TO DETERMINE FORCE MAGNITUDE F CORRESPONDING TO BATTERY PACK VOLTAGE BV
1106
MEASURE ACTUAL FORCE WITH PUSH/PULL FORCE METER
1108
UPDATE LUT WITH CORRECTED FORCE F CORRESPONDING WITH MEASURED BATTERY PACK VOLTAGE BV
ALL VOLTAGE INCREMENTS COMPLETED ?
NO
YES
DONE

FIG. 10

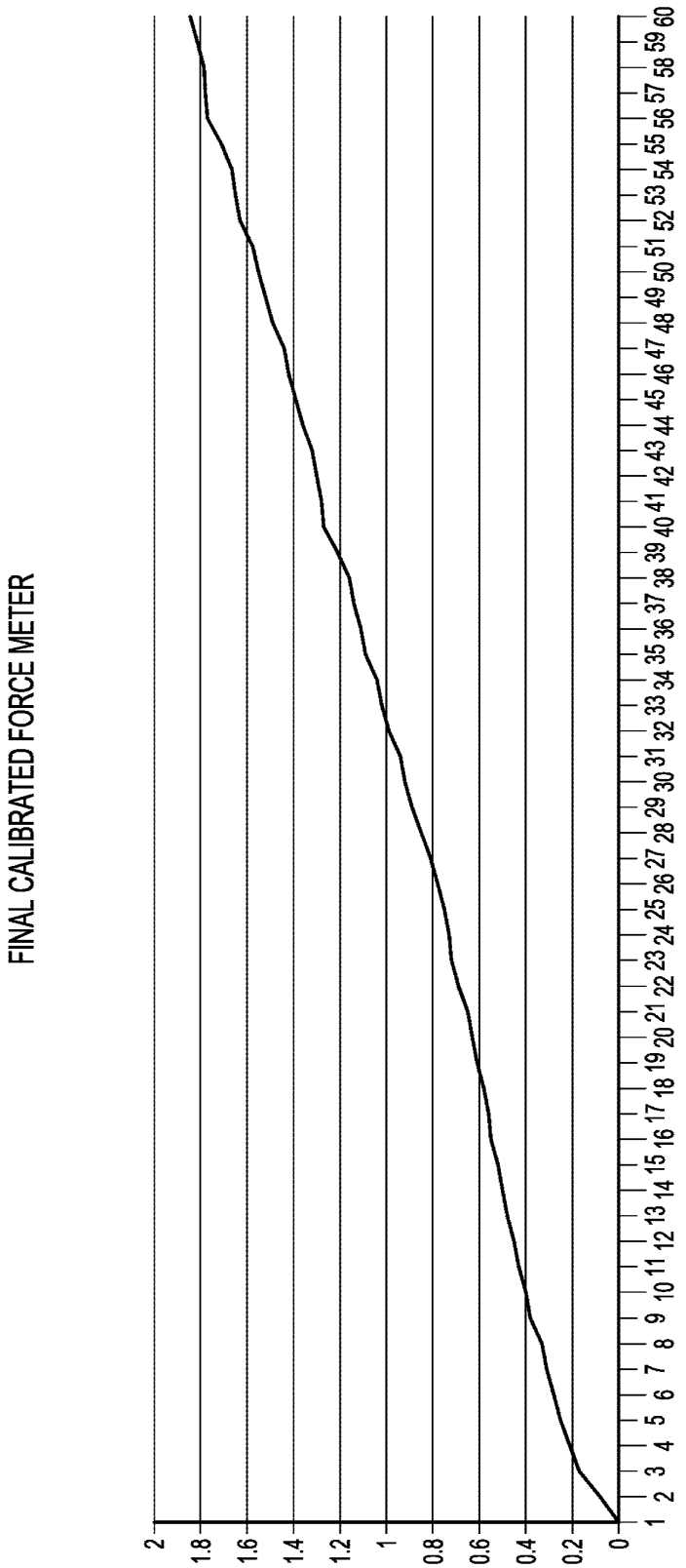

FINAL CALIBRATED FORCE METER
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

FIG. 11

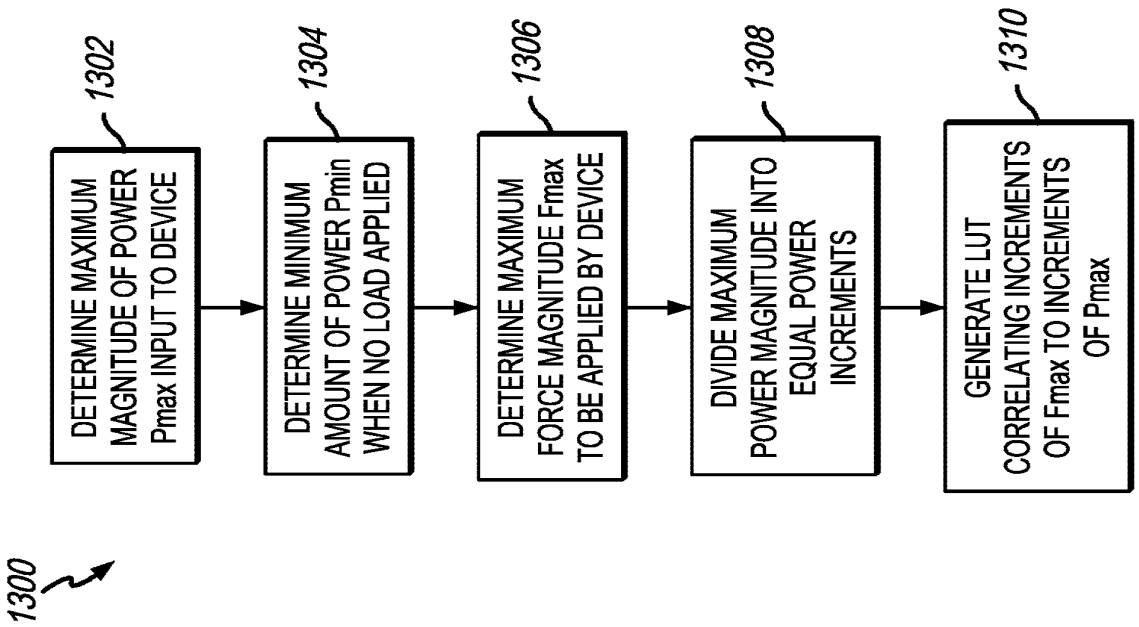

1300
1302
DETERMINE MAXIMUM MAGNITUDE OF POWER Pmax INPUT TO DEVICE
1304
DETERMINE MINIMUM AMOUNT OF POWER Pmin WHEN NO LOAD APPLIED
1306
DETERMINE MAXIMUM FORCE MAGNITUDE Fmax TO BE APPLIED BY DEVICE
1308
DIVIDE MAXIMUM POWER MAGNITUDE INTO EQUAL POWER INCREMENTS
1310
GENERATE LUT CORRELATING INCREMENTS OF Fmax TO INCREMENTS OF Pmax

FIG. 13

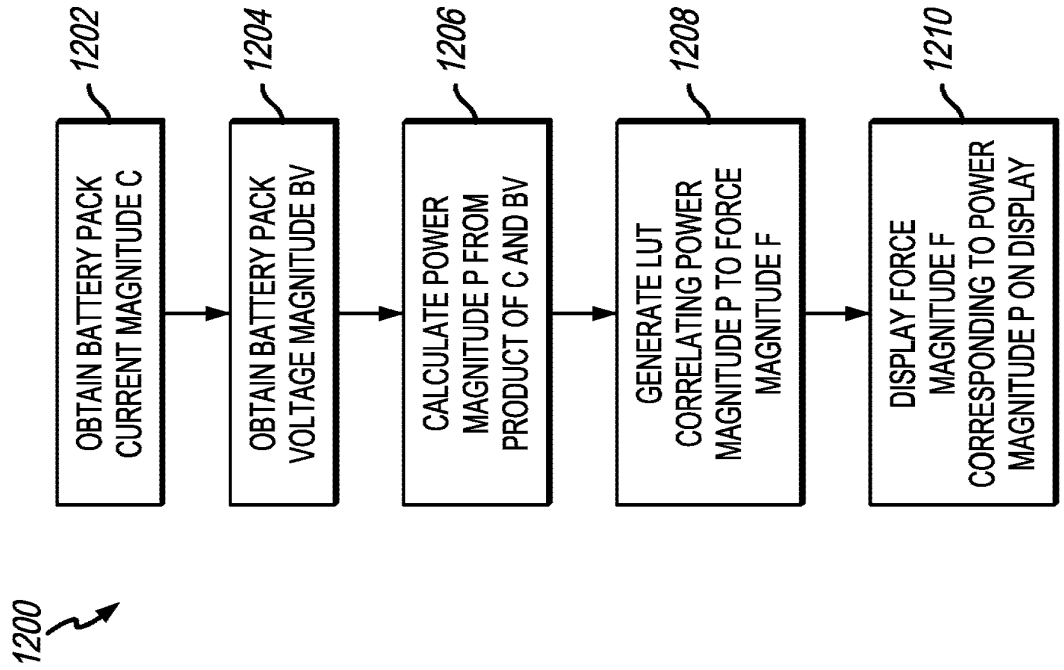

1200
1202
OBTAIN BATTERY PACK CURRENT MAGNITUDE C
1204
OBTAIN BATTERY PACK VOLTAGE MAGNITUDE BV
1206
CALCULATE POWER MAGNITUDE P FROM PRODUCT OF C AND BV
1208
GENERATE LUT CORRELATING POWER MAGNITUDE P TO FORCE MAGNITUDE F
1210
DISPLAY FORCE MAGNITUDE F CORRESPONDING TO POWER MAGNITUDE P ON DISPLAY

FIG. 12

POWER (W)	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	114	117	120	123	126	129	132	135	138	141	144	147
FORCE (LB)	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46

POWER (W)	150	153	156	159	162	165	168	171	174	177	180
FORCE (LB)	47	48	49	50	51	52	53	54	55	56	57

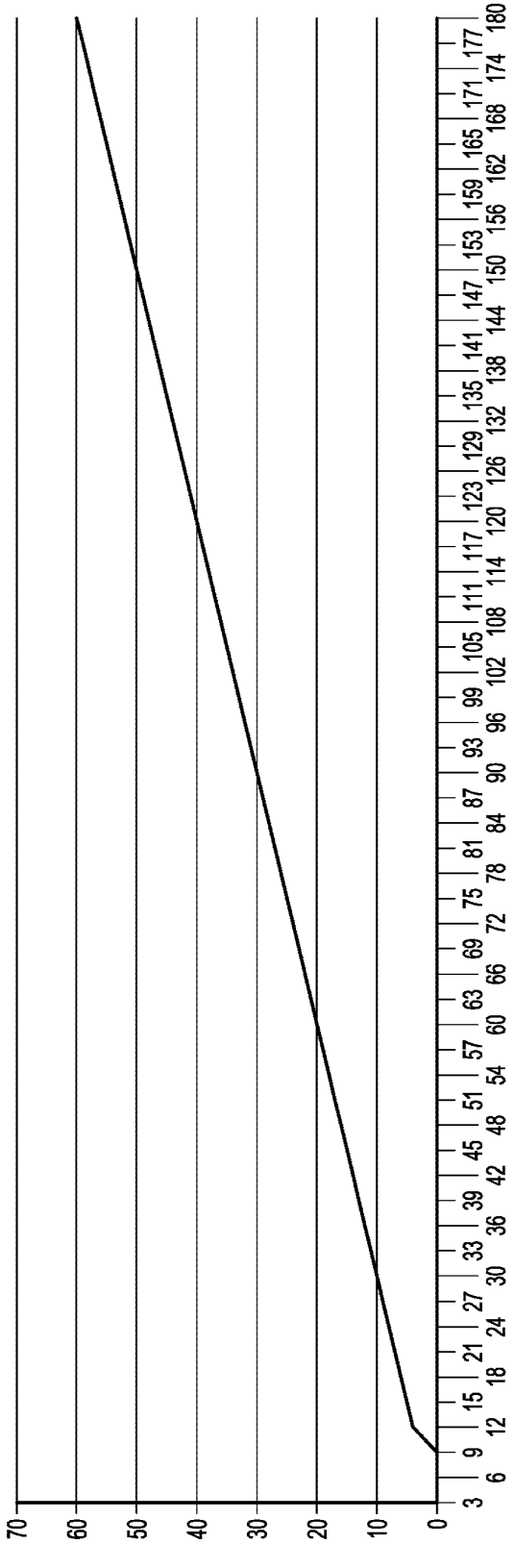


FIG. 14

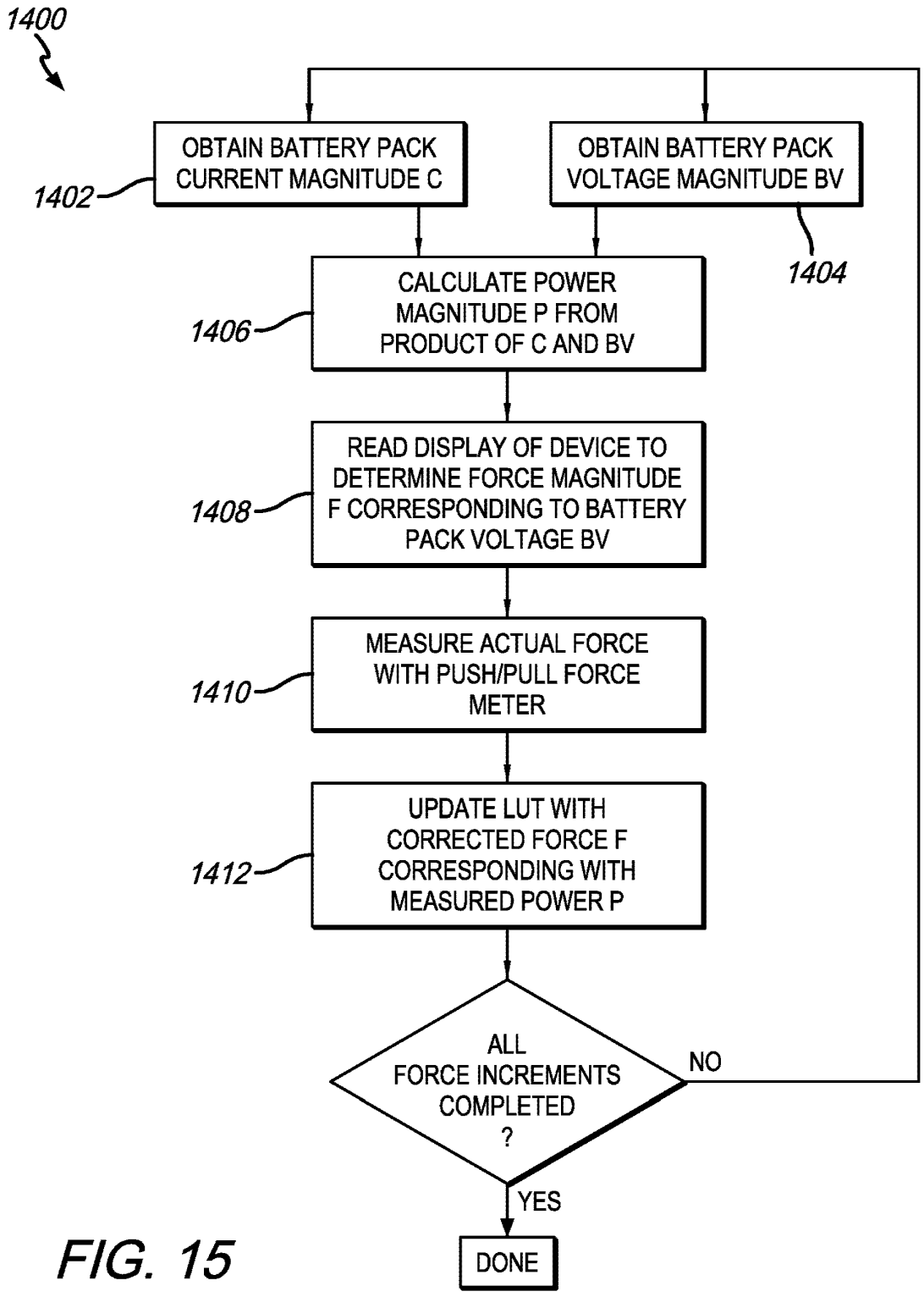

1400
OBTAIN BATTERY PACK CURRENT MAGNITUDE C
1402
OBTAIN BATTERY PACK VOLTAGE MAGNITUDE BV
1404
CALCULATE POWER MAGNITUDE P FROM PRODUCT OF C AND BV
1406
READ DISPLAY OF DEVICE TO DETERMINE FORCE MAGNITUDE F CORRESPONDING TO BATTERY PACK VOLTAGE BV
1408
MEASURE ACTUAL FORCE WITH PUSH/PULL FORCE METER
1410
UPDATE LUT WITH CORRECTED FORCE F CORRESPONDING WITH MEASURED POWER P
1412
ALL FORCE INCREMENTS COMPLETED ?
NO
YES
DONE

FIG. 15

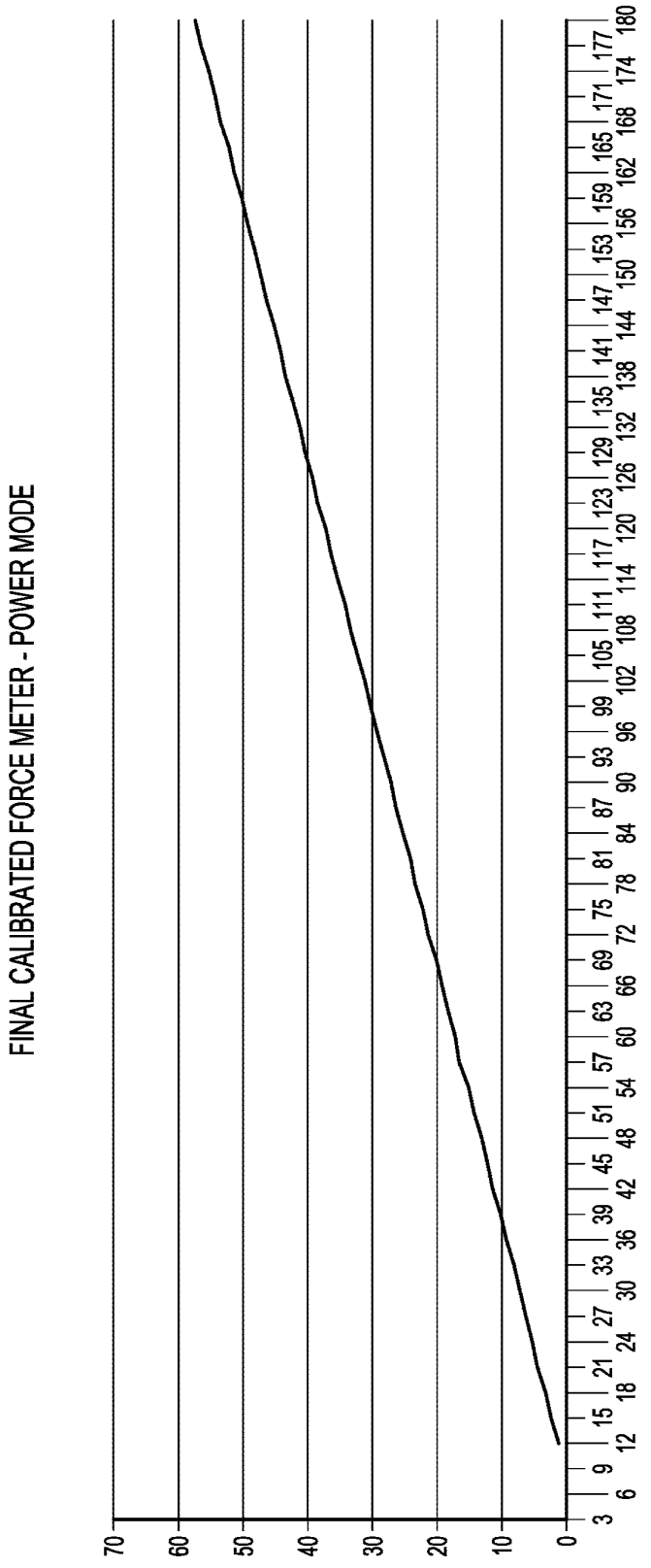

FINAL CALIBRATED FORCE METER - POWER MODE
70
60
50
40
30
20
10
0
3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99 102 105 108 111 114 117 120 123 126 129 132 135 138 141 144 147 150 153 156 159 162 165 168 171 174 177 180

FIG. 16

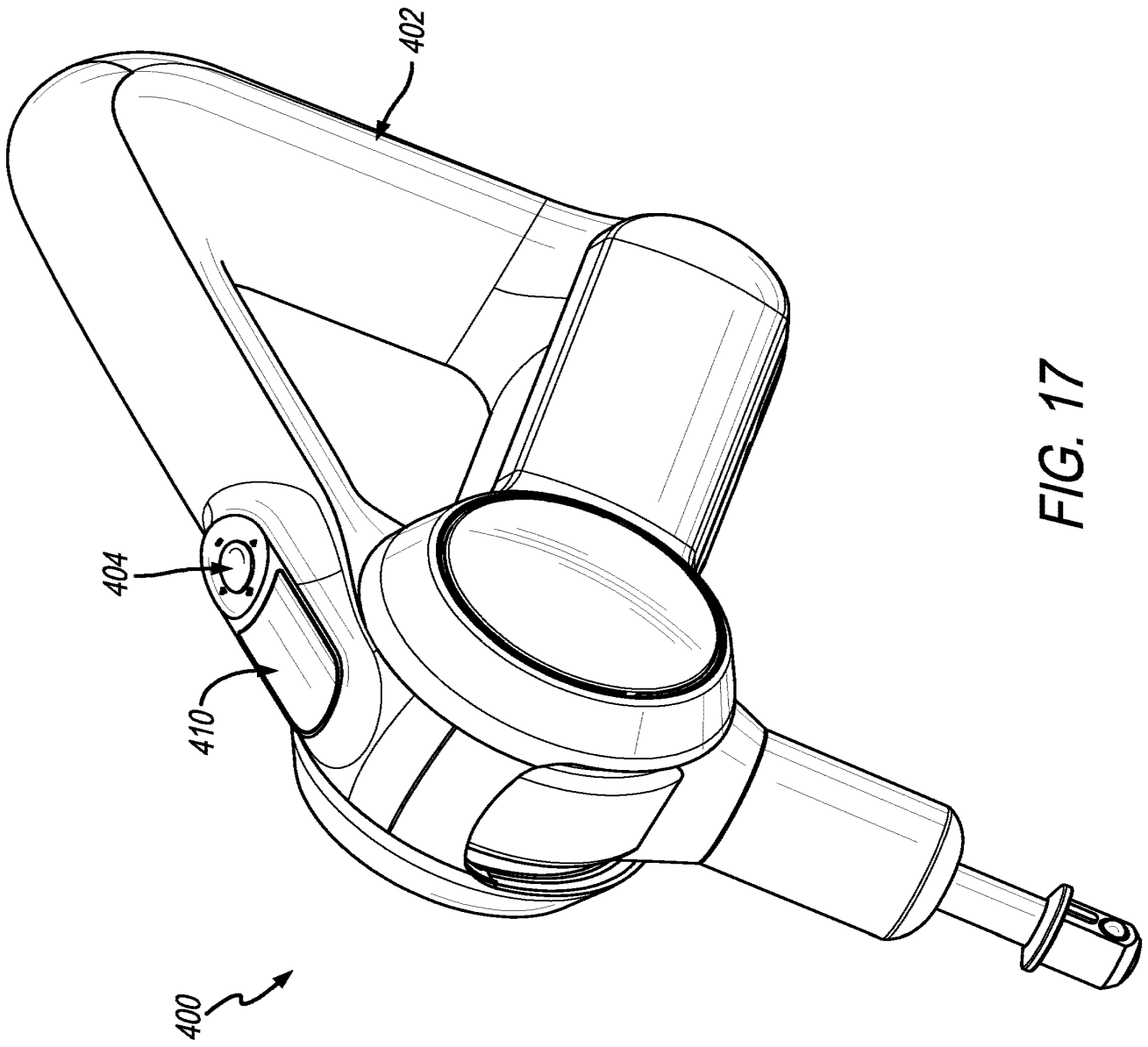


FIG. 17

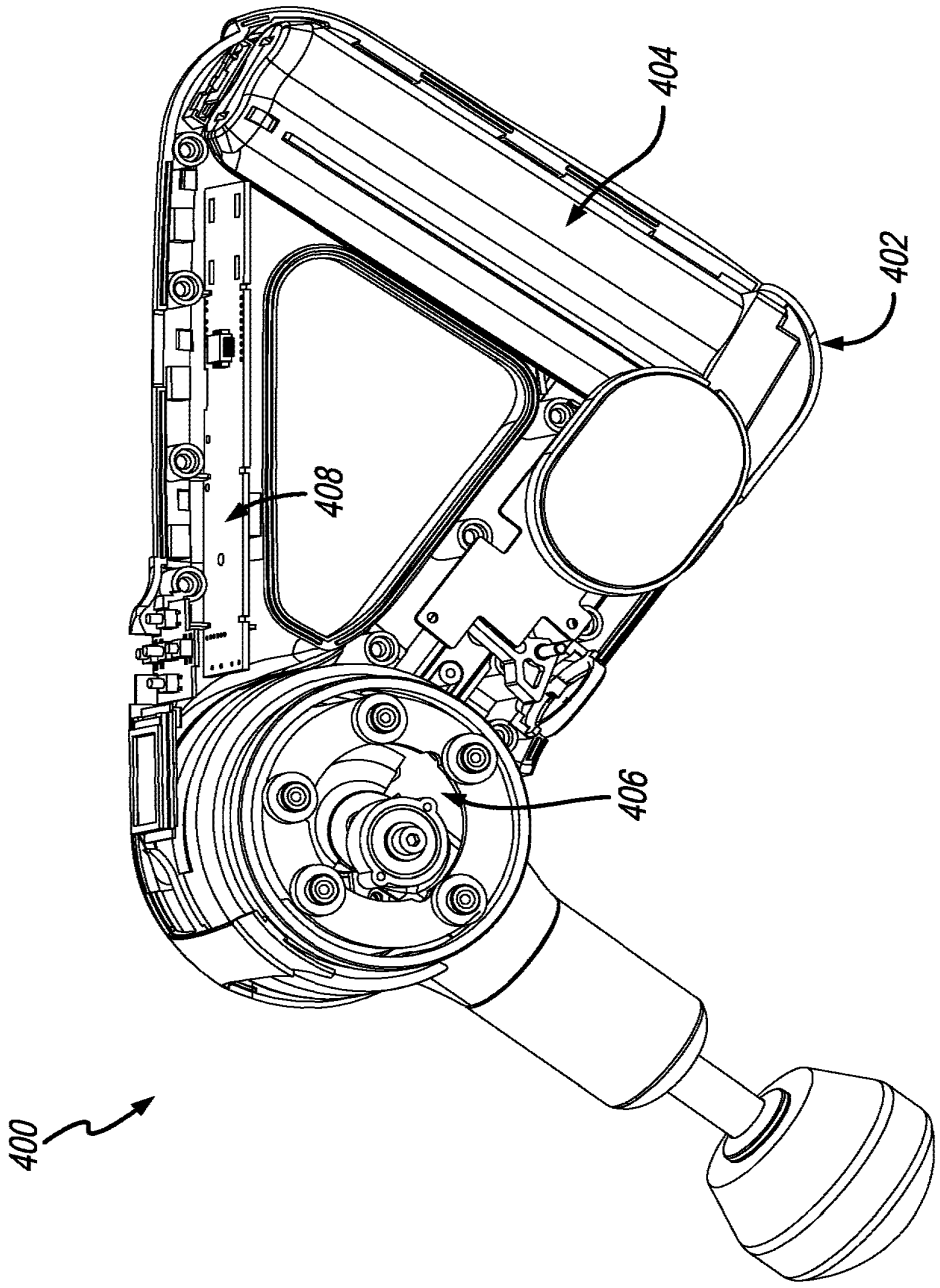


FIG. 18

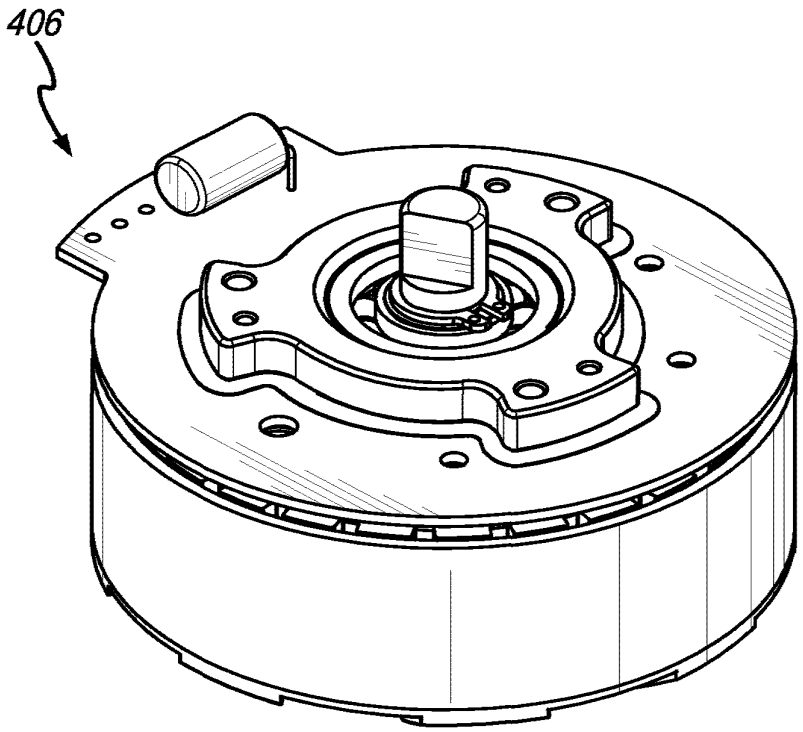


FIG. 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 20/31347

A. CLASSIFICATION OF SUBJECT MATTER

IPC - A61H 23/02, A61H 23/00 (2020.01)

CPC - A61H 23/006, A61H 23/0254, A61H 23/0254, A61H 23/00, A61H 23/0263

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)
See Search History document

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0237751 A1 (Alexander) 12 September 2013 (12.09.2013), entire document	1, 3-11, 15-16
---		---
A		2, 12-14, 17-23
A	WO 2018/012105 A1 (L'oreal) 18 January 2018 (18.01.2018), entire document	2, 12-14, 17-23
A	US 2016/0310353 A1 (Barasch) 27 October 2016 (27.10.2016), entire document	2, 12-14, 17-23
A	WO 01/19316 A2 (Niagara Manufacturing Limited) 22 March 2001 (22.03.2001), entire document	1-23
A	US 2015/0257964 A1 (Panasonic Intellectual Property Management Co., Ltd.) 17 September 2015 (17.09.2015), entire document	1-23

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
20 JULY 2020	03 AUG 2020
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee Young Telephone No. PCT Helpdesk: 571-272-4300

Form PCT/ISA/210 (second sheet) (July 2019)

Petitioner Therabody Ex-1004, 1467

Espacenet

Bibliographic data: TWM599159 (U) — 2020-08-01

Multi-angle massage gun

Inventor(s): LIU HSU-TENG [TW] ± (LIU, HSU-TENG)

Applicant(s): TOKUYO BIOTECH CO LTD [TW] ± (TOKUYO BIOTECH CO., LTD)

Classification: **- international:** ***A61H15/00; A61H23/00***
- cooperative:

Application number: TW20200203793U 20200331

Priority number(s): TW20200203793U 20200331

Also published as: JP3228625 (U)

Abstract of TWM599159 (U)

The disclosure relates to a multi-angle massage gun. The massage gun comprises a shell composed of a gun barrel and a gun handle, a percussion massage device, a rotating limit device and a rotating handle.

Petitioner Therabody Ex-1004, 1468

M599159

(19)中華民國智慧財產局

(12)新型說明書公告本 **(11)證書號數：TW M599159 U**

(45)公告日： 中華民國 109 (2020) 年 08 月 01 日

(21)申請案號：109203793 (22)申請日： 中華民國 109 (2020) 年 03 月 31 日

(51)Int. Cl.： ***A61H23/00 (2006.01)*** ***A61H15/00 (2006.01)***

(71)申請人：督洋生技股份有限公司(中華民國) TOKUYO BIOTECH CO. LTD (TW)

桃園市龜山區文明路 19 號

(72)新型創作人：劉旭騰 LIU, HSU-TENG (TW)

(74)代理人：楊長峯

申請專利範圍項數：13 項 圖式數：7 共 23 頁

(54)名稱

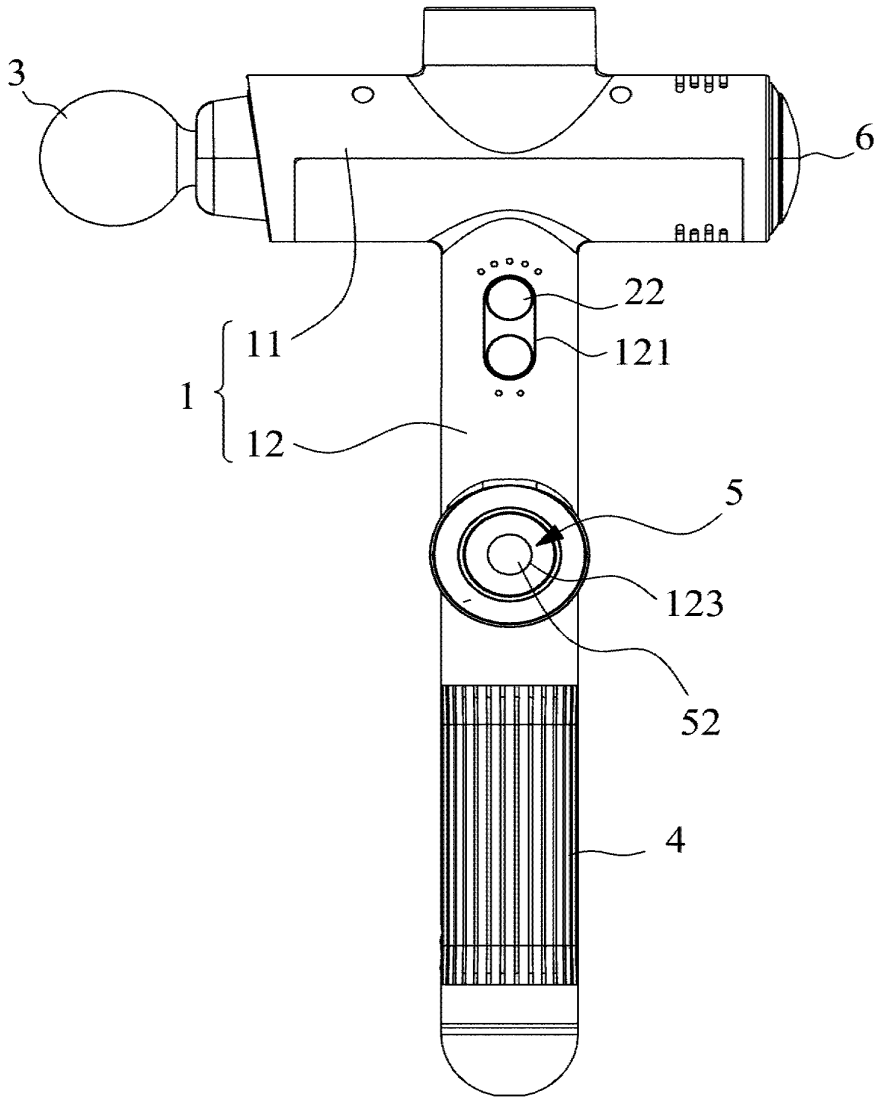
多角度按摩槍

(57)摘要

本新型關於一種多角度按摩槍。其包括槍身部及槍柄部構成的殼體、敲擊按摩裝置、旋轉限位裝置以及旋轉手柄。其特徵在於旋轉手柄轉動連接於旋轉限位裝置，並自槍柄部略呈水平延伸，且在該槍身部及該槍柄部所構成的平面上轉動。

The disclosure relates to a multi-angle massage gun. The massage gun comprises a shell composed of a gun barrel and a gun handle, a percussion massage device, a rotating limit device and a rotating handle.

指定代表圖：



【圖1】

符號簡單說明：

1:殼體

11:槍身部

12:槍柄部

121:按鍵孔

123:按鍵孔

22:按鍵組件

3:敲擊按摩裝置

4:旋轉手柄

5:限位機構

52:按鈕

6:溫控裝置

【新型說明書】

【中文新型名稱】多角度按摩槍

【英文新型名稱】MULTI-ANGLE MASSAGE GUN

【技術領域】

【0001】 本新型涉及一種多角度按摩槍，特別是一種具有多角度彎折功能的按摩槍。

【先前技術】

【0002】 如今，按摩槍漸漸掀起一股使用熱潮，手持槍式的使用方式帶來了便利性，可針對身體的各種部位進行按摩，適用於運動後的肌肉恢復，相較於原始較為侷限的其他按摩工具，按摩槍顯然受到更多人的青睞。

【0003】 在現有技術中，如專利號201820822769.5公開的一種運動恢復按摩槍，其沿用了手持槍式的方便性，並設計了圓球狀的按摩頭增大接觸面，還設計了轉動頭以擴大使用範圍。然而，這只是單一強化了按摩槍的按摩功能，而且令結構顯得很笨重。本申請人觀察到一般使用者在肩頸、後背或是腳底等部位，較不易自行按摩，故設計了轉動功能，能夠輕易地按摩到該等部位。

【新型內容】

【0004】 鑑於上述欲解決之問題及其原因，本新型提供一種多角度按摩槍。針對全身部位皆能輕易按摩，舒緩疲勞，更可用於冷敷及熱敷，使用功能全面。

Petitioner Therabody Ex-1004, 1471

【0005】 具體而言，本新型提供一種多角度按摩槍，用於舒緩一使用者的疲勞痠痛。上述按摩槍包括：一殼體，其包括一槍身部及一槍柄部。上述槍身部位於上述槍柄部之一端，且由槍身部及槍柄部一體成形。一敲擊按摩裝置，配置於槍身部之頭部。一旋轉限位裝置，配置於槍柄部之另一端。一旋轉手柄，轉動連接於旋轉限位裝置，連結後，自上述槍柄部略呈水平延伸，且在槍身部及槍柄部所構成的平面上轉動。

【0006】 依據一實施例，旋轉手柄配置有摩擦表面，異於市面其他產品的是，本案的旋轉手柄與摩擦表面於製造時，即是一體成形，而非黏貼而成。

【0007】 依據另一實施例，上述旋轉手柄自該槍柄部略呈水平延伸，以增長力臂。當敲擊按摩裝置運作，延長的力臂能夠減少使用者握持旋轉手柄時，敲擊按摩裝置對旋轉手柄的作用力。

【0008】 依據又一實施例，旋轉手柄以旋轉限位裝置為轉軸，繞槍柄部之一轉動範圍為順時針90度至逆時針90度。

【0009】 依據又一實施例，上述旋轉手柄於轉動範圍內具有複數個檔位，用以調節轉動角度。

【0010】 依據又一實施例，上述多角度按摩槍進一步包括一溫控裝置，用於提供使用者冷熱敷之功能，且上述溫控裝置配置於槍身部之尾部。

【0011】 依據又一實施例，上述溫控裝置進一步包括：一金屬罩片，配置為密封上述槍身部之尾部，並傳遞熱量至使用者的肌膚。一致冷片，配置於金屬罩片內側，且執行冷熱溫控功能。一散熱片，配置於致冷片內側，且提供熱量至該致冷片。一風扇，配置於散熱片內側。一風扇架，配置於風扇內側，用於提供風扇放置的凹槽。

Petitioner Therabody Ex-1004, 1472

【0012】 依據又一實施例，其中上述溫控裝置進一步包括複數個導熱膠片，配置於散熱片致至冷片間，以及金屬罩片與致冷片間。

【0013】 依據又一實施例，其中上述金屬罩片的材質為鋁合金。

【0014】 依據又一實施例，上述多角度按摩槍進一步包括一控制電源，配置於槍柄部，且與風扇及致冷片電性連接，上述控制電源包括：一鋰電池組，配置於槍柄部內部。一PCB板，配置為電性連接於鋰電池組。一按鍵組件，配置於槍柄部上之一按鍵孔，用於外部按壓。

【0015】 依據又一實施例，其中上述旋轉限位裝置更包括一按鈕，用於限制旋轉手柄的轉動功能。

【0016】 依據又一實施例，其中上述敲擊按摩裝置進一步包括：一按摩頭，配置於槍身部頭部之殼外。一驅動機構，配置於該槍身部頭部之殼內，用於推動該按摩頭相對於該槍身部以略呈水平方向做往復運動。

【0017】 依據又一實施例，其中上述驅動機構更包括：一活塞桿，其兩端分別具有一插接部和一螺接部，該插接部具有一插口，該按摩頭具有一插頭，透過該插口及該插頭的插接，使該按摩頭插接於該活塞桿之頭端，且該螺接部具有一第一螺紋孔。一連桿件，其包括一連桿大頭、一桿身及一連桿小頭。一第一螺絲釘，配置為穿過該連桿小頭，與該第一螺紋孔連接。一第二螺絲釘。一偏心輪，其底面配置有一偏心軸，頂面中心配置有一固定孔，且該偏心輪配置有一第二螺紋孔，該第二螺絲釘穿過該連桿大頭與該第二螺紋孔連接。一馬達，配置有一馬達軸，該馬達透過該馬達軸與該固定孔插接，用於通過該偏心輪偏心轉種該連桿件，帶動該活塞桿及該按摩頭略呈水平方向做往復運動。

Petitioner Therabody Ex-1004, 1473

【0018】 綜上所述，本新型之多角度按摩槍通過按壓按鍵組件進行開啟或關閉電源。開啟按摩頭功能時，PCB板控制驅動機構驅動按摩頭進行軸向往復運動，實現可緩解疲勞的按摩功能。在此基礎上，本新型增設旋轉手柄，讓使用者更輕易地按摩後背、大腿後側等部位，且施力方式亦符合人體工學。另外，本新型更進一步增設溫控裝置。當開啟致冷功能時，PCB板控制風扇輸出，在金屬罩片的位置產生冷感。開啟致熱功能時，PCB板控制製冷片輸出，製冷片緊貼散熱片的一端為冷端，反之，另一端為熱端，冷端吸收散熱片帶來的熱量，熱端放出熱量，從而實現致熱的功能，在金屬罩片的位置產生熱感。製冷和制熱功能可用於金屬罩片對按摩位置進行冷敷或熱敷，治療效果顯著，達到更全面的使用感受，而且結構更簡單。

【圖式簡單說明】

【0019】 為讓本新型之上述和其他目的、特徵、優點與實施例能更明顯易懂，所附附圖之說明如下：

圖1為本新型一實施例的整裝正視示意圖。

圖2為本新型一實施例的分解示意圖。

圖3為本新型一實施例槍身部的分解示意圖。

圖4為本新型一實施例旋轉手柄繞槍柄部逆時針90度轉動的示意圖。

圖5為本新型一實施例旋轉手柄繞槍柄部順時針90度轉動的示意圖。

圖6為本新型一實施例冷熱裝置的分解示意圖。

圖7為本新型一實施例的整裝詳細斜視示意圖。

【實施方式】

Petitioner Therabody Ex-1004, 1474

【0020】 為瞭解本新型之技術特徵、內容與優點及其所能達成之功效，茲將本創作配合附圖，並以實施例之表達形式詳細說明如下。而其中所使用之圖式，其主旨僅為示意及輔助說明書之用，未必為本新型實施後之真實比例與精準配置，故不應就所附之圖式的比例與配置關係解讀、侷限本新型於實際實施上的權利範圍，合先敘明。

【0021】 鑑於上述欲解決之問題及其原因，本新型提供一種多角度按摩槍。針對全身部位皆能輕易按摩，舒緩疲勞，更可用於冷敷及熱敷，使用功能全面。

【0022】 為初步說明本新型之實施方式及技術特徵，請先同時參閱圖1及圖7。圖1為本新型一實施例的整裝正視示意圖，圖7為本新型一實施例的整裝詳細斜視示意圖。本新型關於一種多角度按摩槍，其包括殼體1、敲擊按摩裝置3、旋轉手柄4、旋轉限位機構5和溫控裝置6。上述殼體1由槍身部11和槍柄部12一體成形。上述敲擊按摩裝置3配置於槍身部11之頭部，上述溫控裝置6配置於槍身部11之尾部。上述旋轉限位機構5配置於旋轉手柄之一端。上述槍身部11配置於槍柄部12的一端，且上述旋轉手柄4藉由上述旋轉限位機構5，轉動連接於上述槍柄部12的另一端。

【0023】 關於上述多角度按摩槍，進一步敘述如下。如圖7所示，其中上述旋轉手柄4更配置有直紋狀的摩擦表面，且此部分於製造時，即是一體成形而製造而成的。

【0024】 關於上述多角度按摩槍，進一步敘述如下。其中上述旋轉手柄4自上述槍柄部12略呈水平延伸，並能夠增長使用力臂。如此，當上述敲擊按摩裝

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置3運作，使用者握持上述旋轉手柄4時，增長的力臂能夠減少上述敲擊按摩裝置3對使用者手腕的作用力，進一步降低受傷的風險。

【0025】 另外，為避免審查員於審查時不清楚本新型之技術特徵及構造，上述直紋狀摩擦表面僅繪製於圖7所示之旋轉手柄4，圖1至圖6雖皆未繪製直紋狀摩擦表面，並不代表上述直紋狀摩擦表面不存在於本新型。

【0026】 為更清楚說明本新型之實施方式及技術特徵，請同時重點參閱圖1至圖3。本新型關於一種多角度按摩槍，其包括殼體1、控制電源2、敲擊按摩裝置3、旋轉手柄4、旋轉限位機構5和溫控裝置6。上述殼體1由槍身部11和槍柄部12一體成形。上述控制電源2置於配置於槍柄部12。上述敲擊按摩裝置3配置於槍身部11之頭部，上述溫控裝置6配置於槍身部11之尾部。上述控制電源2分別控制敲擊按摩裝置3和溫控裝置6工作。

【0027】 關於上述殼體1，進一步敘述如下。其中上述控制電源2進一步包括鋰電池組21、按鍵元件22及PCB板23。為了合理分配殼體1內部空間，上述槍柄部12開設按鍵孔121，供按鍵元件22安裝。按鍵元件22連接PCB板23，PCB板23連接鋰電池組21。鋰電池組21配置於槍柄部12的內部，並可以通過外部按壓按鍵元件22來控制PCB板23和鋰電池組21的電性接觸，如此可以更充分運用到殼體1的內部空間。

【0028】 關於上述多角度按摩槍，進一步敘述如下。上述旋轉手柄4轉動於槍身部11和槍柄部12所構成的平面內。上述旋轉手柄4以上述旋轉限位機構5為轉繞點，繞槍柄部12在180度範圍內多個檔位調節轉動。

【0029】 關於上述多角度按摩槍，進一步敘述如下。如圖5所示，該旋轉手柄4繞槍柄部12順時針90度轉動。使用者可持旋轉手柄4，接著將槍身部11繞至背部、腰部等較難接觸的部位，使敲擊按摩裝置3的自由度更多，能按摩到的範圍

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更廣。如此，使用者上身不需要大幅度扭轉就能輕鬆按摩到後背、腰部等較難接觸的部位，以此獲得舒服的使用體驗。

【0030】 關於上述多角度按摩槍，進一步敘述如下。如圖1所示，該旋轉手柄4未轉動時，該狀態下相當於「增長」了按摩槍的使用距離，使用者可輕易按摩到腳部以及小腿部位的肌肉。再如圖4所示，旋轉手柄4繞槍柄部12逆時針90度轉動，此狀態下適合使用者將槍身部11對準大腿後側、另一隻手臂內側等部位進行按摩。適合手持，且符合人體工學，更能幫助後側和內側的肌肉放鬆，此時手持也不會太累。

【0031】 關於上述多角度按摩槍，進一步敘述如下。槍柄部12內配置有旋轉軸122，旋轉手柄4配置有旋轉孔41。旋轉手柄4通過旋轉孔41套置在旋轉軸122外，以使旋轉手柄4轉動連接在槍柄部12之間。上述旋轉手柄4包括限位機構5。上述限位機構5包括卡扣51、按鈕52和彈簧53。上述卡扣51固定在旋轉手柄4上，卡扣51中間開設通孔511供按鈕52穿置，且圍繞通孔511設有環狀限位卡齒512。上述按鈕52設有環狀限位卡槽521與環狀限位卡齒512配合，不同限位卡槽配合不同限位卡齒構成多個不同角度的檔位元。按鈕52通過彈簧53彈性連接在槍柄部12上，上述槍柄部12設有按鈕孔123供按鈕52穿置出去。

【0032】 關於上述多檔位的轉換檔位流程，詳述如下：先按壓按鈕52，帶動限位元卡槽521下降，以解除限位卡槽521和限位卡齒512之間的配合。接著轉動調節旋轉手柄4的檔位，同時旋轉手柄4轉動帶動限位卡齒512轉動。待檔位轉換完成後，鬆開按鈕52使限位元卡槽521彈出並使限位卡齒512嵌入限位卡槽521中，如此限制旋轉手柄122相對槍柄部12轉動，從而固定檔位的轉換。因此，旋

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轉手柄4可以相對於槍柄部12轉動，以進行不同角度、檔位的調節，亦可以藉由限位機構5來達到調節的固定。

【0033】 關於上述多角度按摩槍，進一步敘述如下。上述敲擊按摩裝置3包括按摩頭31、驅動機構32。上述槍身部11的頭部開設第一開口13，上述驅動機構32配置於槍身部11頭部的殼內，PCB板23和驅動機構32相連，上述按摩頭31設於槍身11頭部的殼外。第一開口13供按摩頭31與驅動機構32連接，驅動機構32用於推動按摩頭31相對於槍身部11略呈水平方向做往復運動。

【0034】 關於上述多角度按摩槍，進一步敘述如下。上述驅動機構32包括活塞杆321、連杆件322、第一螺釘323、第二螺釘324、偏心輪325、馬達326和馬達固定架327。上述活塞杆321兩端分別為插接部3211和螺接部3212。插接部3211開設插口，上述按摩頭31設有插頭。通過插頭與插口的插接，使按摩頭31插接在活塞杆321的頭端，也因此本案可拆裝不同結構的按摩頭來搭配使用。

【0035】 如圖3所示，螺接部3212開設第一螺紋孔3213，上述連杆件322包括連杆大頭3221、杆身3222 和連杆小頭3223。杆身3222用於連接連杆大頭3221和連杆小頭3223。上述第一螺釘323穿過連杆小頭3223與第一螺紋孔3213連接，使活塞杆321固定在連杆件322的連杆小頭3223。偏心輪325的底面設有偏心軸3251，偏心輪325的頂面中心設有固定孔3252。上述偏心軸3251開設第二螺紋孔3214，上述第二螺釘324穿過連杆大頭3221與第二螺紋孔3214連接，使偏心輪325的偏心軸3251固定在連杆件322的連杆大頭3221。上述固定孔3252供馬達326的馬達軸3261插接，上述馬達固定架327將馬達326固定安裝在槍身部11。

【0036】 在一實施例的按摩功能工作過程為：當控制電源2驅動馬達326轉動時，馬達軸3261帶動偏心輪325轉動。偏心輪325上的偏心軸3251進行偏心轉

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動，與偏心軸3251連接的連杆大頭3221通過杆身3222將旋轉運動轉化為連杆小頭3223的往復運動，從而推動活塞杆321和按摩頭31進行軸向往復運動。

【0037】 本案更進一步加強連杆件322的載荷能力。上述連杆大頭3221和連杆小頭3223各裝配有滾動軸承3224、3225，滾動軸承3224、3225的型號根據連杆大頭3221和連杆小頭3223的內徑尺寸來配合選擇。該按摩槍可通過按壓按鍵元件22進行開啟或關閉控制電源2，開啟按摩頭31功能時，PCB板23控制驅動機構32驅動按摩頭31進行軸向往復運動。

【0038】 在此按摩基礎上，本案還增設溫控裝置6，來實現致冷致熱的功能，用於冷敷或者熱敷，使得傷部恢復更快。

【0039】 如圖2、圖4 和圖6 所示，上述槍身部11的尾部開設第二開口14供溫控裝置6安裝。上述溫控裝置6包括金屬罩片61、散熱片62、致冷片63、風扇64和風扇架65。風扇架65形成供風扇64放置的凹槽651，風扇64的背面安裝散熱片62，散熱片62的背面緊貼製冷片63，致冷片63的背面緊貼金屬罩片61，金屬罩片61密封安裝在第二開口14處。風扇64和製冷片63電連接PCB板23。

【0040】 關於上述多角度按摩槍，進一步敘述如下。上述散熱片62和致冷片63之間設有導熱膠片66，上述金屬罩片61和致冷片63之間也設有導熱膠片67。導熱膠片66、67能更有效地將熱量進行集中及傳遞。所述金屬罩片61採用鋁合金材質。

【0041】 在一實施例的致冷致熱功能工作過程為：通過按壓按鍵元件22進行開啟或關閉控制電源2。開啟致冷功能時，PCB板23控制風扇64輸出，在金屬罩片61的位置產生冷感。開啟致熱功能時，PCB板23控制致冷片63輸出，致冷片63緊貼散熱片62的一端為冷端，反之，另一端為熱端，冷端吸收散熱片62帶來的熱量，熱端放出熱量，從而實現致熱的功能，在金屬罩片61的位置產生熱感。致

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冷和致熱功能可用於金屬罩片61，以此對按摩位置進行冷敷或熱敷，結合按摩功能後，使傷部獲得較為顯著和全面的恢復。

【0042】 關於上述多角度按摩槍，進一步敘述如下。上述第一開口13和第二開口14分別配置於槍身部11的頭部和尾部，使得按摩頭4和金屬罩片61處於同一水準軸上。這樣當按摩頭31按摩完後，可以將按摩頭31反過來用金屬罩片61進行冷敷或熱敷，也能配合旋轉手柄4一起使用。

【0043】 本新型在本文中僅以較佳實施例揭露，然任何熟習本技術領域者應能理解的是，上述實施例僅用於描述本新型，並非用以限定本新型所主張之專利權利範圍。舉凡與上述實施例均等或等效之變化或置換，皆應解讀為涵蓋於本新型之精神或範疇內。因此，本新型之保護範圍應以下述之申請專利範圍所界定者為準。

【符號說明】

【0044】

1：殼體

11：槍身部

12：槍柄部

121：按鍵孔

122：旋轉軸

123：按鍵孔

13：第一開口

14：第二開口

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2：控制電源

21：鋰電池組

22：按鍵組件

23：PCB板

3：敲擊按摩裝置

31：按摩頭

32：驅動機構

321：活塞桿

3211：插接部

3212：螺接部

3213：第一螺紋孔

3214：第二螺紋孔

322：連桿件

3221：連桿大頭

3222：桿身

3223：聯桿小頭

3224-3225：滾動軸承

323：第一螺絲釘

324：第二螺絲釘

325：偏心輪

3251：偏心軸

3252：固定孔

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326：馬達

3261：馬達軸

327：馬達固定架

4：旋轉手柄

41：旋轉孔

5：限位機構

51：卡扣

511：通孔

512：限位卡齒

52：按鈕

521：限位卡槽

53：彈簧

6：溫控裝置

61：金屬罩片

62：散熱片

63：致冷片

64：風扇

65：風扇架

651：凹槽

66-67：導熱膠片

專利案號：109203793

公告本

M599159

【新型摘要】

【中文新型名稱】多角度按摩槍

【英文新型名稱】MULTI-ANGLE MASSAGE GUN

【中文】

本新型關於一種多角度按摩槍。其包括槍身部及槍柄部構成的殼體、敲擊按摩裝置、旋轉限位裝置以及旋轉手柄。其特徵在於旋轉手柄轉動連接於旋轉限位裝置，並自槍柄部略呈水平延伸，且在該槍身部及該槍柄部所構成的平面上轉動。

【英文】

The disclosure relates to a multi-angle massage gun. The massage gun comprises a shell composed of a gun barrel and a gun handle, a percussion massage device, a rotating limit device and a rotating handle.

【指定代表圖】

圖1

【代表圖之符號簡單說明】

1：殼體

11：槍身部

12：槍柄部

121：按鍵孔

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123：按鍵孔

22：按鍵組件

3：敲擊按摩裝置

4：旋轉手柄

5：限位機構

52：按鈕

6：溫控裝置

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【新型申請專利範圍】

【請求項1】 一種多角度按摩槍，用於舒緩一使用者的疲勞痠痛，該按摩槍包括：

一殼體，其包括一槍身部及一槍柄部，該槍身部配置於該槍柄部之一端，且垂直於該槍柄部；

一敲擊按摩裝置，配置於該槍身部之頭部；

一旋轉限位裝置，配置於該槍柄部之另一端；以及

一旋轉手柄，轉動連接於該旋轉限位裝置，自該槍柄部略呈水平延伸，且在該槍身部及該槍柄部所構成的平面上轉動。

【請求項2】 如請求項1所述之多角度按摩槍，其中該旋轉手柄更配置有一摩擦表面，且該旋轉手柄與該摩擦表面於製造時即一體成形。

【請求項3】 如請求項1所述之多角度按摩槍，其中該旋轉手柄自該槍柄部略呈水平延伸，以增長力臂，於按摩時減少該敲擊按摩裝置對該旋轉手柄部分的作用力。

【請求項4】 如請求項1所述之多角度按摩槍，其中該旋轉手柄以該旋轉限位裝置為樞紐，繞該槍柄部之一轉動範圍為順時針90度至逆時針90度。

【請求項5】 如請求項2所述之多角度按摩槍，其中該旋轉手柄於該轉動範圍內具有複數個檔位，用以調節轉動角度。

【請求項6】 如請求項1所述之多角度按摩槍，其更包括一溫控裝置，用於提供該使用者冷熱敷功能，其配置於該槍身部之尾部。

【請求項7】 如請求項4所述之多角度按摩槍，其中該溫控裝置包括：

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一金屬罩片，配置為密封該槍身部之尾部，並傳遞熱量至接觸該使用者肌膚；

一致冷片，配置於該金屬罩片內側，且執行冷熱功能；

一散熱片，配置於該致冷片內側，且提供熱量至該致冷片；

一風扇，配置於該散熱片內側；以及

一風扇架，配置於該風扇內側，用於提供該風扇放置之凹槽。

【請求項8】 如請求項4所述之多角度按摩槍，其中該溫控裝置更包括複數個導熱膠片，配置於該散熱片與該致冷片間，以及該金屬罩片與該致冷片間。

【請求項9】 如請求項4所述之多角度按摩槍，其中金屬罩片材質為鋁合金。

【請求項10】 如請求項1所述之多角度按摩槍，其更包括一控制電源，配置於該槍柄部，並與該風扇及該致冷片電性連接，其包括：

一鋰電池組，配置於該槍柄部內部；

一PCB板，配置為電性連接於該鋰電池組；以及

一按鍵組件，配置於該槍柄部上之一按鍵孔，用於外部按壓。

【請求項11】 如請求項1所述之多角度按摩槍，其中該旋轉限位裝置更包括一按鈕，用於限制該旋轉手柄的轉動功能。

【請求項12】 如請求項1所述之多角度按摩槍，其中該敲擊按摩裝置更包括：

一按摩頭，配置於該槍身部頭部之殼外；以及

一驅動機構，配置於該槍身部頭部之殼內，用於推動該按摩頭相對於該槍身部以略呈水平方向做往復運動。

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【請求項13】 如請求項10所述之多角度按摩槍，其中該驅動機構更包括：

一活塞桿，其兩端分別具有一插接部和一螺接部，該插接部具有一插口，該按摩頭具有一插頭，透過該插口及該插頭的插接，使該按摩頭插接於該活塞桿之頭端，且該螺接部具有一第一螺紋孔；

一連桿件，其包括一連桿大頭、一桿身及一連桿小頭；

一第一螺絲釘，配置為穿過該連桿小頭，與該第一螺紋孔連接；

一第二螺絲釘；

一偏心輪，其底面配置有一偏心軸，頂面中心配置有一固定孔，且該偏心輪配置有一第二螺紋孔，該第二螺絲釘穿過該連桿大頭與該第二螺紋孔連接；以及

一馬達，配置有一馬達軸，該馬達透過該馬達軸與該固定孔插接，用於通過該偏心輪偏心轉種該連桿件，帶動該活塞桿及該按摩頭略呈水平方向做往復運動。

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Espacenet

Bibliographic data: EP1728494 (A1) — 2006-12-06

Set for massage and / or distribution

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Classification: - international: ***A46B11/00; A46B13/00; A61H15/00; A61H7/00***
- cooperative: **A46B11/0017 (EP); A46B13/008 (EP); A61H15/0085 (EP); A61H7/005 (EP); B65D83/28 (EP);** A46B2200/1006 (EP); A61H2201/105 (EP); A61H2201/1685 (EP)

Application number: EP20060114226 20060519
Global Dossier

Priority number(s): FR20050051493 20050603

Also published as: EP1728494 (B1) ES2404515 (T3) FR2886542 (A1) FR2886542 (B1) JP2006334411 (A)

Abstract of EP1728494 (A1)

The assembly has a recipient (4) containing a cosmetic product and a body (3) on which the recipient is mounted. A massaging unit (2) is mounted on the body. A motor (19) drives in rotation the massaging unit around a rotation axis (X) relative to the body. A conduit (5) fluidly communicates with an outlet (11) of the recipient and the massaging unit. The recipient is arranged relative to the body in order to form a gripping

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unit for the assembly. The conduit is connected to an outlet of a distribution valve (9) of the recipient.

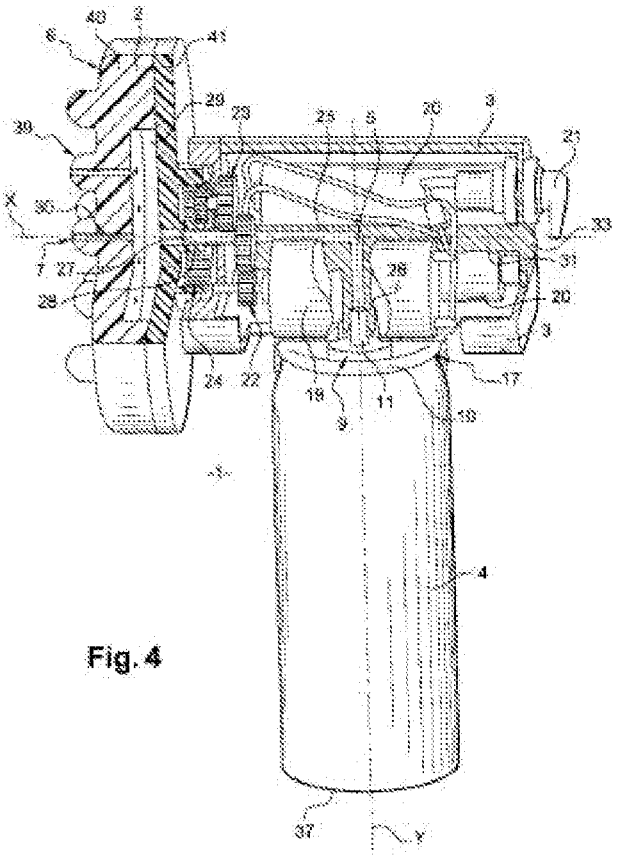


Fig. 4

Independent claims are also included for the following: (1) a kit comprising the cosmetic product distribution and massage assembly (2) a non-therapeutic and cosmetic process for applying a product on a surface of a body.

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DESCRIPTION EP1728494A1

[0001]

The present invention relates to an assembly for massaging and / or dispensing a cosmetic product contained in a container retained on a body of said assembly. Preferably, the massage is obtained by driving the massage member of this assembly in rotation.

[0002]

By "cosmetic product" is meant a product as defined in Council Directive 93/35 / EEC of June 14, 1993.

[0003]

US Pat. No. 3,994,290 discloses a massage device comprising a rotary massage unit driven in rotation by a motor and carrying a plurality of balls freely mounted on it.

The massage device is mounted on a body also receiving a container containing a product which can be distributed to said balls via a channel.

The receptacle comprises a one-way duckbill valve, the opening of which can only be obtained in response to a vacuum created in a chamber of the body adjoining this valve. Such a vacuum can be obtained in the chamber due to the relative sizes and shapes of the chamber and of said channel in communication with this chamber, in particular during the return of the container from a position partially depressed in said chamber towards its initial position.

[0004]

Document US Pat. No. 3,932,909 describes a device for cleaning the skin comprising a handle containing the product to be applied and a rotary applicator in the form of a brush, attached to the end of the handle

The brush is supplied with product through a conduit which communicates with the interior of the handle and in which the product flows by gravity. The duct opens through several orifices distributed over the entire surface of the brush. To rotate the brush, a spring mounted on the back of the brush is compressed by pulling a cord, the spring causing the brush to rotate as it relaxes. When the spring is fully relaxed, the brush stops rotating, so if the application is not finished, it is necessary to pull the cord again.

[0005]

A problem with the massage devices of the state of the art is that they are not easy to grip, and moreover that it is not easy to selectively dispense product or control the drive, rotating the massage member

[0006]

Another problem posed by the massage devices of the state of the art stems from the fact that they do not provide reliable and easy-to-implement solutions for the distribution of a product simultaneously or independently of the massage.

In addition, with the devices of the state of the art, the product is dispensed randomly when the container is no longer completely full.

[0007]

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The subject of the invention is an assembly for massaging and / or dispensing a product comprising

a container containing said product, in particular a cosmetic product,

a body on which the container is mounted,

a massage member mounted on this body,

means for driving in rotation about an axis of rotation of said massage member relative to the body, and

a conduit in fluid communication between an outlet of the container and the massage member,

characterized in that the container is configured for packaging and dispensing a product under pressure, the conduit being connected to an outlet of a dispensing valve of the container.

[0008]

The container can be arranged relative to the body so as to form a gripping member of the assembly.

A closed bottom of said container, opposite the dispensing valve, can then form a gripping member.

[0009]

A valve actuator can protrude from the outer periphery of the body.

This actuator may include a lever arm.

In particular, the actuation of the valve can be obtained by pushing in the valve stem.

Alternatively and or in addition, actuation of the valve can be obtained by tilting or tilting the valve stem.

[0010]

For example, the duct may have a section parallel to the axis of rotation, and in particular a section with an axis substantially coincident with the axis of rotation

When the massage member rotates, this duct section remains fixed, which limits dynamic sealing problems.

In particular, this section is connected to a second section forming an angle relative to the first section, this second section being connected to said valve.

[0011]

A main axis of elongation of the container may form an angle with the axis of rotation of the massager.

Alternatively, the container may include a main axis of elongation parallel to the axis of rotation of the massage member.

[0012]

For example, the container may be mounted on the body at a first end axially opposite, relative to the axis of rotation of the massage member, at a second end of said body where the massage member is retained, such that the container has an elongated axis between said outlet and a bottom of the container, this axis being parallel to the axis of rotation.

[0013]

Advantageously, the container can be removably mounted on the body.

The container may be snap-retained in a body cavity.

[0014]

The container may include a wall delimiting inside the latter a compartment containing a product to be sprayed and a pressurized gas mixed at least in part.

[0015]

Alternatively, the container may include two compartments of variable volume, a first compartment in communication with the valve and containing the product to be sprayed and a second compartment containing a propellant, the wall being impermeable to the product and to the propellant.

[0016]

Advantageously, the massage member can be removably mounted on the body.

The massage member may have an application surface provided with at least one relief, in particular an eccentric relief, or even a plurality of reliefs of different shapes and of different heights.

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[0017]

The massage member may include a removable end piece having said application surface.

The user can thus obtain different applications depending on the massage member chosen.

For example, the massage member may include a foam tip when the massage has for example a slimming aim, or a tuft of hair when the purpose of the massage is, for example, to replace the shaving brush required to spread the shaving foam, or for cleaning the skin, or else an abrasive application surface, for example obtained by inclusion of alumina particles in a resin or foam, when micro dermabrasion of the upper layers of the epidermis or "peeling" is desired.

[0018]

The massage member may include a structure retaining free balls in rotation in housings of the massage member.

[0019]

The massage member may include an elastically deformable portion, for example made from a closed-cell foam or from an elastomeric material, to tolerate the surface differences of the areas of the body to be massaged.

[0020]

The application surface of the massage member may have a symmetry that is substantially of revolution about an axis of symmetry, the application surface being driven in rotation by the drive means about said axis of symmetry.

[0021]

The drive means may include a motor, for example powered by a battery, for example a battery housed in the body, or by the sector, controlled by a control member.

The motor can drive the application member in rotation directly or indirectly, for example by means of movement transmission members, in order for example to reduce the speed of rotation and increase the torque.

[0022]

The subject of the invention is also a massage member intended to be mounted in a rotary and removable manner on a body of an assembly according to the invention.

[0023]

Another subject of the invention is a kit comprising an assembly according to the invention and a plurality of receptacles, the latter being arranged to be mounted selectively and in a removable manner on the body of this assembly. In such a kit, the containers preferably contain different products.

[0024]

The kit may include a plurality of massage members, the latter being arranged to be selectively and removably mounted on the body.

Thus, depending for example on the desired massage effect, the user selects the massage member comprising reliefs suitable for obtaining this massage effect. In such a kit, the massage members preferably have different reliefs.

[0025]

A subject of the invention is also a cosmetic and non-therapeutic process for applying a product to a surface of the body, characterized in that it consists in:

provide a kit as taught above,

select a container,

mount the selected container on the body of the assembly,

apply product to the body

massage the area of the body where the product has been applied with the rotating massage member.

[0026]

In the context of such a method, the user preferably selects a massage member to be mounted on the body of the assembly according to the selected container.

[0027]

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The invention will be better understood on reading the following description and on examining the accompanying figures.

These are presented only as an indication and in no way limit the invention.

The figures show:

Figure 1: a partially exploded side view of an assembly according to the invention;

Figures 2 and 3: longitudinal sectional views of containers configured to be mounted in an assembly according to the invention;

Figure 4: a partially truncated profile view of an assembly according to the invention;

Figure 5: a partially truncated profile view of another embodiment of an assembly according to the invention;

Figure 6: a partially truncated profile view of yet another assembly according to the invention

Figure 7: a perspective view of a kit according to the invention;

Figures 8 and 9 a partially truncated side view and a section of another embodiment of an assembly according to the invention;

Figures 10a to 10e: views of different application surfaces of massage members capable of being mounted in an assembly according to the invention.

[0028]

Figure 1 shows an assembly 1 according to the invention in which a massage member 2 is detached from a body 3 on which is mounted a container 4 able to distribute the product P that it contains through the massage member 2 via at least one duct 5 opening out at the level of an application surface 6 of this massage member 2 through at least one outlet orifice 7 of said massage member 2.

[0029]

The container 4 is a device suitable for containing and distributing under pressure a product P, in liquid or pasty form.

The container 4 is called an "aerosol".

Such a container 4 allows the product P to be propelled in the duct or channel 5 as far as through the massage member 2.

[0030]

The container 4 comprises a rigid outer enclosure 8, preferably made of metal or plastic.

It also comprises a distribution valve 9 generally mounted on a cup 10 retained, for example by expansion, on the external enclosure 8.

The container 4 allows the continuous distribution of the product P, with a continuous flow, during the phase in which the valve 9 is kept open.

[0031]

The enclosure 8 can contain the product and the propellant gas.

To distribute the product, when the rod 11 of the dispensing valve 9 is actuated, the valve 9 must be continuously supplied with product, for example by means of a dip tube, if the density of the product to be to distribute is greater than that of the propellant gas and if the container is presented "head up", namely with the valve 9 above the chamber 8.

[0032]

For example, in order to be able to distribute the product in any position, the product P to be distributed and the propellant gas are packaged separately in the enclosure 8 as shown in Figures 2 and 3, the container 4 can then be of the type of those taught in document FR-2841159.

[0033]

To do this, as shown in Figure 2, the product can be packaged in a bag 12 with flexible walls, in communication with the dispensing valve 9.

A propellant G2 is packaged in a volume formed between the outer surface of the pocket 12 and the inner wall of the outer enclosure 8.

The interior volume of pocket 12 defines a first compartment 14 and the volume of enclosure 8 outside of pocket 12 defines a second compartment 15.

[0034]

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Alternatively, Figure 3, the product P is kept separate from the propellant gas G2 by means of a piston 13 capable of sliding in sealed bearing against the inner surface of the outer chamber 8 so that the container 4 is separated into two compartments, a first compartment 14, in communication with the distribution valve 9, containing the product P and a second compartment 15, between the piston 13 and the bottom of the container, containing the propellant gas G2.

[0035]

To dispense product with such devices, the dispensing valve 9 is opened by pushing in and or by tilting the rod 11 projecting from the body 16 of the valve 9.

The body 16 of the valve 9 is in a fixed axial position relative to the outer enclosure 8 insofar as it is retained in the cup 10, for example by crimping, the cup 10 also being in a fixed axial position relative to the pregnant 8.

[0036]

When the dispensing valve 9 is open, the pressure exerted by the propellant G2 on the bag 12 or the piston 13 acts and presses the product P through the dispensing valve 9 out of the bag or the first compartment.

[0037]

The product P can then be distributed in the form of a paste, in particular a cream or a gel, a liquid, a spray or else in the form of a foam.

[0038]

In the first compartment 14 or internal volume of the pocket 12, the product P to be sprayed can be mixed with a first propellant G1 or a solvent at high vapor pressure, while the second compartment 15 contains the second propellant G2, the wall of the pocket 12 or the piston 13 being impermeable to the product and to the propellants.

[0039]

The first propellant G1 is chosen, for example, from hydrocarbons or dimethyl ether, alone or mixed.

The second propellant G2 is for example a compressed or liquefied gas, for example a mixture of propane, butane and isobutane, or compressed air.

[0040]

The pocket 12 can be made of a metal-plastic complex, in particular an aluminum-plastic complex comprising a layer of aluminum and at least one layer of a thermoplastic material, in particular a polyamide, a polyethylene, a polyethylene terephthalate or a polypropylene.

[0041]

The container 4 is designed to be removably mounted in the body 3.

It is for example provided to be retained by snap-fastening with complementary means provided on the inner periphery of a cavity 17 formed in the body 3, Figure 4.

In particular, these means cooperate with an annular bead formed by the junction zone between the cup 10 and the external enclosure 8.

As a variant, the container 4 can be retained by clamping in the cavity 17

[0042]

Furthermore, as shown in Figure 1, the massage member 2 forms a removable tip 40, and for example intended to be retained by bayonet-type means on a support 41.

Alternatively, the end piece 40 can be retained by snapping onto the support 41.

As a variant, Figures 4 to 9, the end piece 40 is integral, for example glued or heat-sealed, to the support 41.

[0043]

The massage member 2 is designed to be driven in rotation relative to the body 3 by drive means provided inside the body 3, Figure 4.

The drive means comprise a motor 19 supplied by a battery 20, the battery 20 being connected to a control member 21 making it possible to selectively authorize or not the supply of the motor 19, and therefore the drive in rotation or not of the massager 2

Battery 20 is formed by at least one battery, or even several cells, housed in body 3.

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Alternatively, the motor 19 can be powered by the mains.

[0044]

The control member 21 can make it possible to select different speeds of rotation of the motor 19.

The control member 21 can form an electric switch provided with a rotary selector projecting from the body 3 so as for example to be able to be placed in three positions respectively: a first off position, a second position corresponding to a first speed of rotation, and a third position corresponding to a second speed of rotation.

In particular, the control member 21 may include a continuous variator of the speed of rotation of the motor 19 for finer adjustment of the desired massage, and this in particular as a function of the massage member 2 in place and / or the surface. of skin to be massaged.

[0045]

The motor 19 drives in rotation a toothed wheel 22 cooperating with a set of gears 23 transmitting the movement to the massager 2.

Indeed, the massaging member 2, and more particularly the support 41, comprises a toothed surface 24 cooperating with one of the gears of the gear system 23.

The set of gears 23 forms a means of reducing the speed of rotation of the massaging member, this reduction 23 making it possible to increase the torque.

[0046]

The toothed surface 24 is annular and crossed at its center by the channel 5.

The channel 5 is partly formed inside a tube 25, arranged in the body 3, a first end 26 of which is connected to the end of the valve stem 11 via which the product P is dispensed.

At a second end 27, the tube 25 is in engagement with a mounting skirt 28 of the massage member 2, and more particularly of the support 41.

This mounting skirt 28 is interior and concentric with the toothed surface 24, it is in fluid communication with the outlet port 7.

Indeed, the mounting skirt 28 opens into an interior space 29 of the massage member 2, this interior space 29 being for example formed between the support 41 and the end piece 40, such that the application surface 6 is crossed by at least one supply channel 30 connecting the interior space 29 to the outlet orifice 7.

As shown in Figure 4, the application surface 6 is crossed by a plurality of supply channels such as 30 opening out on the one hand into the interior space 29 and on the other hand by as many outlet orifices such as 7. .

[0047]

The axis X around which the massage member 2 is driven in rotation preferably corresponds to the axis of symmetry of revolution of the inner periphery of the mounting skirt 28 and of the outer periphery of the portion of the tube 25 situated between the ends. 26 and 27.

Between the ends 26 and 27, the channel 5 forms a first section extending along the axis of rotation X.

[0048]

When the massage member 2 is rotated, the mounting skirt 28 is rotated relative to the tube 25 which remains stationary in rotation relative to the body 3.

For this purpose, an annular ring may be provided between the tube 25 and the skirt 28 to maintain the tightness of this connection even when one is rotated relative to the other.

[0049]

The assembly 1 is provided so that the distribution of product P can be obtained independently of the rotational drive of the massage member 2.

For this purpose, and preferably near the control member 21, the assembly 1 comprises an actuator 33 of the valve 9 projecting from the outer periphery of the body 3.

This actuator 33 protrudes from the body 3 and can be moved relative to the body 3 so as to exert a stress on the valve stem 11 and thus allow the distribution of product P in the channel 5.

[0050]

In this case, according to the embodiment shown in FIG. 4, the valve 9 can be opened by tilting the valve stem 11 relative to a longitudinal axis of the body 16 of said valve 9, this longitudinal axis preferably being superimposed on a main elongation axis

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Y of the container 4, and the container 4 being mounted in the body so that the main elongation axis Y forms an angle with the axis of rotation X.

[0051]

The tube 25 is therefore mounted on the rod 11 such that they together form an angle, in this case 90 °.

Thus the actuation of the rod 11 can be obtained by simple translation of the tube 25 along the axis X. This translation can be obtained directly, as shown, insofar as the tube 25 comprises a portion s 'extending along the X axis and emerging out of the body 3, this portion of axis X extending opposite the portion of the tube in which the channel 5 is partly formed.

One end 31 of the portion extending along the X axis projecting from the body 3 then forms the actuator 33.

[0052]

Alternatively, a system could be provided, in particular with a lever arm for moving the rod 11 relative to the Y axis, this lever arm being arranged in the body 3 between the actuator 31 and the rod 11.

[0053]

According to an alternative embodiment of an assembly according to FIG. 4, shown in FIG. 5, in which the opening of the valve is obtained by a depression of the valve stem 11 relative to the valve body 16, a push button 33 is provided on the outer periphery of the body 3, arranged in the axis of elongation Y of the container 4.

Thus the actuation of the valve 9 is obtained by pressing the push button 33 into the body 3 along the Y axis. The push button 33 extends inside the body so as to be able to transmit its depression to respectively the end 26 of the tube 25 and de facto to the valve stem 11 inside said body 3

Now, the container 4 being retained in a fixed axial position in the body 3, when the push button 33 is pressed, the valve 9 then releases product into the channel 5

[0054]

According to another variant embodiment of an assembly 1 according to the invention, for example as shown in FIG. 6, the X and Y axes can be mutually parallel.

The container 4 is then retained at one end of the body axially opposite to the end at which the massage member 2 is mounted.

In this case, the actuation of the valve 9 is obtained by depression, and this depression is in particular obtained by relative displacement of the container 4 relative to the body 3, insofar as the tube 25 is here in a fixed axial position inside body 3.

[0055]

To obtain the distribution of product with such an assembly 1, the user grasps the outer periphery of the body with one hand and with his other hand the outer periphery of the container 4 to bring them together.

Alternatively, the user can apply the application surface 6 against an area of skin to be treated, and then depending on the gripping area that he chooses, he can selectively dispense product or not.

Indeed, if the user grasps the outer periphery of the body 3 when the application surface 6 is applied against the skin, then the container 4 remains in a fixed axial position relative to the body 3, and the valve 9 remains closed.

There is no product distribution.

[0056]

On the other hand, if the user grasps the outer rim of the container 4, the container 4 can be made to sink partially into the cavity 17 of the body 3, and the valve 9 be made to open and then allow the dispensing of product, depending on the force with which the application surface 6 of the assembly 1 is applied against the skin.

[0057]

According to this embodiment, the control member 21 is designed to protrude from a side wall 35 of the body 3.

[0058]

When the user grasps the container 4 at its outer periphery projecting from the body 3, and to ensure that only a translational movement of the container 4 relative to the body 3 is allowed, the container 4 is provided with a collar 36 to guide and possibly limit the movement of the container 4 relative to the body 3.

This collar 36 cooperates with the side wall 35.

[0059]

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According to another variant embodiment of an assembly 1 according to the invention shown in Figures 8 and 9, the axis of rotation X of the massage member 2 is inclined relative to the main axis of elongation Y of the container 4.

The X axis is for example inclined at an angle of 75 ° relative to the Y axis.

[0060]

According to this variant, the body 3 comprises an outer casing forming a shell which partially covers the container 4.

The actuator 33 is this time a separate part of the body.

It comprises a portion which is located outside the body and which can be moved along an axis perpendicular to the axis of the valve stem in order to tilt the valve stem 11.

To actuate the valve stem, the actuator 33 is mounted on the valve stem 11 via a first skirt 50 which fits onto the valve stem 11.

The actuating member 33 comprises a second skirt 51, which communicates with the first, and on which is fitted the tube 25 connecting the valve stem 11 to the massaging member 2, in order to place the pressure rod in fluid communication. valve 11 with tube 25.

[0061]

According to this embodiment, the tube 25 is flexible.

He can then bypass the different parts of the device contained in the body 3.

[0062]

By using a separate part of the body 3 to form the actuator 33, different materials can be used to form the body and the actuator.

The product flowing inside the two skirts 50 and 51 of the actuator 33, the latter must be made of a material compatible with the product.

On the other hand, since the product is not in contact with the body 3, it is not necessary to use a material compatible with the product to produce the body, which leaves more choice in the materials that can be used.

The body 3 can for example be made with materials that help improve the aesthetics of the whole.

[0063]

According to this variant, the container which is fixed to the body by snap-fastening is also removable.

[0064]

In the various embodiments, Figures 4 to 9, the side wall 35 of the container 4 is preferably cylindrical, the container 4 comprising a bottom 37 axially opposed, relative to the Y axis, to the cup 10 carrying the valve 9.

The bottom 37 is closed.

It optionally comprises a stopper 38 to allow pressurization of the second compartment 15 when the propellant G2 must be injected via a syringe through this stopper 38, Figures 2 and 3.

[0065]

In the embodiments of the invention, the bottom 37 and at least a portion of the side wall 35 protrudes from the body 3.

In particular, the portion of the side wall 35 projecting from this body 3 represents more than half of this side wall 35 relative to the main axis of elongation Y. Thus the bottom 37 and the portion of the side wall 35 form a means of gripping the assembly 1.

[0066]

In addition, this visible portion of the container 4, not masked by the body 3, when the container 4 is mounted in the body 3, enables the user to become acquainted with the indications relating to the product and or to the recommended methods of use which can be inscribed on this side wall 35.

[0067]

In particular, a method of implementing this assembly 1 is useful to know when the assembly 1 is not completely assembled and ready for use, in particular when it is supplied in the form of a kit 100, FIG. 7, with possibly several massage members such as 2 having different application surfaces which can be mounted selectively and removably on the body 3, and with several receptacles such as 4 comprising different products, these receptacles being able to be mounted selectively and removably on the body 3.

[0068]

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The method for applying a product to a surface of the body to be treated by means of this assembly 1 can consist in selecting a massage member such as 2 depending on the product contained in the container 4 which will have been selected, to mount this massage member on the body 3, and bring the valve 9 into the open position so that the product is dispensed at the level of the application surface 6 with a view to being applied to the body.

Then, simultaneously or not with the dispensing of the product, the user can massage the area of the body where the product has been applied with the massage member driven in rotation.

[0069]

In particular, the massage members capable of being mounted on the body 3 in order to be driven in rotation, may have different application surfaces such as 6.

They may have reliefs and / or a surface condition allowing the user to massage and / or clean the skin.

[0070]

The application surfaces such as 6 of the massage members can be made from natural or synthetic fibers (woven, non-woven, wadding), from natural or synthetic sponge, or even from several materials.

The massage organs can also be impregnated with a second product, for example having antimicrobial or coloring properties.

[0071]

In the embodiment shown, the application surface 6 is formed from a block of thermocompressed foam optionally covered with a textile, having reliefs 39 arranged regularly over the entire said application face 6.

In particular, they are arranged along two concentric lines Leet Li, circular, centered on the axis of rotation X. Such an applicator member is for example obtained in accordance with the teaching of patents FR-2 674 183 and FR-2, 811 872.

Some of the reliefs can be crossed by a channel such as 30.

In particular in the case where the application surface 6 is supplied by several channels such as 30, these can also emerge at a distance from the reliefs such as 39.

The reliefs such as 39 form in this example dome-shaped bosses.

[0072]

In particular, the application surface 6 of the massage member has a symmetry that is substantially of revolution about an axis of symmetry that can be superimposed on the axis of rotation X.

[0073]

As a variant, the application surface 6 is provided with a single relief such as 39a eccentric relative to the axis of rotation X when the massage member 2 is mounted on the body 3, FIG. 10a.

[0074]

As a variant, the application surface 6 comprises a plurality of reliefs such as 39 of different shapes and of different heights, as shown in FIG. 10b.

[0075]

Figure 10c, the application surface 6 can be presented on the removable nozzle 40 relative to the support 41 adapted to be retained on the body 3, the support 41 and the nozzle 40 together forming the massage member 2 can be driven in rotation.

End pieces such as 40 capable of being mounted on the support 41 may have respectively different application surfaces.

In this example, the end piece 40 comprises a groove 42 capable of engaging by snap-fitting with a groove 43 on an inner periphery of a skirt 44 of this support 41.

Skirt 44 extends in a direction opposite to mounting skirt 28.

[0076]

This end piece 40 can be made of foam, or of an elastically deformable material, in particular an elastomer, for example a PVC, PU, EVA, Nitrile, Silicone, Butyl including SEBS, EPDM, etc.

[0077]

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Preferably, the application surface 6 comprises an elastically deformable portion, for example made of elastomer, to provide comfort during application to the skin.

It can be at least in part made from an elastically deformable material such as PVC, PU, EVA, Nitrile, Silicone, Butyl including SEBS, EPDM, etc.

[0078]

As a variant, FIG. 10d, the massage member 2 may comprise a structure retaining balls 45 free to rotate each respectively in housings 46 of the application surface 6 of the massage member 2.

[0079]

Alternatively, Figure 10e, the application surface 6 may have a tuft of bristles 47 intended to be applied against the area of skin to be massaged.

The massager can then be used as a shaving brush to form foam with the product spread on the face, prior to shaving.

[0080]

As a variant, when the object of the massage is to clean the skin in depth, the application surface 6 can be abrasive, for example obtained by including particles of alumina in a resin or a foam.

[0081]

Throughout the description, the expression "comprising a" should be considered as being synonymous with "comprising at least one", unless specified to the contrary.

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CLAIMS EP1728494A1

1.

Set (1) for massaging and or dispensing a product (P) comprising - a container (4) containing said product, in particular a cosmetic product,

- a body (3) on which the container is mounted,

- a massage member (2) mounted on this body,

- a drive means (19) in rotation around an axis of rotation (X) of said massaging member relative to the body, and

- a duct (5) in fluid communication between an outlet (11) of the container and the massage member,

characterized in that the container is configured for packaging and dispensing a product under pressure, the conduit being connected to an outlet of a dispensing valve (9) of the container.

2.

Assembly according to Claim 1, characterized in that the container is arranged relative to the body so as to form a gripping member.

3.

Assembly according to any one of Claims 1 or 2, characterized in that an actuating member (33, 34) of the valve protrudes from the outer periphery of the body.

4.

Assembly according to Claim 3, characterized in that the actuating member comprises a lever arm.

5.

Assembly according to any one of Claims 1 to 4, characterized in that it comprises means for actuating the valve by pushing in the valve stem (11).

6.

Assembly according to any one of Claims 1 to 5, characterized in that it comprises means for actuating the valve by tilting the valve stem (11).

7.

Assembly according to any one of Claims 1 to 6, characterized in that the duct has a section (26) parallel to the axis of rotation.

8.

Assembly according to Claim 7, characterized in that the duct comprises a section (26) of axis substantially coincident with the axis of rotation

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Assembly according to any one of Claims 1 to 8, characterized in that the axis of rotation forms an angle with a main axis of elongation (Y) of the container.

10.

Assembly according to any one of Claims 1 to 8, characterized in that the container has a main axis of elongation (Y) parallel to the axis of rotation.

11.

Assembly according to any one of Claims 1 to 8 or 10, characterized in that the container is mounted on the body at a first end axially opposite, relative to the axis of rotation of the massaging member, at a second end of said body where the massaging member is retained, such that the container has an elongated axis between said outlet and a bottom (37) of the container, this axis being parallel to the axis of rotation.

12.

Assembly according to any one of the preceding claims, characterized in that the container is removably mounted on the body.

13.

Assembly according to any one of the preceding claims, characterized in that the container is retained by snap-fastening in a cavity (17) of the body.

14.

Assembly according to any one of Claims 1 to 13, characterized in that the container comprises a wall delimiting inside the latter two compartments (14, 15) of variable volume, a first compartment in communication (14) with the valve and containing the product to be sprayed and a second compartment (15) containing a propellant (G2), the wall being impermeable to the product and to the propellant.

15.

Assembly according to any one of the preceding claims, characterized in that the massage member is removably mounted on the body.

16.

Assembly according to any one of the preceding claims, characterized in that the massage member has an application surface provided with at least one relief (39), in particular an eccentric relief.

17.

Assembly according to any one of the preceding claims, characterized in that the application surface comprises a plurality of reliefs of different shapes and of different heights.

18.

Assembly according to any one of the preceding claims, characterized in that the massage member comprises a removable end piece (40) presenting said application surface.

19.

Assembly according to any one of the preceding claims, characterized in that the massage member comprises a foam endpiece intended to be applied against the area of skin to be massaged.

20.

Assembly according to any one of the preceding claims, characterized in that the massaging member comprises a tuft of hair intended to be applied against the area of skin to be massaged.

21.

Assembly according to any one of the preceding claims, characterized in that the massage member comprises a structure retaining balls (45) which are free to rotate in the housings (46) of the massage member.

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Assembly according to any one of the preceding claims, characterized in that the massage member comprises an elastically deformable portion, for example made of elastomer.

23.

Assembly according to any one of the preceding claims, characterized in that the massage member comprises an abrasive application surface, for example obtained by including particles of alumina in a resin.

24.

Assembly according to any one of the preceding claims, characterized in that the application surface of the massage member has a symmetry that is substantially of revolution about an axis of symmetry, the application surface being driven in rotation by the means drive around said axis of symmetry.

25.

Assembly according to any one of the preceding claims, characterized in that the drive means comprises a motor (19).

26.

Assembly according to Claim 25, characterized in that the motor is powered by a battery (20), for example powered by a battery housed in the body, or by the sector, controlled by a control member (21).

27.

Assembly according to Claim 25 or 26, characterized in that the motor can drive the applicator member in rotation indirectly by means of movement transmission members (23)

28.

Massage member (2) intended to be rotatably and removably mounted on a body of an assembly as defined in any one of claims 1 to 27.

29.

Kit (100) comprising:

- an assembly as defined in any one of claims 1 to 27,

a plurality of receptacles, the latter being arranged to be mounted selectively and removably on the body.

30.

Kit according to the preceding claim, characterized in that the containers contain different products.

31.

Kit according to Claim 29 or 30, characterized in that it comprises a plurality of massage members, in particular having different reliefs, the latter being arranged to be mounted selectively and removably on the body.

32.

Cosmetic and non-therapeutic process for applying a product to a surface (S) of the body, characterized in that it comprises the following steps:

- provide a kit (100) according to one of claims 29 to 31,

- select a container,

- mount the selected container on the body of the assembly,

- apply product on the body

- massage the area of the body where the product has been applied with the rotating massage member.

33.

Method according to Claim 32, characterized in that it comprises the step of selecting a massage member as a function of the selected container.

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 728 494 A1

(12) DEMANDE DE BREVET EUROPEEN

(43) Date de publication:
06.12.2006 Bulletin 2006/49

(21) Numéro de dépôt: **06114226.1**

(22) Date de dépôt: **19.05.2006**

(51) Int Cl.:
A61H 15/00 *(2006.01)* ***A61H 7/00*** *(2006.01)*
A46B 13/00 *(2006.01)* ***A46B 11/00*** *(2006.01)*

(84) Etats contractants désignés:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Etats d'extension désignés:
AL BA HR MK YU

(30) Priorité: **03.06.2005 FR 0551493**

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(54) Ensemble de massage et ou de distribution

(57) Ensemble (1) de massage et ou de distribution d'un produit comportant
- un récipient (4) contenant ledit produit, notamment un produit cosmétique,
- un corps (3) sur lequel est monté le récipient,
- un organe de massage (2) monté sur ce corps,
- un moyen d'entraînement (19) en rotation autour d'un axe de rotation (X) dudit organe de massage relativement au corps, et
- un conduit (5) en communication fluidique entre une sortie (11) du récipient et l'organe de massage,

caractérisé en ce que le récipient est configuré pour le conditionnement et la distribution d'un produit sous pression, le conduit étant relié à une sortie d'une valve de distribution (9) du récipient.

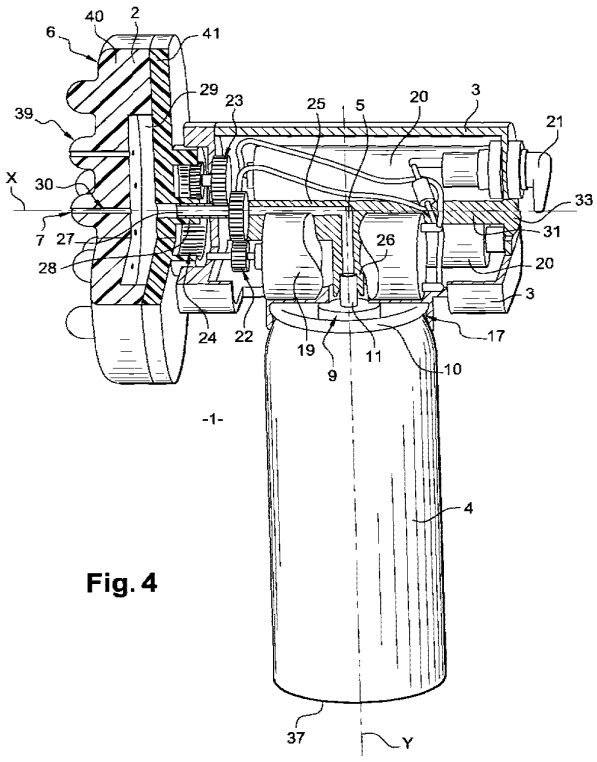


Fig. 4

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Description

[0001] La présente invention a pour objet un ensemble pour le massage et ou la distribution d'un produit cosmétique contenu dans un récipient retenu sur un corps dudit ensemble. De préférence, le massage est obtenu par entraînement en rotation de l'organe de massage de cet ensemble.

[0002] Par « produit cosmétique », on entend un produit tel que défini dans la Directive 93/35/CEE du Conseil du 14 juin 1993.

[0003] On connaît par le brevet US 3 994 290 un dispositif de massage comportant une unité de massage rotative entraînée en rotation par un moteur et portant une pluralité de billes montées librement dessus. Le dispositif de massage est monté sur un corps recevant également un récipient contenant un produit pouvant être distribué vers lesdites billes via un canal. Le récipient comporte une valve unidirectionnelle en bec de canard, dont l'ouverture ne peut être obtenue qu'en réponse à une dépression créée dans une chambre du corps attenante à cette valve. Une telle dépression peut être obtenue dans la chambre du fait des tailles et des formes relatives de la chambre et dudit canal en communication avec cette chambre, notamment lors du retour du récipient depuis une position partiellement enfoncée dans ladite chambre vers sa positon initiale.

[0004] Le document US 3 932 909 décrit un dispositif pour nettoyer la peau comportant un manche contenant du produit à appliquer et un applicateur rotatif sous forme de brosse, fixé à l'extrémité du manche. La brosse est alimentée en produit par un conduit qui communique avec l'intérieur du manche et dans lequel le produit s'écoule par gravité. Le conduit débouche par plusieurs orifices répartis sur toute la surface de la brosse. Pour faire tourner la brosse, on comprime un ressort monté à l'arrière de la brosse en tirant un cordon, le ressort entraînant la brosse en rotation lorsqu'il se détend. Lorsque le ressort est totalement détendu, la brosse s'arrête de tourner, si bien que si l'application n'est pas terminée, il est nécessaire de tirer de nouveau le cordon.

[0005] Un problème posé par les dispositifs de massage de l'état de la technique tient au fait qu'ils ne sont pas faciles de préhension, et par ailleurs qu'il n'est pas facile de sélectivement distribuer du produit ou de commander l'entraînement en rotation de l'organe de massage.

[0006] Un autre problème posé par les dispositifs de massage de l'état de la technique tient au fait qu'ils ne fournissent pas de solutions fiables et faciles à mettre en oeuvre pour la distribution d'un produit simultanément ou indépendamment du massage. De plus, avec les dispositifs de l'état de la technique la distribution de produit est aléatoire dès lors que le récipient n'est plus totalement plein.

[0007] L'invention a pour objet un ensemble de massage et ou de distribution d'un produit comportant

- un récipient contenant ledit produit, notamment un produit cosmétique,
- un corps sur lequel est monté le récipient,
- un organe de massage monté sur ce corps,
- un moyen d'entraînement en rotation autour d'un axe de rotation dudit organe de massage relativement au corps, et
- un conduit en communication fluidique entre une sortie du récipient et l'organe de massage,

caractérisé en ce que le récipient est configuré pour le conditionnement et la distribution d'un produit sous pression, le conduit étant relié à une sortie d'une valve de distribution du récipient.

[0008] Le récipient peut être agencé relativement au corps de manière à former un organe de préhension de l'ensemble. Un fond fermé dudit récipient, à l'opposé de la valve de distribution, peut alors former un organe de préhension.

[0009] Un organe d'actionnement de la valve peut dépasser du pourtour extérieur du corps. Cet organe d'actionnement peut comporter un bras de levier. Notamment, l'actionnement de la valve peut être obtenu par enfoncement de la tige de valve. Alternativement et ou en complément, l'actionnement de la valve peut être obtenu par inclinaison ou basculement de la tige de valve.

[0010] Par exemple, le conduit peut comporter une section parallèle à l'axe de rotation, et en particulier une section d'axe sensiblement confondu avec l'axe de rotation. Lors de la rotation de l'organe de massage, cette section de conduit reste fixe ce qui limite les problèmes d'étanchéité dynamique. Notamment, cette section est reliée à une seconde section formant un angle relativement à la première section, cette seconde section étant connectée à ladite valve.

[0011] Un axe d'allongement principal du récipient peut former un angle avec l'axe de rotation de l'organe de massage. Alternativement, le récipient peut comporter un axe d'allongement principal parallèle à l'axe de rotation de l'organe de massage.

[0012] Par exemple, le récipient peut être monté sur le corps au niveau d'une première extrémité axialement opposée, relativement à l'axe de rotation de l'organe de massage, à une seconde extrémité dudit corps où est retenu l'organe de massage, de telle sorte que le récipient comporte un axe allongé entre ladite sortie et un fond du récipient, cet axe étant parallèle à l'axe de rotation.

[0013] Avantageusement, le récipient peut être monté de manière amovible sur le corps. Le récipient peut être retenu par encliquetage dans une cavité du corps.

[0014] Le récipient peut comporter une paroi délimitant à l'intérieur de celui-ci un compartiment contenant un produit à pulvériser et un gaz sous pression mélangés au moins en partie.

[0015] Alternativement, le récipient peut comporter deux compartiments de volume variable, un premier compartiment en communication avec la valve et conte-

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nant le produit à pulvériser et un second compartiment contenant un propulseur, la paroi étant imperméable au produit et au propulseur.

[0016] Avantageusement, l'organe de massage peut être monté de manière amovible sur le corps. L'organe de massage peut présenter une surface d'application munie d'au moins un relief, notamment un relief excentré, ou encore une pluralité de reliefs de différentes formes et de différentes hauteurs

[0017] L'organe de massage peut comporter un embout amovible présentant ladite surface d'application. L'utilisateur peut ainsi obtenir différentes applications en fonction de l'organe de massage choisi. Par exemple, l'organe de massage peut comporter un embout en mousse lorsque le massage a par exemple une visée amincissante, ou une touffe de poils lorsque le massage a par exemple pour objet de remplacer le blaireau nécessaire pour étaler la mousse à raser, ou pour nettoyer la peau, ou encore une surface d'application abrasive, par exemple obtenu par inclusion de particules d'alumine dans une résine ou mousse, lorsqu'une micro dermabrasion des couches supérieures de l'épiderme ou « peeling » est recherchée.

[0018] L'organe de massage peut comporter une structure retenant des billes libres en rotation dans des logements de l'organe de massage.

[0019] L'organe de massage peut comporter une portion élastiquement déformable, par exemple réalisée dans une mousse à cellules fermées ou dans un matériau élastomère, pour tolérer les différences de surface des zones du corps à masser.

[0020] La surface d'application de l'organe de massage peut présenter une symétrie sensiblement de révolution autour d'un axe de symétrie, la surface d'application étant entraînée en rotation par le moyen d'entraînement autour dudit axe de symétrie.

[0021] Le moyen d'entraînement peut comporter un moteur, par exemple alimenté par une batterie, par exemple une pile logée dans le corps, ou par le secteur, commandé par un organe de commande. Le moteur peut entraîner l'organe d'application en rotation directement ou indirectement, par exemple par l'intermédiaire d'organes de transmission de mouvement, afin par exemple de réduire la vitesse de rotation et augmenter le couple.

[0022] L'invention a également pour objet un organe de massage destiné à être monté de manière rotative et amovible sur un corps d'un ensemble selon l'invention.

[0023] L'invention a encore pour objet un kit comportant un ensemble selon l'invention et une pluralité de récipients, ces derniers étant agencés pour être montés sélectivement et de manière amovible sur le corps de cet ensemble. Dans un tel kit, les récipients contiennent de préférence des produits différents.

[0024] Le kit peut comporter une pluralité d'organes de massage, ces derniers étant agencés pour être montés sélectivement et de manière amovible sur le corps. Ainsi, selon par exemple l'effet de massage souhaité, l'utilisateur sélectionne l'organe de massage comportant des reliefs adaptés à obtenir cet effet de massage. Dans un tel kit, les organes de massage comportent de préférence des reliefs différents.

[0025] L'invention a de fait aussi pour objet un procédé cosmétique et non thérapeutique pour appliquer un produit sur une surface du corps, caractérisé en ce qu'il consiste à:

- fournir un kit comme enseigné ci-dessus,
- sélectionner un récipient,
- monter le récipient sélectionné sur le corps de l'ensemble,
- appliquer du produit sur le corps
- masser la zone du corps où le produit a été appliqué avec l'organe de massage entraîné en rotation.

[0026] Dans le cadre d'un tel procédé, de préférence, l'utilisateur sélectionne un organe de massage à monter sur le corps de l'ensemble en fonction du récipient sélectionné.

[0027] L'invention sera mieux comprise à la lecture de la description qui suit et à l'examen des figures qui l'accompagnent. Celles ci ne sont présentées qu'à titre indicatif et nullement limitatif de l'invention. Les figures montrent :

- Figure 1 : une vue de profil partiellement éclatée d'un ensemble selon l'invention ;
- Figures 2 et 3 : des vues en coupe longitudinale de récipients configurés pour être montés dans un ensemble selon l'invention ;
- Figure 4 : une vue de profil partiellement tronquée d'un ensemble selon l'invention ;
- Figure 5 : une vue de profil partiellement tronquée d'un autre mode de réalisation d'un ensemble selon l'invention ;
- Figure 6 : une vue de profil partiellement tronquée d'encore un autre ensemble selon l'invention
- Figure 7 : une vue en perspective d'un kit selon l'invention ;
- Figures 8 et 9 une vue de profil partiellement tronquée et une coupe d'un autre mode de réalisation d'un ensemble selon l'invention ;
- Figures 10a à 10e : des vues de différentes surfaces d'application d'organes de massage aptes à être montés dans un ensemble selon l'invention.

[0028] La Figure 1 montre un ensemble 1 selon l'invention dans lequel un organe de massage 2 est détaché d'un corps 3 sur lequel est monté un récipient 4 apte à distribuer le produit P qu'il contient au travers de l'organe de massage 2 via au moins un conduit 5 débouchant au niveau d'une surface d'application 6 de cet organe de massage 2 par au moins un orifice de sortie 7 dudit organe de massage 2.

[0029] Le récipient 4 est un dispositif propre à contenir et à distribuer sous pression un produit P, sous forme liquide ou pâteuse. Le récipient 4 est dit « aérosol ». Un

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tel récipient 4 permet la propulsion du produit P dans le conduit ou canal 5 jusqu'au travers de l'organe de massage 2.

[0030] Le récipient 4 comporte une enceinte externe rigide 8, de préférence en métal ou en matière plastique. Il comporte également une valve de distribution 9 montée généralement sur une coupelle 10 retenue, par exemple par dudgeonnage, sur l'enceinte externe 8. Le récipient 4 permet la distribution en continu du produit P, avec un débit continu, pendant la phase où la valve 9 est maintenue ouverte.

[0031] L'enceinte 8 peut contenir le produit et le gaz propulseur. Pour distribuer le produit, lors de l'actionnement de la tige 11 de la valve de distribution 9, il faut que la valve 9 soit alimentée en continu en produit, par exemple au moyen d'un tube plongeur, si la densité du produit à distribuer est supérieure à celle du gaz propulseur et si le récipient est présenté « tête en haut », à savoir avec la valve 9 au dessus de l'enceinte 8.

[0032] Par exemple pour pouvoir distribuer le produit dans n'importe quelle position, le produit P à distribuer et le gaz propulseur sont conditionnés de façon séparée dans l'enceinte 8 comme cela est représenté sur les figures 2 et 3, le récipient 4 peut alors être du type de ceux enseignés dans le document FR-2841159.

[0033] Pour ce faire, comme représenté Figure 2, le produit peut être conditionné dans une poche 12 à parois souples, en communication avec la valve de distribution 9. Un propulseur G2 est conditionné dans un volume formé entre la surface extérieure de la poche 12 et la paroi intérieure de l'enceinte externe 8. Le volume intérieur de la poche 12 définit un premier compartiment 14 et le volume de l'enceinte 8 à l'extérieur de la poche 12 définit un second compartiment 15.

[0034] Alternativement, Figure 3, le produit P est maintenu séparé du gaz propulseur G2 au moyen d'un piston 13 apte à coulisser en appui étanche contre la surface intérieure de l'enceinte externe 8 de sorte que le récipient 4 est séparé en deux compartiments, un premier compartiment 14, en communication avec la valve de distribution 9, contenant le produit P et un second compartiment 15, entre le piston 13 et le fond du récipient, contenant le gaz propulseur G2.

[0035] Pour distribuer du produit avec de tels dispositifs, on provoque l'ouverture de la valve de distribution 9, par enfoncement et ou par basculement de la tige 11 dépassant du corps 16 de la valve 9. Le corps 16 de la valve 9 est à position axiale fixe relativement à l'enceinte externe 8 dans la mesure où il est retenu dans la coupelle 10, par exemple par sertissage, la coupelle 10 étant elle aussi à position axiale fixe relativement à l'enceinte 8.

[0036] Lorsque la valve de distribution 9 est ouverte, la pression exercée par l'agent propulseur G2 sur la poche 12 ou le piston 13 agit et presse le produit P par la valve de distribution 9 hors de la poche ou du premier compartiment.

[0037] Le produit P peut ensuite être distribué sous forme de pâte, notamment de crème ou de gel, de liquide, de spray ou encore sous forme de mousse.

[0038] Dans le premier compartiment 14 ou volume intérieur de la poche 12, le produit P à pulvériser peut être mélangé avec un premier propulseur G1 ou un solvant à forte tension de vapeur, tandis que le second compartiment 15 contient le second propulseur G2, la paroi de la poche 12 ou du piston 13 étant imperméable au produit et aux propulseurs.

[0039] Le premier propulseur G1 est choisi par exemple parmi les hydrocarbures ou le diméthyléther, seuls ou mélangés. Le second propulseur G2 est par exemple un gaz comprimé ou liquéfié, par exemple un mélange de propane, de butane et d'isobutane, ou de l'air comprimé.

[0040] La poche 12 peut être réalisée en un complexe métallo-plastique, notamment un complexe aluminoplastique comprenant une couche d'aluminium et au moins une couche d'un matériau thermoplastique, notamment un polyamide, un polyéthylène, un polyéthylène téréphtalate ou un polypropylène.

[0041] Le récipient 4 est prévu pour être monté de manière amovible dans le corps 3. Il est par exemple prévu d'être retenu par encliquetage avec des moyens complémentaires prévus sur le pourtour intérieur d'une cavité 17 formée dans le corps 3, Figure 4. En particulier, ces moyens coopèrent avec un bourrelet annulaire formé par la zone de jonction entre la coupelle 10 et l'enceinte externe 8. En variante, le récipient 4 peut être retenu par serrage dans la cavité 17

[0042] Par ailleurs, comme représenté Figure 1, l'organe de massage 2 forme un embout 40 amovible, et par exemple prévu pour être retenu par des moyens de type à baïonnette sur un support 41. Alternativement l'embout 40 peut être retenu par encliquetage sur le support 41. En variante, Figures 4 à 9, l'embout 40 est solidaire, par exemple collé ou thermosoudé, au support 41.

[0043] L'organe de massage 2 est prévu pour être entraîné en rotation relativement au corps 3 par des moyens d'entraînement prévus à l'intérieur du corps 3, Figure 4. Les moyens d'entraînement comportent un moteur 19 alimenté par une batterie 20, la batterie 20 étant relié à un organe de commande 21 permettant de sélectivement autoriser ou non l'alimentation du moteur 19, et par conséquent l'entraînement en rotation ou non de l'organe de massage 2. La batterie 20 est formée par au moins une pile, voire plusieurs piles, logée dans le corps 3. Alternativement, le moteur 19 peut être alimenté par le secteur.

[0044] L'organe de commande 21 peut permettre de sélectionner différentes vitesses de rotation du moteur 19. L'organe de commande 21 peut former un commutateur électrique muni d'un sélecteur rotatif dépassant du corps 3 de manière à par exemple pouvoir être placé dans respectivement trois positions : une première position éteinte, une seconde position correspondant à une première vitesse de rotation, et une troisième position correspondant à une seconde vitesse de rotation. Notamment, l'organe de commande 21 peut comporter un

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variateur continu de la vitesse de rotation du moteur 19 pour un ajustage plus fin du massage désiré, et ce notamment en fonction de l'organe de massage 2 mis en place et ou de la surface de peau à masser.

[0045] Le moteur 19 entraîne en rotation une roue dentée 22 coopérant avec un ensemble d'engrenages 23 transmettant le mouvement à l'organe de massage 2. En effet, l'organe de massage 2, et plus particulièrement le support 41, comporte une surface dentée 24 coopérant avec l'un des engrenages du système d'engrenages 23. L'ensemble d'engrenages 23 forme un moyen réducteur de la vitesse de rotation de l'organe de massage, ce réducteur 23 permettant d'augmenter le couple.

[0046] La surface dentée 24 est annulaire et traversée en son centre par le canal 5. Le canal 5 est en partie formé à l'intérieur d'un tube 25, disposé dans le corps 3, dont une première extrémité 26 est raccordée à l'extrémité de la tige de valve 11 par laquelle le produit P est distribué. A une seconde extrémité 27, le tube 25 est en engagement avec une jupe de montage 28 de l'organe de massage 2, et plus particulièrement du support 41. Cette jupe de montage 28 est intérieure et concentrique à la surface dentée 24, elle est en communication fluidique avec l'orifice de sortie 7. En effet, la jupe de montage 28 débouche dans un espace intérieur 29 de l'organe de massage 2, cet espace intérieur 29 étant par exemple formé entre le support 41 et l'embout 40, de telle sorte que la surface d'application 6 est traversée par au moins un canal d'alimentation 30 reliant l'espace intérieur 29 à l'orifice de sortie 7. Comme représenté Figure 4, la surface d'application 6 est traversée par une pluralité de canaux d'alimentation tels que 30 débouchant d'une part dans l'espace intérieur 29 et d'autre part par autant d'orifices de sortie tels que 7.

[0047] L'axe X autour duquel l'organe de massage 2 est entraîné en rotation correspond de préférence à l'axe de symétrie de révolution du pourtour intérieur de la jupe de montage 28 et du pourtour extérieur de la portion du tube 25 située entre les extrémités 26 et 27. Entre les extrémités 26 et 27, le canal 5 forme une première section s'allongeant selon l'axe de rotation X.

[0048] Lorsque l'organe de massage 2 est entraîné en rotation, la jupe de montage 28 est entraînée en rotation relativement au tube 25 qui reste immobile en rotation relativement au corps 3. A cet effet, il peut être prévu un jonc annulaire entre le tube 25 et la jupe 28 pour maintenir l'étanchéité de cette connexion même lorsque l'un est entraîné en rotation relativement à l'autre.

[0049] L'ensemble 1 est prévu pour que la distribution de produit P puisse être obtenue indépendamment de l'entraînement en rotation de l'organe de massage 2. A cet effet, et de préférence à proximité de l'organe de commande 21, l'ensemble 1 comporte un organe d'actionnement 33 de la valve 9 dépassant du pourtour extérieur du corps 3. Cet organe d'actionnement 33 dépasse du corps 3 et peut être déplacé relativement au corps 3 de manière à exercer une contrainte sur la tige de valve 11 et ainsi permettre la distribution de produit P dans le canal 5.

[0050] En l'occurrence, selon le mode de réalisation présenté Figure 4, la valve 9 peut être ouverte par basculement de la tige de valve 11 relativement à un axe longitudinal du corps 16 de ladite valve 9, cet axe longitudinal se superposant de préférence à un axe d'allongement principal Y du récipient 4, et le récipient 4 étant monté dans le corps de telle sorte que l'axe d'allongement principal Y forme un angle avec l'axe de rotation X.

[0051] Le tube 25 est donc monté sur la tige 11 de telle sorte qu'ils forment ensemble un angle, en l'occurrence de 90°. Ainsi l'actionnement de la tige 11 peut être obtenu par simple translation du tube 25 le long de l'axe X. Cette translation peut être obtenue de manière directe, comme cela est représenté, dans la mesure où le tube 25 comporte une portion s'étendant le long de l'axe X et débouchant hors du corps 3, cette portion d'axe X s'étendant à l'opposé de la portion du tube dans laquelle est en partie formé le canal 5. Une extrémité 31 de la portion s'étendant le long de l'axe X dépassant du corps 3 forme alors l'organe d'actionnement 33.

[0052] Alternativement, on pourrait prévoir un système, notamment avec bras de levier pour déplacer la tige 11 relativement à l'axe Y, ce bras de levier étant disposé dans le corps 3 entre l'organe d'actionnement 31 et la tige 11.

[0053] Selon une variante de réalisation d'un ensemble selon la figure 4, présenté Figure 5, dans lequel l'ouverture de la valve est obtenue par un enfoncement de la tige de valve 11 relativement au corps de valve 16, un bouton poussoir 33 est prévu sur le pourtour extérieur du corps 3, disposé dans l'axe d'allongement Y du récipient 4. Ainsi l'actionnement de la valve 9 est obtenu par enfoncement du bouton poussoir 33 dans le corps 3 le long de l'axe Y. Le bouton poussoir 33 s'étend à l'intérieur du corps de manière à pouvoir transmettre son enfoncement à respectivement l'extrémité 26 du tube 25 et de facto à la tige de valve 11 à l'intérieur dudit corps 3. Or le récipient 4 étant retenu à position axiale fixe dans le corps 3, lorsque le bouton poussoir 33 est enfoncé, la valve 9 libère alors du produit dans le canal 5.

[0054] Selon une autre variante de réalisation d'un ensemble 1 selon l'invention, par exemple comme représenté Figure 6, les axes X et Y peuvent être parallèles entre eux. Le récipient 4 est alors retenu au niveau d'une extrémité du corps axialement opposée à l'extrémité au niveau de laquelle est monté l'organe de massage 2. Dans ce cas, l'actionnement de la valve 9 est obtenu par enfoncement, et cet enfoncement est notamment obtenu par déplacement relatif du récipient 4 relativement au corps 3, dans la mesure où le tube 25 est ici à position axiale fixe à l'intérieur du corps 3.

[0055] Pour obtenir la distribution de produit avec un tel ensemble 1, l'utilisateur saisit d'une main le pourtour extérieur du corps et de son autre main le pourtour extérieur du récipient 4 pour les rapprocher. Alternativement, l'utilisateur peut appliquer la surface d'application 6 contre une zone de peau à traiter, et ensuite en fonction

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de la zone de préhension qu'il choisit, il peut sélectivement distribuer du produit ou non. En effet, si l'utilisateur saisit le pourtour extérieur du corps 3 lorsque la surface d'application 6 est appliquée contre la peau, alors le récipient 4 reste à position axiale fixe relativement au corps 3, et la valve 9 reste fermée. Il n'y a pas de distribution de produit.

[0056] Par contre, si l'utilisateur saisit le pourtour extérieur du récipient 4, le récipient 4 peut être amené à s'enfoncer partiellement dans la cavité 17 du corps 3, et la valve 9 être amenée à s'ouvrir et autoriser alors la distribution de produit, en fonction de la force avec laquelle la surface d'application 6 de l'ensemble 1 est appliquée contre la peau.

[0057] Selon ce mode de réalisation, l'organe de commande 21 est prévu pour dépasser d'une paroi latérale 35 du corps 3.

[0058] Lorsque l'utilisateur saisit le récipient 4 au niveau de son pourtour extérieur dépassant du corps 3, et pour s'assurer que seul un mouvement de translation du récipient 4 relativement au corps 3 est permis, le récipient 4 est muni d'une collerette 36 pour guider et éventuellement limiter le déplacement du récipient 4 relativement au corps 3. Cette collerette 36 coopère avec la paroi latérale 35.

[0059] Selon une autre variante de réalisation d'un ensemble 1 selon l'invention représenté sur les Figures 8 et 9, l'axe de rotation X de l'organe de massage 2 est incliné par rapport à l'axe d'allongement principal Y du récipient 4. L'axe X est par exemple incliné d'un angle de 75° par rapport à l'axe Y.

[0060] Selon cette variante, le corps 3 comporte une enveloppe externe formant une coque qui recouvre en partie le récipient 4. L'organe d'actionnement 33 est cette fois une pièce distincte du corps. Il comporte une portion qui se trouve à l'extérieur du corps et qui peut être déplacée selon un axe perpendiculaire à l'axe de la tige de valve pour faire basculer la tige de valve 11. Pour actionner la tige de valve, l'organe d'actionnement 33 est monté sur la tige de valve 11 via une première jupe 50 qui vient s'emmancher sur la tige de valve 11. L'organe d'actionnement 33 comprend une seconde jupe 51, qui communique avec la première, et sur laquelle est emmanché le tube 25 raccordant la tige de valve 11 à l'organe de massage 2, afin de mettre en communication fluidique la tige de valve 11 avec le tube 25.

[0061] Selon ce mode de réalisation, le tube 25 est souple. Il peut alors contourner les différentes parties du dispositif contenues dans le corps 3.

[0062] En utilisant une pièce distincte du corps 3 pour former l'organe d'actionnement 33, on peut utiliser des matériaux différents pour former le corps et l'organe d'actionnement. Le produit s'écoulant à l'intérieur des deux jupes 50 et 51 de l'organe d'actionnement 33, celui-ci doit être réalisé en matériau compatible avec le produit. Par contre, le produit n'étant pas en contact avec le corps 3, il n'est pas nécessaire d'utiliser un matériau compatible avec le produit pour réaliser le corps, ce qui laisse plus de choix dans les matériaux utilisables. Le corps 3 peut par exemple être réalisé avec des matériaux qui contribuent à améliorer l'esthétique de l'ensemble.

[0063] Selon cette variante, le récipient qui est fixé sur le corps par encliquetage est également amovible.

[0064] Dans les différents modes de réalisation, Figures 4 à 9, la paroi latérale 35 du récipient 4 est de préférence cylindrique, le récipient 4 comportant un fond 37 axialement opposé, relativement à l'axe Y, à la coupelle 10 portant la valve 9. Le fond 37 est fermé. Il comporte éventuellement un bouchon 38 pour permettre la mise sous pression du second compartiment 15 lorsque le propulseur G2 doit être injecté via une seringue au travers de ce bouchon 38, Figures 2 et 3.

[0065] Dans les modes de réalisation de l'invention, le fond 37 et au moins une portion de la paroi latérale 35 dépasse du corps 3. En particulier, la portion de la paroi latérale 35 dépassant de ce corps 3 représente plus de la moitié de cette paroi latérale 35 relativement à l'axe d'allongement principal Y. Ainsi le fond 37 et la portion de la paroi latérale 35 forment un moyen de préhension de l'ensemble 1.

[0066] De plus, cette portion du récipient 4 visible, non masquée par le corps 3, lorsque le récipient 4 est monté dans le corps 3, permet à l'utilisateur de prendre connaissance des indications relatives au produit et ou aux procédés d'utilisation conseillés qui peuvent être inscrits sur cette paroi latérale 35.

[0067] En particulier un procédé de mise en oeuvre de cet ensemble 1 est utile à connaître lorsque l'ensemble 1 n'est pas totalement monté et prêt à l'emploi, notamment lorsqu'il est fourni sous forme de kit 100, Figure 7, avec éventuellement plusieurs organes de massage tels que 2 présentant des surfaces d'application différentes pouvant être montés sélectivement et de manière amovible sur le corps 3, et avec plusieurs récipients tels que 4 comportant des produits différents, ces récipients pouvant être montés sélectivement et de manière amovible sur le corps 3.

[0068] Le procédé pour appliquer un produit sur une surface du corps à traiter au moyen de cet ensemble 1 peut consister à sélectionner un organe de massage tel que 2 en fonction du produit contenu dans le récipient 4 qui aura été sélectionné, de monter cet organe de massage sur le corps 3, et d'amener la valve 9 en position ouverte de telle sorte que du produit est dispensé au niveau de la surface d'application 6 en vue d'être appliqué sur le corps. Ensuite, simultanément ou non à la distribution de produit, l'utilisateur peut masser la zone du corps où le produit a été appliqué avec l'organe de massage entraîné en rotation.

[0069] En particulier, les organes de massage aptes à être montés sur le corps 3 pour être entraînés en rotation, peuvent présenter des surfaces d'application telles que 6 différentes. Elles peuvent présenter des reliefs et/ou un état de surface permettant à l'utilisateur de masser et/ou de nettoyer la peau.

[0070] Les surfaces d'application telles que 6 des or-

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ganes de massage peuvent être réalisées à base de fibres naturelles ou synthétiques (tissé, non tissé, ouate), en éponge naturelle ou synthétique, ou encore à partir de plusieurs matériaux. Les organes de massage peuvent également être imprégnés d'un deuxième produit, par exemple ayant des propriétés antimicrobienne ou colorantes.

[0071] Dans le mode de réalisation représenté, la surface d'application 6 est formée à partir d'un bloc de mousse thermocomprimée éventuellement recouvert d'un textile, présentant des reliefs 39 disposés de manière régulière sur toute ladite face d'application 6. En particulier, ils sont disposés selon deux lignes concentriques L_e et L_i, circulaires, centrées sur l'axe de rotation X. Un tel organe d'application est par exemple obtenu conformément à l'enseignement des brevets FR-2 674 183 et FR-2 811 872. Certains des reliefs peuvent être traversés par un canal tel que 30. Notamment dans le cas où la surface d'application 6 est alimentée par plusieurs canaux tels que 30, ceux-ci peuvent aussi déboucher à distance des reliefs tels que 39. Les reliefs tels que 39 forment dans cet exemple des bossages en forme de dôme.

[0072] En particulier, la surface d'application 6 de l'organe de massage présente une symétrie sensiblement de révolution autour d'un axe de symétrie superposable à l'axe de rotation X.

[0073] En variante, la surface d'application 6 est munie d'un seul relief tel que 39a excentré relativement à l'axe de rotation X lorsque l'organe de massage 2 est monté sur le corps 3, Figure 10a.

[0074] En variante, la surface d'application 6 comporte une pluralité de reliefs tels que 39 de différentes formes et de différentes hauteurs, comme représenté Figure 10b.

[0075] Figure 10c, la surface d'application 6 peut être présentée sur l'embout 40 amovible relativement au support 41 apte à être retenu sur le corps 3, le support 41 et l'embout 40 formant ensemble l'organe de massage 2 pouvant être entraîné en rotation. Des embouts tels que 40 aptes à être montés sur le support 41 peuvent présenter des surfaces d'application respectivement différentes. Dans cet exemple, l'embout 40 comporte une gorge 42 apte à coopérer par encliquetage avec une rainure 43 sur un pourtour intérieur d'une jupe 44 de ce support 41. La jupe 44 s'étend dans une direction opposée à la jupe de montage 28.

[0076] Cet embout 40 peut être réalisé en mousse, ou dans une matière élastiquement déformable, notamment un élastomère, par exemple un PVC, PU, EVA, Nitrile, Silicone, Butyle sis SEBS, EPDM, etc.

[0077] De préférence, la surface d'application 6 comporte une portion élastiquement déformable, par exemple réalisée en élastomère, pour conférer un confort lors de l'application sur la peau. Elle peut être au moins en partie réalisée à partir de matière élastiquement déformable telle que le PVC, PU, EVA, Nitrile, Silicone, Butyle sis SEBS, EPDM, etc.

[0078] En variante, Figure 10d, l'organe de massage 2 peut comporter une structure retenant des billes 45 libres en rotation chacune respectivement dans des logements 46 de la surface d'application 6 de l'organe de massage 2.

[0079] Alternativement, Figure 10e, la surface d'application 6 peut présenter une touffe de poils 47 destinée à être appliquée contre la zone de peau à masser. L'organe de massage peut alors être utilisé comme blaireau pour former de la mousse avec le produit étalé sur le visage, préalablement au rasage.

[0080] En variante, lorsque le massage a pour objet de nettoyer la peau en profondeur, la surface d'application 6 peut être abrasive, par exemple obtenue par inclusion de particules d'alumine dans une résine ou une mousse.

[0081] Dans toute la description, l'expression « comportant un » doit être considérée comme étant synonyme de « comportant au moins un », sauf si le contraire est spécifié.

Revendications

1. Ensemble (1) de massage et ou de distribution d'un produit (P) comportant

   - un récipient (4) contenant ledit produit, notamment un produit cosmétique,
   - un corps (3) sur lequel est monté le récipient,
   - un organe de massage (2) monté sur ce corps,
   - un moyen d'entraînement (19) en rotation autour d'un axe de rotation (X) dudit organe de massage relativement au corps, et
   - un conduit (5) en communication fluidique entre une sortie (11) du récipient et l'organe de massage,

   caractérisé en ce que le récipient est configuré pour le conditionnement et la distribution d'un produit sous pression, le conduit étant relié à une sortie d'une valve de distribution (9) du récipient.

2. Ensemble selon la revendication 1 **caractérisé en ce que** le récipient est agencé relativement au corps de manière à former un organe de préhension.

3. Ensemble selon l'une quelconque des revendications 1 ou 2 **caractérisé en ce qu'**un organe d'actionnement (33, 34) de la valve dépasse du pourtour extérieur du corps.

4. Ensemble selon la revendication 3 **caractérisé en ce que** l'organe d'actionnement comporte un bras de levier.

5. Ensemble selon l'une quelconque des revendications 1 à 4 **caractérisé en ce qu'**il comporte des

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moyens d'actionnement de la valve par enfoncement de la tige de valve (11).

6. Ensemble selon l'une quelconque des revendications 1 à 5 **caractérisé en ce qu'**il comporte des moyens d'actionnement de la valve par inclinaison de la tige de valve (11).

7. Ensemble selon l'une quelconque des revendications 1 à 6 **caractérisé en ce que** le conduit comporte une section (26) parallèle à l'axe de rotation.

8. Ensemble selon la revendication 7, **caractérisé en ce que** le conduit comporte une section (26) d'axe sensiblement confondu avec l'axe de rotation.

9. Ensemble selon l'une quelconque des revendications 1 à 8 **caractérisé en ce que** l'axe de rotation forme un angle avec un axe d'allongement principal (Y) du récipient.

10. Ensemble selon l'une quelconque des revendications 1 à 8 **caractérisé en ce que** le récipient comporte un axe d'allongement principal (Y) parallèle à l'axe de rotation.

11. Ensemble selon l'une quelconque des revendications 1 à 8 ou 10 **caractérisé en ce que** le récipient est monté sur le corps au niveau d'une première extrémité axialement opposée, relativement à l'axe de rotation de l'organe de massage, à une seconde extrémité dudit corps où est retenu l'organe de massage, de telle sorte que le récipient comporte un axe allongé entre ladite sortie et un fond (37) du récipient, cet axe étant parallèle à l'axe de rotation.

12. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** le récipient est monté de manière amovible sur le corps.

13. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** le récipient est retenu par encliquetage dans une cavité (17) du corps.

14. Ensemble selon l'une quelconque des revendications 1 à 13 **caractérisé en ce que** le récipient comporte une paroi délimitant à l'intérieur de celui-ci deux compartiments (14, 15) de volume variable, un premier compartiment en communication (14) avec la valve et contenant le produit à pulvériser et un second compartiment (15) contenant un propulseur (G2), la paroi étant imperméable au produit et au propulseur.

15. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage est monté de manière amovible sur le corps.

16. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage présente une surface d'application munie d'au moins un relief (39), notamment un relief excentré.

17. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** la surface d'application comporte une pluralité de reliefs de différentes formes et de différentes hauteurs.

18. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte un embout (40) amovible présentant ladite surface d'application.

19. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte un embout en mousse destiné à être appliqué contre la zone de peau à masser.

20. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte une touffe de poils destinée à être appliquée contre la zone de peau à masser.

21. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte une structure retenant des billes (45) libres en rotation dans des logements (46) de l'organe de massage.

22. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte une portion élastiquement déformable, par exemple réalisée en élastomère.

23. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'organe de massage comporte un surface d'application abrasive, par exemple obtenu par inclusion de particules d'alumine dans une résine.

24. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** la surface d'application de l'organe de massage présente une symétrie sensiblement de révolution autour d'un axe de symétrie, la surface d'application étant entraînée en rotation par le moyen d'entraînement autour dudit axe de symétrie.

25. Ensemble selon l'une quelconque des revendications précédentes **caractérisé en ce que** le moyen d'entraînement comporte un moteur (19).

26. Ensemble selon la revendication 25 **caractérisé en**

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ce que le moteur est alimenté par une batterie (20), par exemple alimenté par une pile logée dans le corps, ou par le secteur, commandé par un organe de commande (21).

27. Ensemble selon la revendication 25 ou 26 **caractérisé en ce que** le moteur peut entraîner l'organe d'application en rotation indirectement par l'intermédiaire d'organes de transmission (23) de mouvement.

28. Organe de massage (2) destiné à être monté de manière rotative et amovible sur un corps d'un ensemble tel que défini dans l'une quelconque des revendications 1 à 27.

29. Kit (100) comportant :

- un ensemble tel que défini dans l'une quelconque des revendications 1 à 27,
- une pluralité de récipients, ces derniers étant agencés pour être montés sélectivement et de manière amovible sur le corps.

30. Kit selon la revendication précédente, **caractérisé par le fait que** les récipients contiennent des produits différents.

31. Kit selon la revendication 29 ou 30, **caractérisé par le fait qu'**il comporte une pluralité d'organes de massage, notamment présentant des reliefs différents, ces derniers étant agencés pour être montés sélectivement et de manière amovible sur le corps.

32. Procédé cosmétique et non thérapeutique pour appliquer un produit sur une surface (S) du corps, **caractérisé par le fait qu'**il comporte les étapes suivantes :

- fournir un kit (100) selon l'une des revendications 29 à 31,
- sélectionner un récipient,
- monter le récipient sélectionné sur le corps de l'ensemble,
- appliquer du produit sur le corps
- masser la zone du corps où le produit a été appliqué avec l'organe de massage entraîné en rotation.

33. Procédé selon la revendication 32 **caractérisé en ce qu'**il comporte l'étape de sélectionner un organe de massage en fonction du récipient sélectionné.

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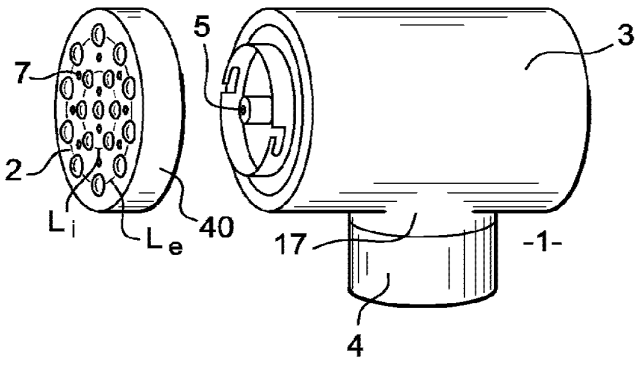


Fig. 1

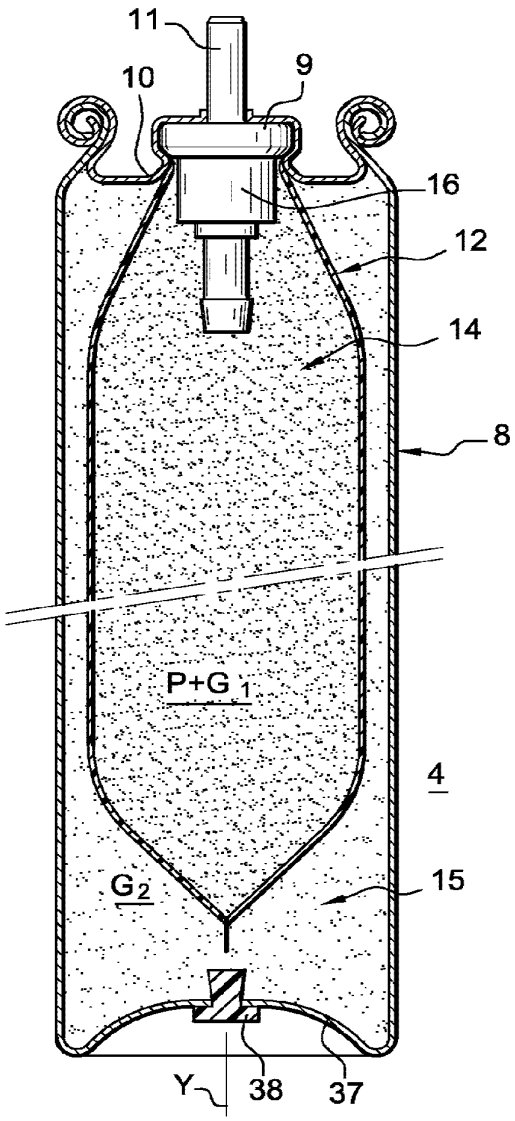


Fig. 2

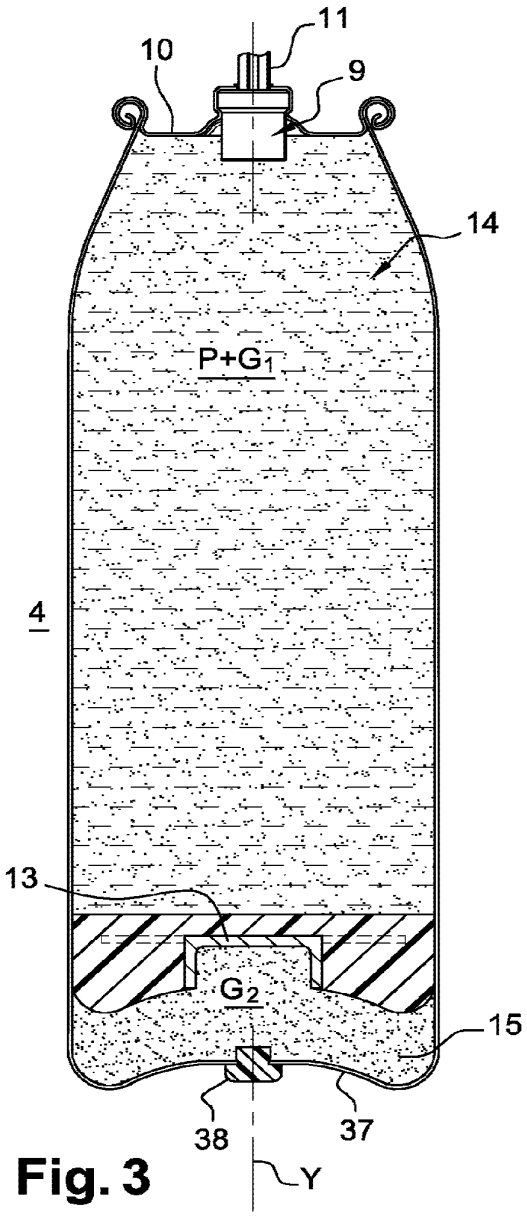


Fig. 3

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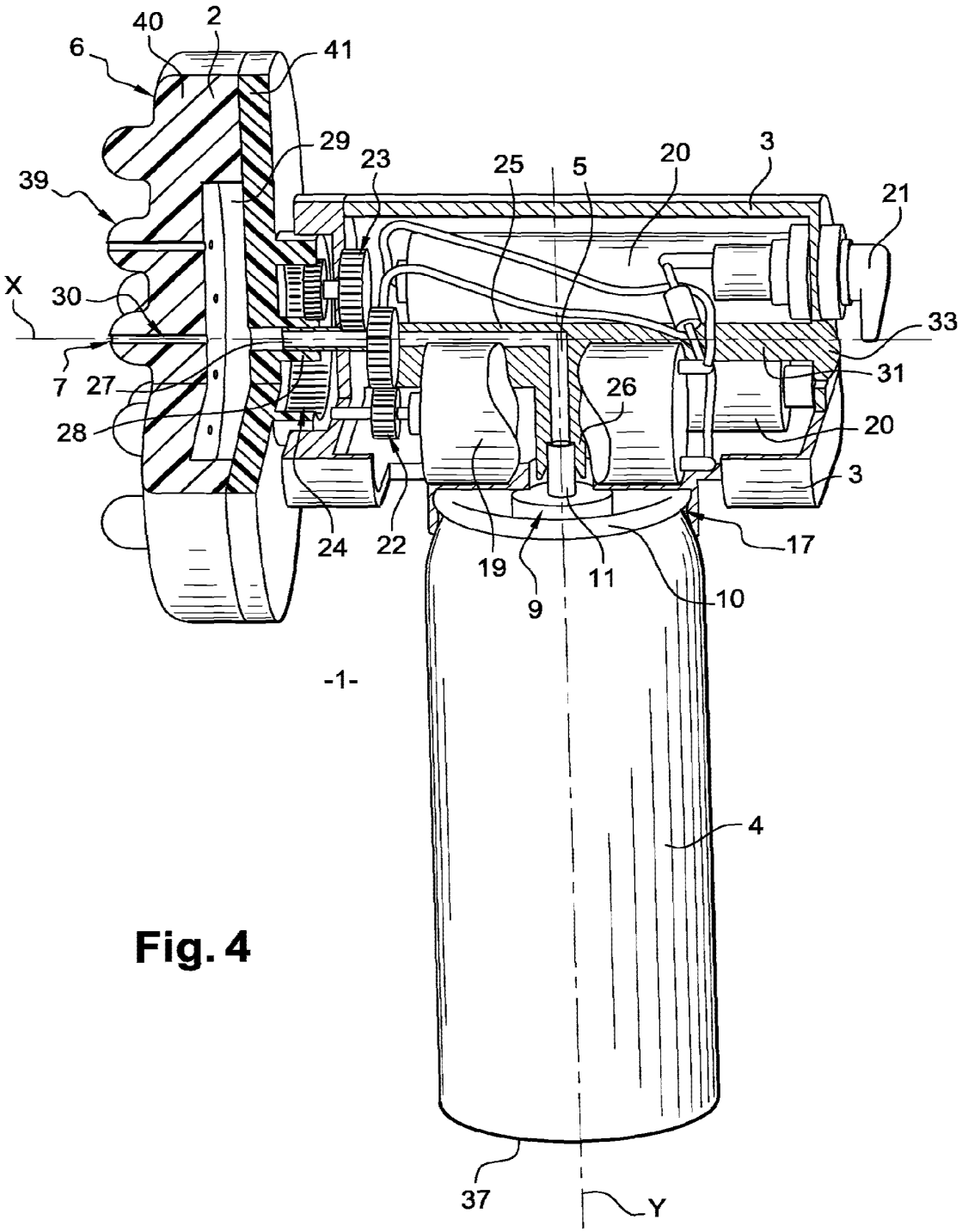


Fig. 4

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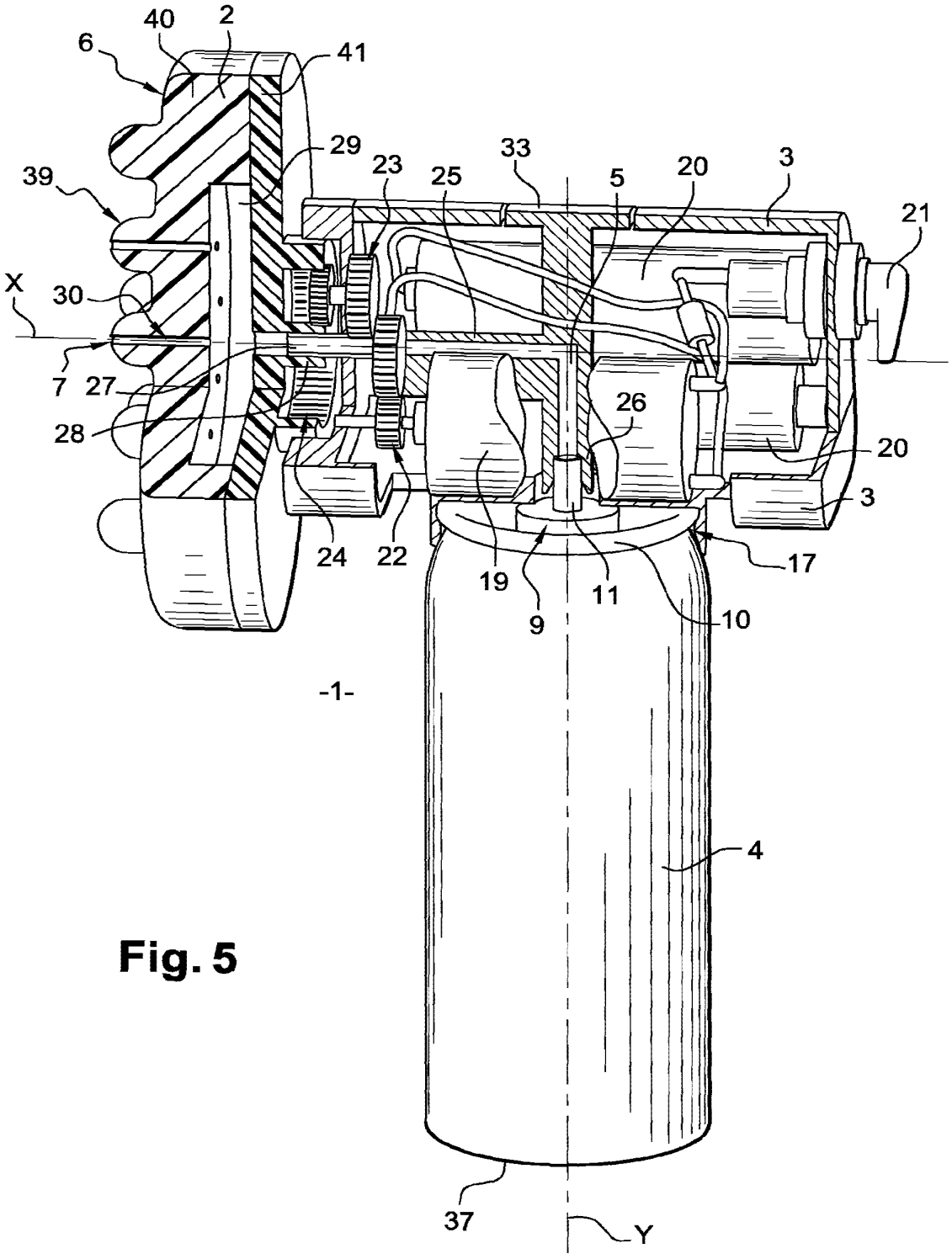


Fig. 5

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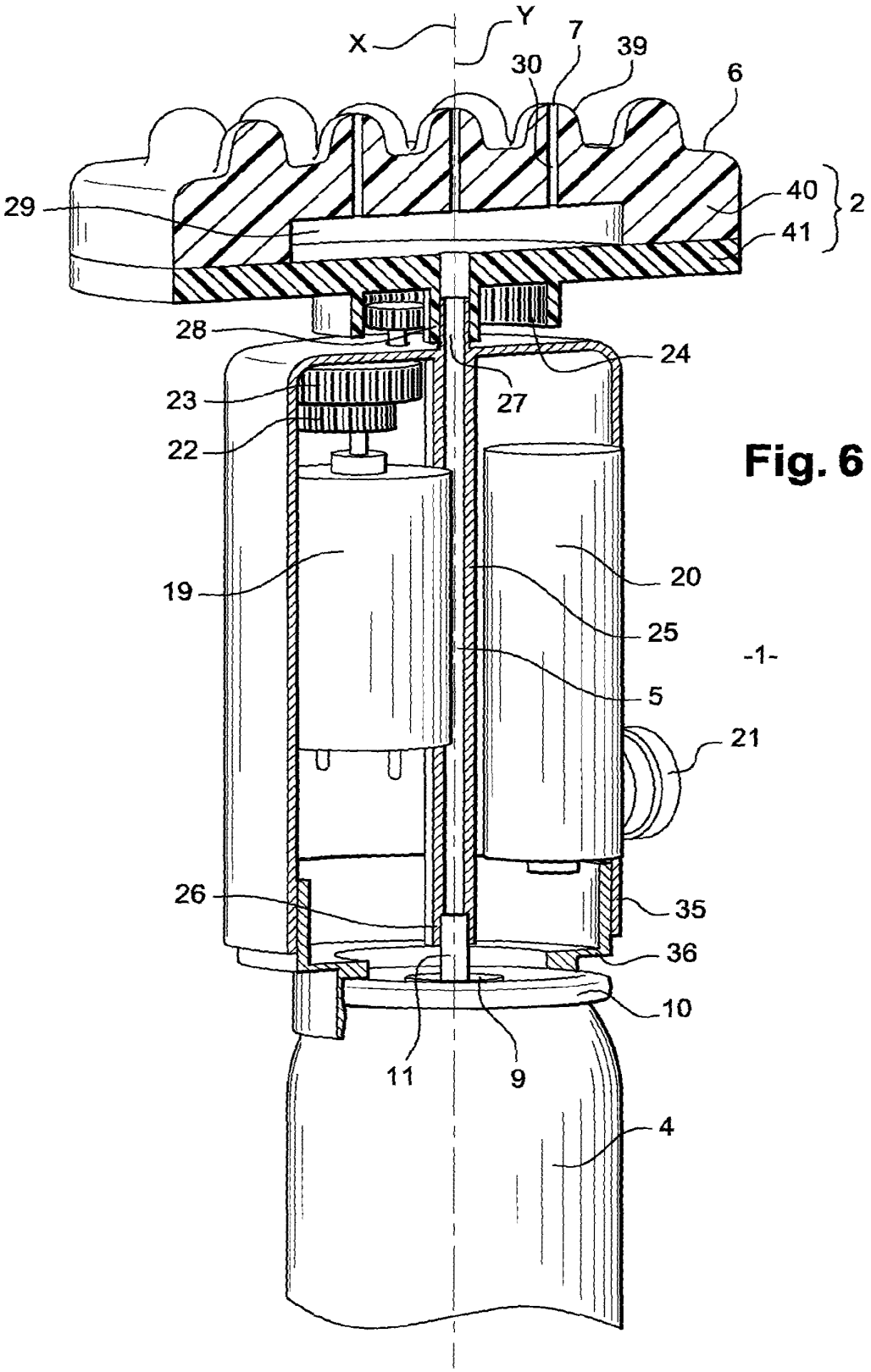


Fig. 6

-1-

Petitioner Therabody Ex-1004, 1516

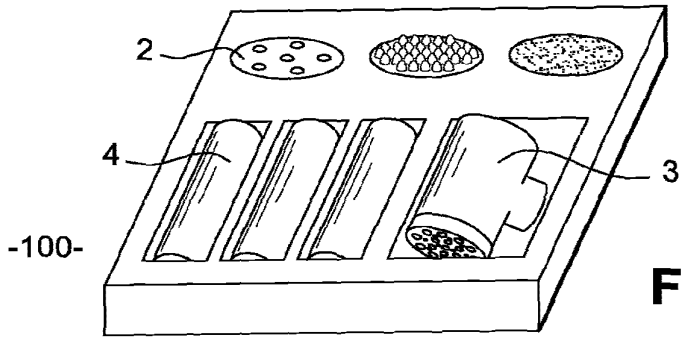


Fig. 7

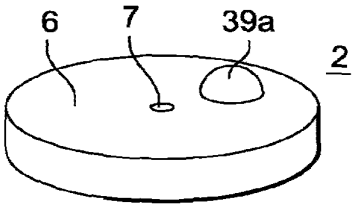


Fig. 10a

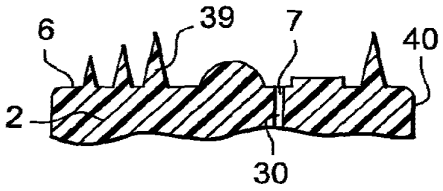


Fig. 10b

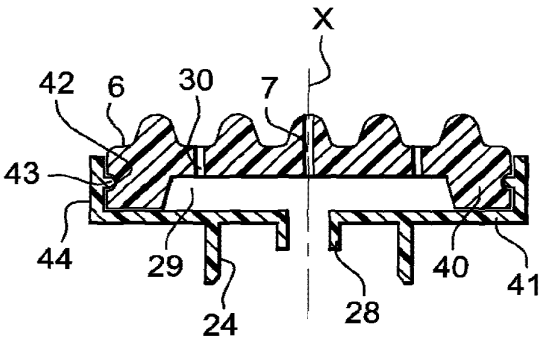


Fig. 10c

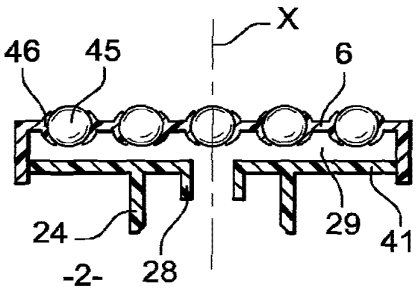


Fig. 10d

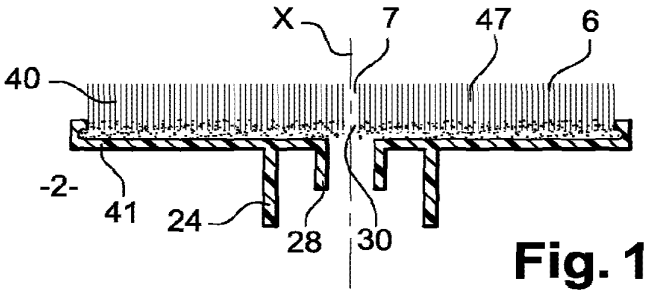


Fig. 10e

Petitioner Therabody Ex-1004, 1517

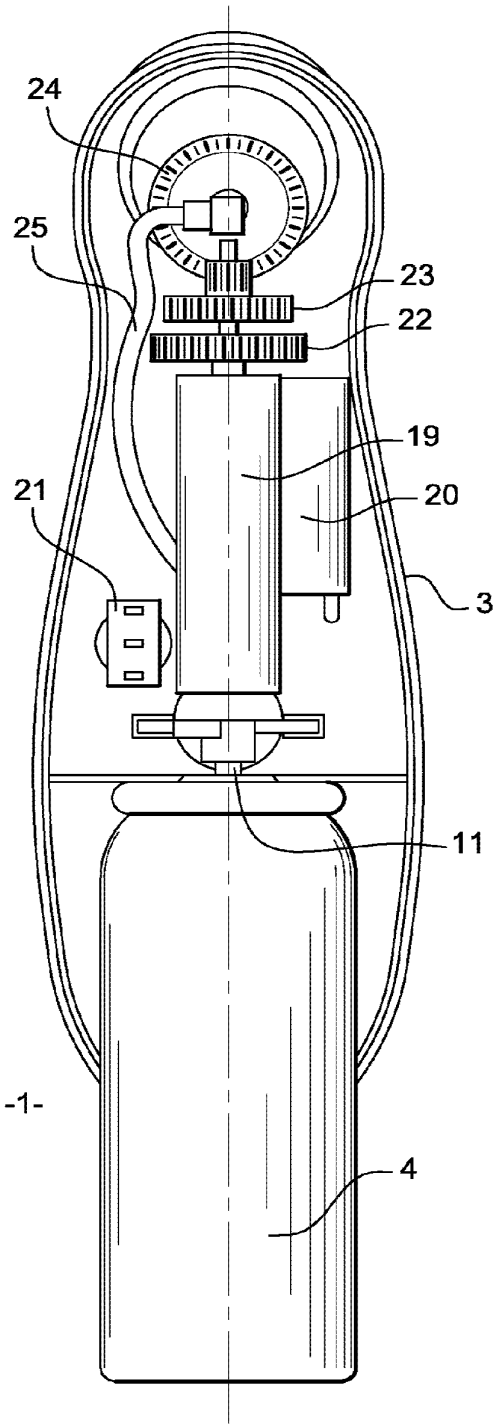


Fig. 8

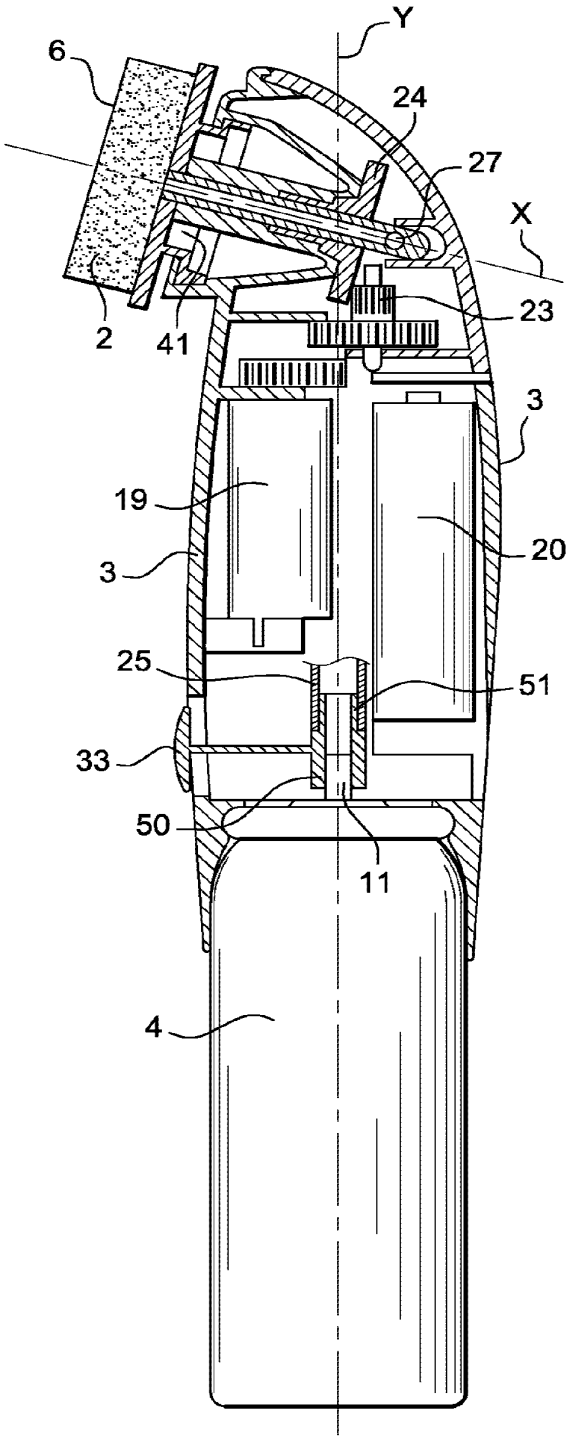


Fig. 9

Petitioner Therabody Ex-1004, 1518

Office européen des brevets

RAPPORT DE RECHERCHE EUROPEENNE

Numéro de la demande
EP 06 11 4226

DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes	Revendication concernée	CLASSEMENT DE LA DEMANDE (IPC)
X	EP 0 216 038 A (TAVELLI, ANACLETO) 1 avril 1987 (1987-04-01) * le document en entier * -----	1,2,5,9, 12,13, 16,24,28	INV. A61H15/00 A61H7/00 A46B13/00 A46B11/00
Y A	US 5 725 483 A (PODOLSKY) 10 mars 1998 (1998-03-10) * le document en entier * -----	1,2, 28-33 7,9,15, 18,25-27	
Y A	US 4 492 223 A (BURKE) 8 janvier 1985 (1985-01-08) * colonne 2, ligne 6 - colonne 3, ligne 26; figures 1-6 * -----	1,2, 28-33 3,5,12	
D,A	FR 2 841 159 A (L'OREAL) 26 décembre 2003 (2003-12-26) * le document en entier * -----	14	
A	US 3 981 597 A (COHN ET AL) 21 septembre 1976 (1976-09-21) * le document en entier * -----	1-6,12, 13,15, 18,20	DOMAINES TECHNIQUES RECHERCHES (IPC) A61H A46B
A	WO 94/04116 A (MEHL, THOMAS, L) 3 mars 1994 (1994-03-03) * page 15, ligne 36 - page 20, ligne 20; figure 11 * * page 23, ligne 19 - page 24, ligne 28; figures 21-31 * -----	1,9,12, 15,16, 18,21, 23-33	B65D

Le présent rapport a été établi pour toutes les revendications

Lieu de la recherche	Date d'achèvement de la recherche	Examinateur
La Haye	6 octobre 2006	Levert, Corinne

CATEGORIE DES DOCUMENTS CITES

X : particulièrement pertinent à lui seul
Y : particulièrement pertinent en combinaison avec un autre document de la même catégorie
A : arrière-plan technologique
O : divulgation non-écrite
P : document intercalaire

T : théorie ou principe à la base de l'invention
E : document de brevet antérieur, mais publié à la date de dépôt ou après cette date
D : cité dans la demande
L : cité pour d'autres raisons

& : membre de la même famille, document correspondant

4

EPO FORM 1503 03.82 (P04C02)

Petitioner Therabody Ex-1004, 1519

ANNEXE AU RAPPORT DE RECHERCHE EUROPEENNE RELATIF A LA DEMANDE DE BREVET EUROPEEN NO. EP 06 11 4226

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche européenne visé ci-dessus.
Lesdits members sont contenus au fichier informatique de l'Office européen des brevets à la date du
Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office européen des brevets.

06-10-2006

Document brevet cité au rapport de recherche	Date de publication	Membre(s) de la famille de brevet(s)	Date de publication
EP 0216038 A	01-04-1987	IT 209289 Z2	20-09-1988
US 5725483 A	10-03-1998	AUCUN	
US 4492223 A	08-01-1985	AUCUN	
FR 2841159 A	26-12-2003	AUCUN	
US 3981597 A	21-09-1976	AUCUN	
WO 9404116 A	03-03-1994	AU 5008293 A	15-03-1994
		CA 2142813 A1	03-03-1994
		EP 0654987 A1	31-05-1995
		JP 8501957 T	05-03-1996

EPO FORM P0460

Pour tout renseignement concernant cette annexe : voir Journal Officiel de l'Office européen des brevets, No.12/82

Petitioner Therabody Ex-1004, 1520

RÉFÉRENCES CITÉES DANS LA DESCRIPTION

Cette liste de références citées par le demandeur vise uniquement à aider le lecteur et ne fait pas partie du document de brevet européen. Même si le plus grand soin a été accordé à sa conception, des erreurs ou des omissions ne peuvent être exclues et l'OEB décline toute responsabilité à cet égard.

Documents brevets cités dans la description

- US 3994290 A **[0003]**
- US 3932909 A **[0004]**
- FR 2841159 **[0032]**
- FR 2674183 **[0071]**
- FR 2811872 **[0071]**

Petitioner Therabody Ex-1004, 1521

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference HYP-001WO	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2021/041073	International filing date *(day/month/year)* 09 July 2021 (09.07.2021)	Priority date *(day/month/year)* 09 July 2020 (09.07.2020)
International Patent Classification (IPC) or national classification and IPC See relevant information in Form PCT/ISA/237		
Applicant HYPER ICE, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
☒	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 10 January 2023 (10.01.2023)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Fiona Doherty e-mail pct.team4@wipo.int

Form PCT/IB/373 (revised January 2020)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2021/041073	09.07.2021	09.07.2020

International Patent Classification (IPC) or both national classification and IPC
INV. A61H23/02 A63B24/00 G16H20/30 G16H40/63

Applicant
HYPER ICE, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Hauber, Jörg Telephone No. +49 89 2399-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Petitioner Therabody Ex-1004, 1524

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	7-9, 17-19
	No:	Claims	1-6, 10-16, 20
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

see form 210

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Petitioner Therabody Ex-1004, 1525

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 US 2015/366746 A1 (ASHBY DARREN [US]) 24 December 2015

D2 EP 3 320 888 A1 (FAMILY INADA CO LTD [JP]) 16 May 2018

D3 EP 3 235 484 A1 (BEIJING XIAOMI MOBILE SOFTWARE CO LTD [CN]) 25 October 2017

D4 EP 3 435 381 A1 (FAMILY INADA CO LTD [JP]) 30 January 2019

INDEPENDENT CLAIM 1

1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claim 1** is not new in the sense of Article 33(2) PCT.

1.1 Document **D1** discloses (the references in parentheses applying to this document):

> A method for recommending a recovery activity (see [0041, "The fitness tracking device may send to the massage device 100 details about the user's fitness activities. In response to receiving such information, the massage device generates a massage plan for massaging the user based on the fitness information.", emphasis added), the method comprising:
> receiving activity data of a user at a mobile application executing on a mobile device in communication with a server (see Fig. 1 with [0038], "the mobile device 102 is in communication with the fitness tracking device, which is located at a remote site. For example, the fitness tracking device may be a cloud based device that receives data about the user's workout or other activities from sensors that monitor the user's activity. For example, the user may wear an accelerometer that indicates the steps, arm movements, core movements, or other types of body movements of the user.";

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also see [0075], "the massage system 300 may be implemented on the massage device 100, the mobile device 102, the fitness tracking device"); and
providing a recommended recovery activity based on the activity data, wherein a primary goal of the recovery activity is to facilitate physiological recovery of the user (see [0041], "the massage device generates a massage plan for massaging the user based on the fitness information. For example, the massage plan may include massaging each of the muscle groups worked out by the user. Further, the massage plan may include the order in which the muscle groups are massaged. For example, if the fitness information indicates that the user has extensively worked out a particular muscle group more than the other muscles groups, that particular muscle group may be worked out first or another appropriate order.").

Being already known from **D1**, the subject-matter of independent **claim 1** does thus not fulfil the requirements of novelty in the sense of Article 33(2) PCT.

1.2 Also, document **D2** discloses (the references in parentheses applying to this document)

A method for recommending a recovery activity (see [0049]-[0056], "Determination of Basic Treatment in Massage System"), the method comprising:
receiving activity data of a user at a mobile application executing on a mobile device in communication with a server (see [0064], "Extraction of Activity Information", with Fig. 3, "terminal 40" and [0043]); and
providing a recommended recovery activity based on the activity data, wherein a primary goal of the recovery activity is to facilitate physiological recovery of the user (see [0064], "the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the activity information of the treatment target person in addition to the determination including a type or a site of the treatment.For example, in a case where the treatment target person carries out the standing work all day, the artificial intelligence unit 51 can determine that the legs are tired, and can recommend the treatment target person to receive the intensive treatment for the legs.").

Claim 1 thus also lacks novelty (Article 33(2) PCT) vis-à-vis this document.

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1.3 For the sake of completeness only it is noted that the subject-matter of independent claim 1 is also anticipated by **D3** (see **D3**, in particular, Figs. 1-4, 7 and 13 with corresponding text passages).

INDEPENDENT CLAIM 11

2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claim 11** is not new in the sense of Article 33(2) PCT.

The subject-matter of independent claim 11 (system) substantially corresponds to the subject-matter of independent claim 1 (method). Hence, the same objections under Article 33(2) PCT vis-à-vis **D1**-**D3** raised in items 1.1 -1.3 above apply, *mutatis mutandis*.

DEPENDENT CLAIMS

3 Dependent **claims 2-10**, and **12-20** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

3.1 The additional features proposed in **claims 2-6**, **10**, **12-16**, and **20** are also known from **D1** or **D2**:

- **Claims 2**, **12**:
  see **D1**, [0038], "the user may wear an accelerometer that indicates the steps, arm movements, core movements, or other types of body movements of the user.";
- **Claims 3**, **13**:
  see **D1**, [0039], "The sensors may be incorporated into any appropriate exercise machine or exercise accessory, such as a treadmill, weight bench, pull-up bar, exercise mat, exercise garment, pull cable machine, suspension strap, rowing machine, stepping machine, elliptical, stationary bicycle, self-propelling bicycle, ski, sliding disc, jump rope, weight stack, dumbbell, heart rate monitor, physiological parameter sensor, a mobile device carried or worn by the user, another type of exercise machine, another type of exercise accessory, or combinations thereof";

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- **Claims 4**, **5**, **14**, **15**:
  see **D1**, [0035], " the massage device may include vibrators that are positioned and arranged to vibrate the user's thighs, back, arms, legs, neck, head, other body parts, or combinations thereof.", in view of [0041].
- **Claims 6**, **16**:
  see **D2**, [0027], "at least any one of the massage machine and the server may cause a history storage unit to store a usage history including the treatment determined based on the voice information of the treatment target person.";
- **Claims 10**, **20**:
  see **D2**, Fig. 1, "artificial intelligence unit 51" with [0064], "the artificial intelligence unit 51 can determine the treatment suitable for the treatment target person by considering the activity information of the treatment target person in addition to the determination including a type or a site of the treatment."

Above mentioned dependent claims thus also lack novelty (Article 33(2) PCT).

3.2 The additional features proposed in **claims 7-9**, and **17-19**, respectively, are not considered inventive within the meaning of Article 33(3) PCT.

According to these claims, recovery data is compared to "an optimal recovery data", and respective comparison results are presented to the user (claim 7) or a trainer or healthcare professional (claims 8, 9).

It is not apparent which technical relevance this information bears. Merely presenting comparative data derived from unspecific "recovery data" and essentially undefined "optimal recovery data" does not seem to go beyond the mere presentation of (cognitive) information which does not contribute to the technical character of the claim. Claims 7-9 and 17-19 do thus not contain any features that would produce a technical effect serving a technical purpose, as would be required for an inventive step in the sense of Article 33(3) PCT.

Re Item VI

Certain documents cited

4 The following documents appears to have been published prior to the international filing date but later than the priority date claimed (P-document):

D5 US 2021/022955 A1 (WERSLAND JASON [US] ET AL) 28 January 2021

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Document **D5** relates to a percussive messaging system comprising an intelligence engine for recommending a protocol to be performed by a percussive massage device, e.g. based on received activity data (see **D5**, claims 1, 9, description pars. [0004]-[0010], [0106]-[0108], [0153]-[0178], Figs. 30, 31).

Since the claim to priority of the present application cannot be presently verified, this opinion has been established assuming that the relevant priority date is the claimed priority date. Hence, at present, **D5** does not appear to be relevant to the assessment of novelty and inventive step.

Re Item VII

Certain defects in the international application

5 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in **D1**-**D4** is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

6 The application does not meet the requirements of Article 6 PCT, because the technical subject-matter for which protection is sought by the claims is not properly defined.

6.1 For example, from the following wording of independent claim 1:

> "receiving activity data of a user at a mobile application executing on a mobile device in communication with a server; and
> providing a recommended recovery activity based on the activity data, wherein a primary goal of the recovery activity is to facilitate physiological recovery of the user."

the functional interplay of the only stated technical means "mobile device" and "server" and the method steps cannot be derived.

Is the activity data received from said server?

Which entity "provides" the "recommended recovery activity"?

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In fact, it is not excluded by the claim wording that the "providing" step relates to a (non-technical) mental act performed by a medical expert being presented with activity data. Evidently, such mental act would not make a technical contribution to the claim.

For the sake of this report, the method according to claim 1 (and claim 11, respectively) has been interpreted as being performed by a computer, as supported e.g. by the further features of dependent claim 10 (claim 20, respectively.

6.2 Even when assuming that all steps of the method as per claim 1 are performed by a computer, it is moreover noted that claim 1 (and claim 11 respectively) would not meet the requirements of Article 6 PCT because the matter for which protection is sought is not clearly defined.

Specifically, by merely stating:

> "providing a recommended recovery activity based on the activity data";

the claim attempts to define the subject-matter in terms of the **result to be achieved**, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result. It is not derivable from the claim how (unspecific) "activity data" is to be translated into a technically meaningful (undefined) "recovery activity", certainly not over the whole scope of the claim.

Petitioner Therabody Ex-1004, 1531

Espacenet

Bibliographic data: WO2020101725 (A1)

— 2020-05-22

BATTERY-POWERED PERCUSSIVE MASSAGE DEVICE WITH PRESSURE SENSOR

Inventor(s): MARTON ROBERT [US]; KATZ ANTHONY [US] ± (MARTON, Robert, ; KATZ, Anthony)

Applicant(s): HYPER ICE INC [US] ± (HYPER-ICE, INC)

Classification: **- international:** ***A61H23/00; A61H23/02***

- cooperative: **A61H1/008 (EP, US); A61H23/004 (EP, US); A61H23/006 (EP, CN, KR, US); A61H23/0254 (EP, CN, KR, US);** A61H2201/0153 (EP, US); A61H2201/0157 (EP, US); A61H2201/0188 (KR); A61H2201/1215 (KR); A61H2201/1436 (EP, US); A61H2201/1685 (KR); A61H2201/169 (KR); A61H2201/5002 (EP, US); A61H2201/501 (KR); A61H2201/5041 (KR); A61H2201/5043 (EP, KR, US); A61H2201/5058 (EP, CN, US); A61H2201/5071 (EP, KR, US); A61H2201/5097 (EP, CN, US); A61H2205/081 (CN)

Application number: WO2019US13769 20190116

Global Dossier

Petitioner Therabody Ex-1004, 1532

Priority number(s): US201862759968P 20181112 ; US201862760617P 20181113 ; US201862767260P 20181114 ; US201816201542 20181127

Also published as: AU2019204770 (B1) CA3049387 (A1) CA3049387 (C) CN111166643 (A) CN111166643 (B) more

Abstract of WO2020101725 (A1)

ABSTRACT A percussive massage device (100) includes an enclosure having a cylindrical bore that extends along a longitudinal axis (116). A motor has a rotatable shaft that rotates about a central axis perpendicular to the longitudinal axis. A crank (360) coupled to the shaft includes a pivot (370), which is offset from the central axis of the shaft. A reciprocation linkage has a first end coupled to the pivot of the crank. A piston has a first end coupled to a second end of the reciprocation linkage. The piston is constrained to move within a cylinder along the longitudinal axis of the cylindrical bore. An applicator head has a first end coupled to a second end of the piston and has a second end exposed outside the cylindrical bore for application to a person receiving treatment.

Petitioner Therabody Ex-1004, 1533

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 May 2020 (22.05.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/101725 A1

(51) International Patent Classification:
A61H 23/00 (2006.01) *A61H 23/02* (2006.01)

(21) International Application Number:
PCT/US2019/013769

(22) International Filing Date:
16 January 2019 (16.01.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

62/759,968	12 November 2018 (12.11.2018)	US
62/760,617	13 November 2018 (13.11.2018)	US
62/767,260	14 November 2018 (14.11.2018)	US
16/201,542	27 November 2018 (27.11.2018)	US

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) Title: BATTERY-POWERED PERCUSSIVE MASSAGE DEVICE WITH PRESSURE SENSOR

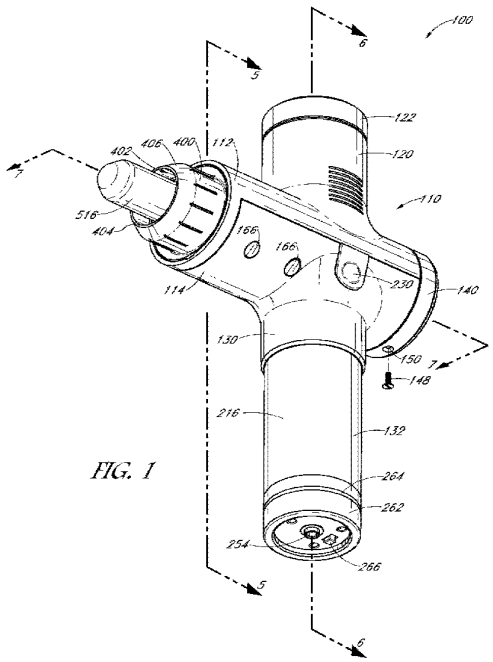


FIG. 1

(57) Abstract: ABSTRACT A percussive massage device (100) includes an enclosure having a cylindrical bore that extends along a longitudinal axis (116). A motor has a rotatable shaft that rotates about a central axis perpendicular to the longitudinal axis. A crank (360) coupled to the shaft includes a pivot (370), which is offset from the central axis of the shaft. A reciprocation linkage has a first end coupled to the pivot of the crank. A piston has a first end coupled to a second end of the reciprocation linkage. The piston is constrained to move within a cylinder along the longitudinal axis of the cylindrical bore. An applicator head has a first end coupled to a second end of the piston and has a second end exposed outside the cylindrical bore for application to a person receiving treatment.

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DESCRIPTION

BATTERY-POWERED PERCUSSIVE MASSAGE DEVICE WITH PRESSURE SENSOR

TECHNICAL FIELD

[0001] The present invention is in the field of therapeutic devices, and, more particularly, is in the field of devices that apply percussive massage to selected portions of a body.

BACKGROUND ART

[0002] Percussive massage, which is also referred to as tapotement, is the rapid, percussive tapping, slapping and cupping of an area of the human body. Percussive massage is used to more aggressively work and strengthen deep-tissue muscles. Percussive massage increases local blood circulation and can even help tone muscle areas. Percussive massage may be applied by a skilled massage therapist using rapid hand movements; however, the manual force applied to the body varies, and the massage therapist may tire before completing a sufficient treatment regime.

[0003] Percussive massage may also be applied by electromechanical percussive massage devices (percussive applicators), which are commercially available. Such percussive applicators may include, for example, an electric motor coupled to drive a reciprocating piston within a cylinder. A variety of percussive heads may be attached to the piston to provide different percussive effects on selected areas of the body. Many of the known percussive applicators are expensive, large, relatively heavy, and tethered to an electrical power source. For example, some percussive applicators may require users to grip the applicators with both hands in order to control the applicators. Some percussive applicators are relatively noisy because of the conventional mechanisms used to convert the rotational energy of an electric motor to the reciprocating motion of the piston.

[0004] When a percussive massage device is applied to a body of a human, the efficacy of the therapy provided by the percussive massage device depends in part on the pressure applied to the body. For certain persons, a lower pressure provides a relaxing massage and a higher pressure may be uncomfortable. For other persons, a higher pressure is required to provide relief from sore muscles and other tissues. For many persons, the pressure needs to be varied from location to location on their bodies. Presently available percussive massage devices do not provide a way to determine the pressure applied to a body. Thus, achievement of a correct pressure for a particular location on the body of a specific person relies on the skill and the memory of the massage therapist applying a percussive massager. Even with the same percussive massage equipment, the same therapist is not likely to provide the appropriate pressures during two successive treatment.

DISCLOSURE OF THE INVENTION

[0005] A need exists for an electromechanical percussive massage device that provides a way to monitor the pressure applied to a location on a body.

[0006] One aspect of the embodiments disclosed herein is a percussive massage device that includes an enclosure having a cylindrical bore that extends along a longitudinal axis. A motor has a rotatable shaft that rotates about a central axis perpendicular to the longitudinal axis. A crank coupled to the shaft includes a pivot, which is offset from the central axis of the shaft. A reciprocation linkage has a first end coupled

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to the pivot of the crank. A piston has a first end coupled to a second end of the reciprocation linkage. The piston is constrained to move within a cylinder along the longitudinal axis of the cylindrical bore. An applicator head has a first end coupled to a second end of the piston and has a second end exposed outside the cylindrical bore for application to a person receiving treatment. A motor controller measures current applied to the motor and displays a pressure indicator responsive to the measured current.

[0007] Another aspect in accordance with embodiments disclosed herein is a battery-powered percussive massage device. The device includes an enclosure having a cylindrical bore. The cylindrical bore extends along a longitudinal axis. A piston is located within the cylindrical bore. The piston has a first end and a second end. The piston is constrained to move only along the longitudinal axis of the cylindrical bore. A motor is positioned within the enclosure. The motor has a rotatable shaft. The shaft has a central axis. The central axis of the shaft is perpendicular to the longitudinal axis of the cylindrical bore. A crank is coupled to the shaft. The crank includes a pivot, which is offset from the central axis of the shaft. A reciprocation linkage has a first end and a second end. The first end of the reciprocation linkage is coupled to the pivot of the crank. The second end of the reciprocation linkage is coupled to the first end of the piston. An applicator head has a first end and a second end. The first end of the applicator head is coupled to the second end of the piston. The second end of the applicator head is exposed outside the cylindrical bore. A battery assembly extends from the enclosure. The battery assembly provides DC electrical power. A motor controller within the enclosure receives DC electrical power from the battery assembly and selectively provides DC electrical power to the motor to control the speed of the motor. The motor controller further includes a sensor that senses a sensed magnitude of an electrical current flowing through the motor. The motor controller is responsive to the sensed magnitude of the electrical current to display a pressure indication signal corresponding to the sensed magnitude of the electrical current. A motor controller measures current applied to the motor and displays a pressure indicator responsive to the measured current.

[0008] In certain embodiments in accordance with this aspect, the applicator head is removably coupled to the piston.

[0009] In certain embodiments in accordance with this aspect, the reciprocation linkage is rigid; and the second end of the reciprocation linkage is pivotally coupled to the first end of the piston.

[0010] In certain embodiments in accordance with this aspect, the reciprocation linkage is flexible; and the second end of the reciprocation linkage is fixed to the first end of the piston.

[0011] In certain embodiments in accordance with this aspect, the motor controller includes a radio frequency transceiver, which selectively transmits a signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

[0012] In certain embodiments in accordance with this aspect, the motor controller determines an applied current magnitude by subtracting a no-load current measured at no load from the sensed current magnitude. The motor controller displays the pressure in response to the applied current magnitude.

[0013] Another aspect in accordance with embodiments disclosed herein is method of operating a percussive massage device. The method comprises rotating a shaft of an electric motor to rotate a pivot of a crank about a centerline of the shaft. The method further comprises coupling the pivot of the crank to a

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first end of an interconnection linkage of a reciprocation assembly The method further comprises coupling a second end of the interconnection linkage to a first end of a piston constrained to move along a longitudinal centerline The method further comprises coupling a second end of the piston to an applicator head wherein rotational movement of the pivot of the crank causes reciprocating longitudinal movement of the piston and the applicator head The method further comprises measuring an electrical current through the motor, the electrical current having a magnitude responsive to a pressure applied to the applicator head The method further comprises displaying one of a plurality of pressure indicators, each of the plurality of pressure indicators corresponding to a range of pressures, each range of pressures corresponding to a range of current magnitudes.

[0014] In certain embodiments in accordance with this aspect, the applicator head is removably coupled to the piston.

[0015] In certain embodiments in accordance with this aspect, the interconnection linkage is rigid; and the second end of the interconnection linkage is pivotally coupled to the first end of the piston.

[0016] In certain embodiments in accordance with this aspect, the interconnection linkage is flexible; and the second end of the interconnection linkage is fixed to the first end of the piston.

[0017] In certain embodiments in accordance with this aspect, the method further comprises selectively transmitting a radio frequency signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

[0018] In certain embodiments in accordance with this aspect, the method further comprises receiving the transmitted radio frequency signal by a remote communication device; storing speed and pressure along with a time when the radio frequency signal is received; and selectively retrieving the stored speed, pressure and time to display the speed, pressure and time on the remote communication device.

[0019] In certain embodiments in accordance with this aspect, the method further comprises determining a no-load current and subtracting the no-load current from a measured current to determine the current magnitude.

[0020] Another aspect in accordance with embodiments disclosed herein is percussive massage device. The device includes a source of electrical energy. An electric motor is configured to rotate about a shaft. A piston is constrained to move in a reciprocating motion within a cylinder. A linkage is configured to couple the electrical motor to the piston such that rotation of the electrical motor causes the piston to reciprocate. An applicator head is removably coupled to the piston. A motor controller is coupled to the source of electrical energy and is coupled to the motor. The motor controller is configured to selectively provide electrical energy to the motor cause the motor to rotate. The motor controller includes a pressure indication system. The pressure indication system is configured to measure a magnitude of a current flowing through the electric motor. The magnitude of the current is responsive to pressure applied against the applicator head. The magnitude of the current includes a plurality of current ranges. The pressure indication system includes a pressure indication display having a plurality of display states, wherein each display state corresponds to a respective one of the current ranges.

[0021] In certain embodiments in accordance with this aspect, the pressure indication display comprises a first display device, a second display device and a third display device. Each display device has a

respective non-illuminated state and a respective illuminated state. The first display device is in the respective non-illuminated state if the magnitude of the current is less than a first threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the first threshold magnitude. The second display device is in the respective non-illuminated state if the magnitude of the current is less than a second threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the second threshold magnitude. The third display device is in the respective non-illuminated state if the magnitude of the current is less than a third threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the third threshold magnitude.

[0022] In certain embodiments in accordance with this aspect, the motor controller includes a radio frequency transceiver, which selectively transmits a signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

[0023] In certain embodiments in accordance with this aspect, the linkage is rigid; and an end of the linkage is pivotally coupled to an end of the piston.

[0024] In certain embodiments in accordance with this aspect, the linkage is flexible; and an end of the linkage is fixed to an end of the piston.

[0025] In certain embodiments in accordance with this aspect, the motor controller reduces the magnitude of current as measured by a no-load current to produce a calibrated current. The calibrated current is used to determine the range of pressure.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0026] The foregoing aspects and other aspects of the disclosure are described in detail below in connection with the accompanying drawings in which:

[0027] FIG. 1 illustrates a bottom perspective view of a portable electromechanical percussive massage applicator that is battery powered and has a single hand grip, the view in FIG. 1 showing the bottom, the left side and the distal end (the end facing away from a user (not shown)) of the applicator;

[0028] FIG. 2 illustrates a top perspective view of the portable electromechanical percussive massage applicator of FIG. 1 showing the top, the right side and the proximal end (the end closest to a user (not shown)) of the applicator;

[0029] FIG. 3 illustrates an exploded perspective view of the portable electromechanical percussive massage applicator of FIG. 1, the view showing the upper housing, a motor assembly, a reciprocation assembly, and a lower housing with an attached battery assembly;

[0030] FIG. 4A illustrates an enlarged proximal end view of the combined upper and lower housing with the endcap of the housing detached and rotated to show the interlocking features, the view further showing a distal view of the main printed circuit board (PCB) positioned within the endcap of the housing;

[0031] FIG. 4B illustrates a proximal view of the main PCB isolated from the endcap of the housing;

[0032] FIG. 5 illustrates an elevational cross-sectional view of the portable electromechanical percussive massage applicator of FIGS. 1 and 2 taken along the line 5--5 in FIG. 1, the view taken through a set of the mated interconnecting features of the upper and lower housings;

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[0033] FIG. 6 illustrates an elevational cross-sectional view of the portable electromechanical percussive massage applicator of FIGS. 1 and 2 taken along the line 6--6 in FIG. 1, the view taken through the centerline of the shaft of the motor in the motor assembly of FIG. 3;

[0034] FIG. 7 illustrates an elevational cross-sectional view of the portable electromechanical percussive massage applicator of FIGS. 1 and 2 taken along the line 7--7 in FIG. 1, the view taken through the longitudinal centerline of the apparatus;

[0035] FIG. 8 illustrates a top plan view of the lower housing of FIG. 3;

[0036] FIG. 9 illustrates an exploded perspective view of the lower housing and the battery assembly of FIG. 3;

[0037] FIG. 10 illustrates an enlarged perspective view of the lower surface of the battery assembly printed circuit board;

[0038] FIG. 11A illustrates an exploded top perspective view of the motor assembly of FIG. 3, the view showing the upper surfaces of the elements of the motor assembly;

[0039] FIG. 11B illustrates an exploded bottom perspective view of the motor assembly of FIG. 3, the view of FIG. 11B similar to the view of FIG. 11A with the elements of the motor assembly rotated to show the lower surfaces of the elements;

[0040] FIG. 12 illustrates a bottom perspective view of the upper housing of the percussive massage applicator viewed from the proximal end;

[0041] FIG. 13 illustrates an exploded perspective view of the upper housing of the percussive massage applicator corresponding to the view of FIG. 12 showing the outer sleeve, the cylindrical mounting sleeve and the cylinder body;

[0042] FIG. 14 illustrates an exploded perspective view of the reciprocation assembly of FIG. 3, the reciprocation assembly including a crank bracket, a flexible interconnection linkage, a piston and a removably attachable application head;

[0043] FIG. 15 illustrates a cross-sectional view of the assembled reciprocation assembly taken along the line 15--15 in FIG. 3;

[0044] FIG. 16 illustrates a plan view of the percussive massage applicator of FIGS. 1 and 2 with the lower cover removed, the view looking upward toward the electrical motor of the applicator, the view in FIG. 16 showing the crank in the 12 o'clock position (as viewed in FIG. 16) such the end of the applicator head is extended a first distance from the housing of the applicator;

[0045] FIG. 17 illustrates a plan view of the portable electromechanical percussive massage applicator similar to the view of FIG. 16, the view in FIG. 17 showing the crank in the 3 o'clock position (as viewed in FIG. 17) such the applicator head is extended a second distance from the housing of the applicator, wherein the second distance is greater than the first distance of FIG. 16;

[0046] FIG. 18 illustrates a plan view of the portable electromechanical percussive massage applicator similar to the views of FIGS. 16 and 17, the view in FIG. 18 showing the crank in the 6 o'clock position (as viewed in FIG. 18) such the applicator head is extended a third distance from the housing of the applicator, wherein the third distance is greater than the second distance of FIG. 17;

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[0047] FIG. 19 illustrates a plan view of the portable electromechanical percussive massage applicator similar to the views of FIGS. 16, 17 and 18, the view in FIG. 19 showing the crank in the 9 o'clock position (as viewed in FIG. 19) such the applicator head is extended a fourth distance from the housing of the applicator, wherein the fourth distance is substantially equal to the second distance of FIG. 17;

[0048] FIG. 20 illustrates a left elevational view of the percussive massage applicator of FIGS. 1 and 2 with the bullet-shaped applicator removed and replaced with a spherical applicator;

[0049] FIG. 21 illustrates a left elevational view of the percussive massage applicator of FIGS. 1 and 2 with the bullet-shaped applicator removed and replaced with a convex applicator having a larger surface area than the bullet-shaped applicator;

[0050] FIG. 22 illustrates a left elevational view of the percussive massage applicator of FIGS. 1 and 2 with the bullet-shape applicator removed and replaced with a two-pronged applicator having two smaller distal surface areas;

[0051] FIG. 23 illustrates a schematic diagram of the battery controller circuit;

[0052] FIG. 24 illustrates a schematic diagram of the motor controller circuit;

[0053] FIG. 25 illustrates a plan view of a modified percussive massage applicator having a solid reciprocation linkage, the view shown with the lower cover removed, the view looking upward toward the electrical motor of the applicator, the components other than the motor assembly and the reciprocation assembly shown in phantom;

[0054] Fig. 26 illustrates an exploded perspective view of the solid reciprocation linkage of Fig. 25;

[0055] Fig. 27 illustrates a schematic diagram of a modified motor controller circuit similar to the motor controller circuit of Fig. 24, the modified motor controller circuit including a circuit to sense motor current corresponding to applied pressure and three additional light-emitting diodes (LEDs) to display ranges of pressure;

[0056] Fig. 28 illustrates a top perspective view of a modified portable electromechanical percussive massage applicator showing the top, the right side and the proximal end of the applicator, the proximal end including openings for the three additional LEDs;

[0057] Fig. 29 illustrates a proximal end view of a motor controller printed circuit board supporting the three additional LEDs;

[0058] Fig. 30 illustrates a flowchart of the operation of the motor controller of Fig. 27;

[0059] Fig. 31 illustrates a flowchart showing steps of the perform calibration procedure step of Fig. 30;

[0060] Fig. 32 illustrates a flowchart showing steps within the step of inputting voltages, determining current magnitudes and displaying pressure of Fig. 30;

[0061] Fig. 33 illustrates a flowchart similar to the flowchart of Fig. 32, which is modified to provide a cascading pressure display instead of the discrete pressure display provided by the flowchart of Fig. 32;

[0062] Fig. 34 illustrates a schematic diagram of a further modified motor controller circuit similar to the modified motor controller circuit of Fig. 27, the further modified motor controller circuit including a Bluetooth interface to communicate the status of the motor speed LEDs and the pressure range LEDs to a remote device;

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[0063] Fig. 35 illustrates a pictorial representation of the percussive massage device in communication with a remote device (e.g., a smartphone); and

[0064] Fig. 36 illustrates a flowchart of the communication between the remote device and the percussive massage device of Fig. 35 to display and store the motor speed and the pressure range on the remote device.

BEST MODE FOR CARRYING OUT THE INVENTION

[0065] As used throughout this specification, the words "upper," "lower," "longitudinal," "upward," "downward," "proximal," "distal," and other similar directional words are used with respect to the views being described. It should be understood that the percussive massage applicator described herein can be used in various orientations and is not limited to use in the orientations illustrated in the drawing figures.

[0066] A portable electromechanical percussive massage applicator ("percussive massage applicator") 100 is illustrated in FIGS. 1-22. As described below, the percussive massage applicator can be applied to different locations of body to apply percussion to the body to effect percussive treatment. The percussive massage applicator is operable with removably attachable applicator heads to vary the effect of the percussive strokes. The percussive massage applicator operates at a plurality of speeds (e.g., three speeds).

[0067] The portable electromechanical percussive massage applicator 100 includes a main body 110. The main body includes an upper body portion 112 and a lower body portion 114. The two body portions engage to form a generally cylindrical enclosure about a longitudinal axis 116 (FIG. 2).

[0068] A generally cylindrical motor enclosure 120 extends upward from the upper body portion 112. The motor enclosure is substantially perpendicular to the upper body portion. The motor enclosure is capped with a motor enclosure endcap 122. The motor enclosure and the upper body portion house a motor assembly 124 (FIG. 3). The upper body portion also supports a reciprocation assembly 126 (FIG .3), which is coupled to the motor assembly as described below.

[0069] A generally cylindrical battery assembly receiving enclosure 130 extends downward from the lower body portion 114 and is substantially perpendicular to the lower body portion. A battery assembly 132 extends from the battery assembly receiving enclosure.

[0070] A main body endcap 140 is positioned on a proximal end of the main body 110. In addition to other functions described below, the main body endcap also serves as a clamping mechanism to hold the respective proximal ends of the upper body portion 112 and the lower body portion 114 together. As illustrated in FIG. 4A, the endcap includes a plurality of protrusions 142 on an inner perimeter surface 144. The protrusions are positioned to engage a corresponding plurality of L-shaped notches 146 on the outer perimeters of the proximal ends of the upper body portion and the lower body portion. In the illustrated embodiment, two notches are formed on the upper body portion and two notches are formed on the lower body portion. The protrusions on the endcap are inserted into the proximal ends of the notches until seated against the distal ends of the notches. The endcap is then twisted by a few degrees (e.g., approximately 10 degrees) to lock the endcap to the two body portions. A screw 148 is then inserted through a bore 150 in the endcap to engage the lower body portion to prevent the endcap from rotating to unlock during normal use.

[0071] As shown in FIG. 4A, the main body endcap 140 houses a motor controller (main) printed circuit board (PCB) 160. As shown in FIG. 4B, the proximal side of the main PCB supports a central pushbutton

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switch 162. The operation of the switch is described below in connection with the electronic circuitry. As shown in FIG. 2, the switch is surrounded on the endcap by a plurality of bores 164, which extend perpendicularly from the outer (proximal) surface of the endcap to form a plurality of concentric rows of bores. Selected ones of the bores are through bores, which allow airflow through the endcap. Three of the bores above the switch have respective speed indication light-emitting diodes (LEDs) 166A, 166B, 166C positioned therein. The three LEDs extend from the proximal side of the PCB as shown in FIG. 4B. The three LEDs provide an indication of the operational state of the percussive massage applicator 100 as described in more detail below. Five of the bores located below the switch have respective battery charge state LEDs 168A, 168B, 168C, 168D, 168E positioned therein. The five LEDs also extend from the proximal side of the PCB as shown in FIG. 4B. The five LEDs provide an indication of the charge state of the battery when the battery assembly 132 is attached and is providing power to the percussive massage applicator. As shown in FIG. 4A, the distal side of the PCB supports a first plug 170, which includes three contact pins that are connectable to the battery assembly 132 as described below. The distal side of the PCB also supports a second plug 172, which includes five contact pins that are connectable to the motor assembly 124 as described below.

[0072] As shown in FIGS. 5 and 8, a distal portion of the lower body portion 114 includes a plurality of through bores 180 (e.g., four through bores) that are aligned with a corresponding plurality of through bores 182 in the upper body portion 112. When lower body portion is attached to the upper body portion, a plurality of interconnection screws 184 pass through the through bores in the lower body portion and engage the through bores of the upper body portion to further secure the two body portions together. A plurality of plugs 186 are inserted into outer portions of the through bores of the lower body portion to hide the ends of the interconnection screws.

[0073] As shown in FIGS. 8 and 9, the lower body portion 114 includes a battery assembly receiving tray 200, which is secured to the inside of the lower body portion in alignment with the battery assembly receiving enclosure 130. The receiving tray is secured to the lower body portion with a plurality of screws 202 (e.g., four screws). The receiving tray includes a plurality of leaf spring contacts 204A, 204B, 204C (e.g., three contacts), which are positioned in a triangular pattern. The three contacts are positioned to engage a corresponding plurality of contacts 206A, 206B, 206C, which are positioned around the top edge of the battery assembly 132 when the battery assembly is positioned in the battery assembly receiving enclosure.

[0074] The battery assembly 132 includes a first battery cover half 210 and a second battery cover half 212, which enclose a battery unit 214. In the illustrated embodiment, the battery unit comprises six 4.2-volt lithium-ion battery cells connected in series to produce an overall battery voltage of approximately 25.2 volts when fully charged. The battery cells are commercially available from many suppliers, such as, for example, Samsung SDI Co., Ltd., of South Korea. The first battery cover half and the second battery cover half snap together. The two halves are further held together by an outer cylindrical cover 216, which also serves as a gripping surface when the percussive massage applicator 100 is being used. In the illustrated embodiment, the outer cover extends only over the portion of the battery assembly that does not

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enter the battery receiving enclosure 132. In the illustrated embodiment, the outer cover comprises neoprene or another suitable material that combines a cushioning layer with an effective gripping surface.

[0075] The upper end of the battery assembly 132 includes a first mechanical engagement tab 220 and a second mechanical engagement tab 222 (FIG. 6). As shown in FIG. 6, for example, when the battery assembly is fully inserted into the battery assembly receiving enclosure 130, the first engagement tab engages a first ledge 224 and the second engagement tab engages a second ledge 226 within the battery assembly receiving enclosure to secure the battery assembly within the battery assembly receiving enclosure.

[0076] The lower body portion 114 includes a mechanical button 230 in alignment with the first engagement tab 220. When sufficient pressure is applied to the button, the first engagement tab is pushed away from the first ledge 224 to allow the first engagement tab to move downward with respect to the first ledge and thereby disengage from the ledge. In the illustrated embodiment, the mechanical button is biased by a compression spring 232. The lower body portion further includes an opening 234 (FIG. 6) opposite the mechanical button. The opening allows a user to insert a fingertip into the opening to apply pressure to disengage the second engagement tab 222 from the second ledge 226 and at the same time to apply downward pressure to move the second engagement tab downward away from the second ledge and thereby move the battery assembly 132 downward. Once disengaged in this manner, the battery assembly is easily removed from the battery assembly receiving enclosure 130. In the illustrated embodiment, the opening is covered in part by a flap 236. The flap may be biased by a compression spring 238. In alternative embodiments (not shown), a second mechanical button may be included in place of the opening.

[0077] The second battery cover half 212 includes an integral printed circuit board support structure 250, which supports a battery controller printed circuit board (PCB) 252. The battery controller PCB is shown in more detail in FIG. 10. In addition to other components, the battery controller PCB includes a charging power adapter input jack 254 and an on/off switch 256. In the illustrated embodiment, the on/off switch is a slide switch. The battery controller PCB further supports a plurality of light-emitting diodes (LEDs) 260 (e.g., six LEDs), which are mounted around the periphery of the battery controller PCB. In the illustrated embodiment, each LED is a dual-color LED (e.g., red and green), which may be illuminated to display either color. The battery controller PCB is mounted to a battery assembly endcap 262. A translucent plastic ring 264 is secured between the battery controller PCB and the battery assembly endcap such that the ring generally aligned with the LEDs. Accordingly, light emitted by the LEDs is emitted through the ring. As discussed below, the color of the LEDs may be used to indicate the charged state of the battery assembly 132. A switch actuator extender 266 is positioned on the actuator of the slide switch and extends through the endcap to enable the slide switch to be manipulated from the outside of the endcap.

[0078] As illustrated in FIG. 3, the motor enclosure 120 houses the electric motor assembly 124, which is shown in more detail in FIGS. 11A and 11B. The electric motor assembly includes a brushless DC electric motor 310 having a central shaft 312 that rotates in response to applied electrical energy. In the illustrated embodiment, the electric motor is a 24-volt brushless DC motor. The electric motor may be a commercially available motor. The diameter and height of the motor enclosure and the mounting structures (described below) are adaptable to receive and secure the electric motor within the motor enclosure.

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[0079] The electric motor 310 is secured to a motor mounting bracket 320 via a plurality of motor mounting screws 322. The motor mounting bracket includes a plurality of mounting tabs 324 (e.g., four tabs). Each mounting tab includes a central bore 326, which receives a respective rubber grommet 330, wherein first and second enlarged portions of the grommet are positioned on opposite surfaces of the tab. A respective bracket mounting screw 332 having an integral washer is passed through a respective central hole 334 in each grommet to engage a respective mounting bore 336 in the upper body portion 112. Two of the four mounting bores are shown in FIG. 12. The grommets serve as vibration dampers between the motor mounting bracket and the upper body portion.

[0080] The central shaft 312 of the electric motor 310 extends through a central opening 350 in the motor mounting bracket 320. The central shaft engages a central bore 362 of an eccentric crank 360. The central bore is press-fit onto the central shaft of the electric motor or is secured to the shaft by another suitable technique (e.g., using a setscrew).

[0081] The eccentric crank 360 has a circular disk shape. The crank has an inner surface 364 oriented toward the electric motor and an outer surface 366 oriented away from the electric motor. A cylindrical crank pivot 370 is secured to or formed on the outer surface and is offset from the central bore of the crank in a first direction by a selected distance (e.g., 2.8 millimeters in the illustrated embodiment). An arcuate cage 372 extends from the inner surface of the crank and is generally positioned diametrically opposite the crank pivot with reference to the central bore 362 of the crank. A semi-annular weight ring 374 is inserted into the arcuate cage and is secured therein by screws, crimping or by using another suitable technique. The masses of the arcuate cage and the semi-annular weight ring operate to at least partially counterbalance the mass of the crank and the forces applied to the crank, as described below.

[0082] As shown in FIGS. 12 and 13, the distal end of the upper body portion 112 supports a generally cylindrical outer sleeve 400 having a central bore 402. In the illustrated embodiment, a distal portion 406 proximate to a distal end 404 of the outer sleeve is tapered inward toward the central bore. The outer sleeve has an annular base 408 that is secured to the distal end of the upper body portion by a plurality of screws 410 (e.g., three screws).

[0083] The outer sleeve 400 surrounds a generally cylindrical mounting sleeve 420 that is secured within the outer sleeve when the outer sleeve is secured to the upper body portion 112. The mounting sleeve surrounds a cylinder body 422 that is clamped by the mounting sleeve and is secured in a concentric position with respect to the longitudinal axis 116 of the percussive massage applicator 100. In addition to securing the cylinder body, the mounting sleeve serves as a vibration damper to reduce vibrations propagating from the cylinder body to the main body 110 of the percussive massage applicator. In the illustrated embodiment, the cylinder body has a length of approximately 25 millimeters and has an inner bore 424, which has an inner diameter of approximately 25 millimeters. In particular, the inner diameter of the cylinder body is at least 25 millimeters plus a selected clearance fit (e.g., approximately 25 millimeters plus approximately 0.2 millimeters).

[0084] As shown in FIG. 3, the percussive massage applicator 100 includes the reciprocating assembly 126, which comprises a crank engagement bearing holder 510, which may also be referred to as a transfer bracket; a flexible interconnection linkage 512, which may also be referred to as a flexible transfer linkage;

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a piston 514; and an applicator head 516. The reciprocating assembly is shown in more detail in FIGS. 14 and 15.

[0085] The crank engagement bearing holder 510 comprises a bearing housing 530 having an upper end wall 532 that defines the end of a cylindrical cavity 534. An annular bearing 536 fits within the cylindrical cavity. A removably attachable lower end wall 538 is secured to the bearing housing by a plurality of screws 540 (e.g., two screws) to constrain the annual bearing within the cylindrical cavity. The annular bearing includes a central bore 542 that is sized to engage the cylindrical crank pivot 370 of the eccentric crank 360.

[0086] The crank engagement bearing holder 510 further includes an interconnect portion 550 that extends radially from the bearing housing 530. The interconnect portion includes a disk-shaped interface portion 552 having a threaded longitudinal central bore 554. The central bore is aligned with a radial line 556 directed toward the center of bearing housing. In the illustrated embodiment, the central bore is threaded with an 8x1.0 metric external thread. The interface portion has an outer surface 558, which is orthogonal to the radial line. The center of the outer surface of the interface portion is approximately 31 millimeters from the center of the bearing housing. The interface portion has an overall diameter of approximately 28 millimeters and has a thickness of approximately 8 millimeters. A lower portion 560 of the interface portion may be flattened to provide clearance with other components. Selected portions of the interface portion may be removed to form ribs 562 to reduce the overall mass of the interface portion.

[0087] A threaded radial bore 564 is formed in the interface portion 552. The threaded radial bore extends from the outer perimeter of the interface portion to the threaded longitudinal central bore 554. The threaded radial bore has an internal thread selected to engage a bearing holder setscrew 566 that is inserted into the third threaded bore. The bearing holder setscrew is rotated to a selected depth as described below.

[0088] As used herein, "flexible" in connection with the flexible interconnection linkage 512 means that the linkage is capable of bending without breaking. The linkage comprises a resilient rubber material. The linkage may have a Shore A durometer hardness of around 50; however, softer or harder materials in a medium soft Shore hardness range of 35A to 55A may be used. The linkage is molded or otherwise formed to have a shape similar to an hour glass. That is, the shape of the linkage is relatively larger at each end and relatively narrower in the middle. In the illustrated embodiment, the linkage has a first disk-shaped end portion 570 and a second disk-shaped end portion 572. In the illustrated embodiment, the two end portions have similar thicknesses of approximately 4.7 millimeters and have similar outer diameters of approximately 28 millimeters. The material between the two end portions tapers to middle portion 574, which has a diameter of approximately 18 millimeters. In general, the middle portion has a diameter that is between 50 percent and 75 percent of the diameter of the end portions; however, the middle portion may be relatively smaller or relatively larger to accommodate materials having a greater hardness or a lesser hardness. The linkage has an overall length between the outer surfaces of the two end portions of approximately 34 millimeters. As discussed in more detail below, the smaller diameter middle portion of the linkage allows the linkage to flex easily between the two end portions.

[0089] A first threaded interconnect rod 580 extends from the first end portion 570 of the flexible interconnection linkage 512. A second threaded interconnect rod 582 extends from the second end portion

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572 of the linkage. In the illustrated embodiment, the interconnect rods are metallic and are embedded into the respective end portions. For example, in one embodiment, the linkage is molded around the two interconnect rods. In other embodiment, the two interconnect rods are adhesively fixed within respective cavities formed in the respective end portions. In a still further embodiment, the two interconnect rods are formed as integral threaded rubber portions of the linkage.

[0090] The first interconnect rod 580 of the flexible interconnection linkage 512 has an external thread selected to engage with the internal thread of the threaded longitudinal central bore 554 of the crank engagement bearing holder 510 (e.g., an 8x1.0 metric external thread). When the thread of the first interconnect rod is fully engaged with the thread of the longitudinal central bore, the bearing holder setscrew 566 is rotated to cause the inner end of the setscrew to engage the thread of the first interconnect rod within the longitudinal central bore to inhibit the first interconnect rod from rotating out of the longitudinal central bore.

[0091] In the illustrated embodiment, the second interconnect rod 582 of the flexible interconnection linkage 512 has an external thread similar to the thread of the first interconnect rod 580 (e.g., an 8x1.0 metric external thread). In other embodiments, the threads of the two interconnect rods may be different.

[0092] In the illustrated embodiment, the piston 514 comprises stainless steel or another suitable material. The piston has an outer diameter that is selected to fit snugly within the inner bore 424 of the cylinder body 422 described above. For example, the outer diameter of the illustrated piston is no greater than approximately 25 millimeters. As discussed above, the inner diameter of the inner bore of the cylinder body is at least 25 millimeters plus a selected minimum clearance allowance (e.g., approximately 0.2 millimeter). Thus, with the outer diameter of the piston being no more than 25 millimeters, the piston has sufficient clearance with respect to the cylinder body that the piston is able to move smoothly within the cylinder body without interference. The maximum clearance is selected such that no significant play exists between the two parts.

[0093] In the illustrated embodiment, the piston 514 comprises a cylinder having an outer wall 600 that extends for a length of approximately 41.2 millimeters between a first end 602 and a second end 604. A first bore 606 is formed in the piston for a selected distance from the first end toward the second end. For example, in the illustrated embodiment, the first bore has a depth (e.g., length toward the second end) of approximately 31.2 millimeters and has a base diameter of approximately 18.773 millimeters. A first portion 608 (FIG. 15) of the first bore is threaded to form a 20x1.0 metric internal thread to a depth of approximately 20 millimeters in the first bore.

[0094] A second bore 610 (FIG. 15) is formed from the second end 604 of the piston 514 toward the first end. The second bore has a base diameter of approximately 6.917 millimeters and has a length sufficient to extend the second bore to the cavity formed by the first bore (e.g., a length of approximately 10 millimeters in the illustrated embodiment). The second bore is threaded for its entire length to form an internal thread in the second bore. The internal thread of the second bore engages the external thread of the second interconnect rod 582 of the interconnection linkage 512. Accordingly, in the illustrated embodiment, the second bore has an 8x1.0 metric internal thread.

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[0095] A third bore 620 is formed in the piston 514 near the second end 604 of the piston. The third threaded bore extends radially inward from the outer wall 600 of the piston to the second threaded bore. In the illustrated embodiment, the third bore is threaded for the entire length of the bore. The third bore has an internal thread selected to engage a piston setscrew 622, which is inserted into the third threaded bore. When the external thread of the second interconnect rod 582 of the flexible interconnection linkage 512 is fully engaged with the internal thread of the second bore 610 of the piston, the piston setscrew is rotated to cause the inner end of the setscrew to engage the external thread of the second interconnect rod within the second bore to inhibit the second interconnect rod from rotating out of engagement with the thread of the second bore.

[0096] The applicator head 516 of the reciprocating assembly 500 can be configured in a variety of shapes to enable a user to apply different types of percussive massage. The illustrated applicator head is "bullet-shaped" and is useful for apply percussive massage to selected relatively small surface areas of a body such as, for example, trigger points. In the illustrated embodiment, the applicator head comprises a medium hard to hard rubber material. The applicator head has an overall length from a first distal (application) end 650 to a second proximal (mounting) end 652 of approximately 55 millimeters. The applicator head has an outer diameter of approximately 25 millimeters for a length of approximately 32 millimeters along a main body portion 654. An engagement portion 656 at the proximal (mounting) end of the applicator head has a length of approximately 11 millimeters and is threaded for a distance of approximately 9 millimeters to form an external 20x1.0 metric thread that is configured to engage the internal thread of the first bore 606 of the piston 514. The thread of the applicator head is removably engageable with the thread of the piston to allow the applicator head to be removed and replaced with a different applicator head as described below. The distal (applicator) end of the applicator has a length of approximately 12 millimeters and tapers from the diameter of the main body portion (e.g., approximately 25 millimeters to a blunt rounded portion 658 having the shape of a truncated spherical cap. The spherical cap extends distally for approximately 3.9 millimeters. The spherical cap has a longitudinal of approximately 10 millimeters and a lateral radius of approximately 7.9 millimeters. In the illustrated embodiment, the applicator head has a hollow cavity 660 for a portion of the length from the proximal mounting end 652. The cavity reduces the overall mass of the applicator head to reduce the energy required to reciprocate the applicator head as described below.

[0097] In the illustrated embodiment, percussive massage applicator 100 is assembled by positioning and securing the motor assembly 124 in the upper body portion 112 as described above. A cable (not shown) from the motor 310 in the motor assembly is connected to the five-pin second plug 172.

[0098] After installing the motor assembly 300, the reciprocation assembly 126 is installed in the enclosure 110 by first attaching the flexible interconnection linkage 512 to the crank engagement bearing holder 510 by threading the first threaded interconnect rod 580 into the longitudinal central bore 554. The first threaded interconnect rod is secured within the longitudinal central bore by engaging the bearing holder setscrew 566 into the threaded radial bore 564. The annular bearing 536 is installed within the cylindrical cavity 534 of the bearing bracket and is secured therein by positioning the lower end wall 538 over the bearing and securing the lower end wall with the screws 548. It should be understood that the annular bearing can be installed either before or after the bearing bracket is attached to the flexible linkage.

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[0100] The crank engagement bearing holder 510 and the connected flexible interconnection linkage 512 are installed by positioning the central bore 542 of the annular bearing 536 over the cylindrical crank pivot 370 of the eccentric crank 360 with the flexible interconnection linkage aligned with the longitudinal axis 116. The second threaded interconnect rod 582 is directed toward the bore 424 of the cylinder body 422 within the cylindrical outer sleeve 400 at the distal end of the percussive massage applicator 100.

[0101] The applicator head 516 is attached to the piston 514 by threading the engagement portion 656 of the applicator head into the threaded first portion 608 of the piston. The interconnected applicator head and piston are then installed through the bore 424 of the cylinder body 422 to engage the second bore 610 of the piston with the second threaded interconnector rod 582 of the flexible interconnection linkage 512. The interconnected applicator had and the piston are rotated within the bore of the cylinder body to thread the second bore of the piston onto the second threaded interconnect rod. When the second bore and the second threaded interconnector rod are fully engaged as shown in FIG. 7, for example, the piston setscrew 622 is threaded into the third bore 620 of the piston to engage the threads of the second threaded interconnect rod of the flexible linkage to secure the piston to the flexible linkage. In the illustrated embodiment, the interconnected threads of the piston and the second threaded interconnect rod are configured such that the third bore of the piston is directed generally downward as shown in FIG. 7 and is thereby accessible to tighten the piston setscrew within the third bore. After the piston is secured to the flexible linkage, the applicator head may be unthreaded from the piston without unthreading the piston from the flexible linkage to allow the applicator head to be removed and replaced without having to remove the piston.

[0102] After installing the reciprocation assembly 126, as described above, the lower body portion 114 is installed by aligning the lower body portion with the upper body portion 112 and securing the two body portions together using the screws 184 (FIG. 5). The main body endcap 140 is then placed over the proximal ends of the two body portions to engage the protrusions 142 of the endcap with the L-shaped notches 146 of the two body portions. The endcap is then secured to prevent inadvertent removal by inserting the screw 148 through the bore 150 and into the material of the lower body portion.

[0103] The battery assembly 132 is installed in the battery assembly receiving enclosure 130 of the lower body portion 114 of the percussive massage applicator 100 and electrically and mechanically engaged as described above. The battery assembly may be charged while installed; or the battery assembly may be charged while removed from the percussive massage applicator.

[0104] The operation of the percussive massage applicator 100 is illustrated in FIGS. 16-19, which are views looking up at the motor assembly in the upper body portion 112 with the lower cover 114 and the battery assembly 132 removed. In FIG. 16, the eccentric crank 360 attached to the shaft 312 of the motor 310 is shown at a first reference position, which is designated as the 12 o'clock position. In this first reference position, the cylindrical crank pivot 370 on the outer surface 366 of the eccentric crank is at a most proximal location (nearest the top of the illustration in FIG. 16). The crank pivot is positioned in alignment with the longitudinal axis 116. The crank engagement bearing holder 510, the flexible interconnection linkage 512, the piston 514 and the applicator head 516 are all aligned with the longitudinal

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axis. In this first position, the distal end of the applicator head extends by a first distance D1 from the distal end of the outer sleeve 400.

[0105] In FIG. 17, the shaft 312 of the motor 300 has rotated the eccentric crank 360 clockwise 90 degrees (as viewed in FIGS. 16-19). Accordingly, the cylindrical crank pivot 370 on the eccentric crank is now positioned to the right of the shaft of the motor at a second position designated as the 3 o'clock position. The central bore 542 of the annular bearing 536 within the crank engagement bearing holder 510 must move to the right because of the engagement with the cylindrical crank pivot. The piston 514 is constrained by the bore 424 of the cylinder body 422 (FIGS. 12-13) to remain aligned with the longitudinal axis 116. The second end 572 of the flexible interconnection linkage 512 remains aligned with the piston because of the second threaded interconnect rod 582. The first end 570 of the flexible interconnection linkage remains aligned with the crank engagement bearing holder 510 because of the first threaded interconnect rod 580. The smaller middle portion 574 of the flexible interconnection linkage allows the flexible interconnection to bend to the right to allow the crank engagement bearing holder to tilt to the right as shown. In addition to moving to the right and away from the longitudinal axis, the cylindrical crank pivot has also moved distally away from the proximal end of the percussive massage applicator 100, which causes the crank engagement bearing holder to also move distally. The distal movement of the crank engagement bearing holder is coupled to the piston via the flexible interconnector to push the piston longitudinally within the cylinder. The longitudinal movement of the piston causes the applicator head 516 to extend further outward to a second distance D2 from the distal end of the outer sleeve 400. The second distance D2 is greater than the first distance D1.

[0106] In FIG. 18, the shaft 312 of the motor 310 has rotated the eccentric crank 360 clockwise an additional 90 degrees to a position designated as the 6 o'clock position. Accordingly, the cylindrical crank pivot 370 is again aligned with the longitudinal axis 116. The crank engagement bearing holder 510 and the flexible interconnection linkage 512 have returned to the initial straight-line configuration in alignment with the piston 514. The cylindrical crank pivot has moved further from the proximal end of the percussive massage applicator 100. Thus, the crank engagement bearing holder and the flexible interconnection linkage push the piston longitudinally within the bore 424 of the cylinder body 422 to cause the applicator head 516 to extend further outward to a third distance D3 from the distal end of the outer sleeve 400. The third distance D3 is greater than the second distance D2.

[0107] In FIG. 19, the shaft 312 of the motor 310 has rotated the eccentric crank 360 clockwise an additional 90 degrees. Accordingly, the cylindrical crank pivot 370 is now positioned to the left of the shaft of the motor at a fourth position designated as the 9 o'clock position. The piston 514 is constrained by the bore 424 of the cylinder body 422 to remain aligned with the longitudinal axis 116. The smaller middle portion 574 of the flexible interconnection linkage 512 allows the flexible interconnection linkage to bend to the left to allow the crank engagement bearing holder 510 to tilt to the left as shown. In addition to moving to the left and away from the longitudinal axis, the cylindrical crank pivot has also moved proximally toward the proximal end of the percussive massage applicator 100. The proximal movement pulls the piston longitudinally within the cylinder to cause the applicator head 516 to retreat proximally to

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a fourth distance D4 from the distal end of the outer sleeve 400. The fourth distance D4 is less than the third distance D2 and is substantially the same as the second distance D2.

[0108] A further rotation of the shaft 312 of the motor 310 by an additional 90 degrees clockwise returns the eccentric crank 360 to the original 12 o'clock position shown in FIG. 16 to return the cylindrical crank pivot 370 to the most proximal location. This further rotation causes the distal end of the applicator head 516 to retreat to the original first distance D1 from the outer sleeve 400. Continued rotation of the shaft of the motor causes the distal end of the applicator head to repeatedly extend and retreat with respect to the outer sleeve. By placing the distal end of the applicator head on a body part to be massaged, the applicator head applies percussive treatment to the selected body part.

[0109] In the illustrated embodiment, the axis of the cylindrical crank pivot 370 is located approximately 2.8 millimeters from the axis of the shaft 312 of the motor 310. Accordingly, the cylindrical crank pivot moves a total longitudinal distance of approximately 5.6 millimeters from the 12 o'clock position of FIG. 16 to the 6 o'clock position of FIG. 18. This results in a 5.6-millimeter stroke distance of the distal end of the applicator head 516 from the fully retreated first distance D1 to the fully extended third distance D3.

[0110] Conventional linkage systems between a crank and a piston have two sets of bearings. A first bearing (or set of bearings) couples a first end of a drive rod to a rotating crank. A second bearing (or set of bearings) couples a second end of a drive rod to a reciprocating piston. When the piston reaches each of the two extremes of the reciprocating motion, the piston must abruptly change directions. The stresses caused by the abrupt changes in direction are applied against the bearings at each end of the drive rod as well as to the other components in the linkage system. The abrupt changes of direction also tend to generate substantial noise.

[0111] The reciprocating linkage system 126 described herein eliminates a second bearing (or set of bearings) at the piston 514. The piston is linked to the other components of the linkage via the flexible interconnection linkage 512, which bends as the cylindrical crank pivot 370 rotates about the centerline of the shaft 312 of the motor 300. The flexible interconnect cushions the abrupt changes in direction at each end of the piston stroke. For example, as the applicator head 516 and the piston reverse direction from distal movement to proximal movement at the 6 o'clock position, the flexible interconnect may stretch by a small amount during the transition. The stretching of the flexible interconnect reduces the coupling of energy through the linkage system to the bearing 536 (FIG. 14) and the cylindrical crank pivot. Similarly, as the applicator head and the piston reverse direction from proximal movement to distal movement at the 12 o'clock position, the flexible interconnect may compress by a small amount during the transition. The compression of the flexible interconnect reduces the coupling of energy though the linkage system to the bearing and the cylindrical crank pivot. Thus, in addition to eliminating the bearing at the piston end of the linkage system, the flexible interconnect also reduces the stress on the bearing at the crank end of the linkage system.

[0112] The flexible interconnection linkage 512 in the linkage assembly 126 also reduces the noise of the operating percussive massage applicator 100. The effectively silent stretching and compressing of the flexible interconnect when the reciprocation reverses direction at the 6 o'clock and 12 o'clock positions,

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respectively, eliminates the conventional metal-to-metal interaction that would occur if the linkage system were coupled to the piston 514 with a conventional bearing.

[0113] As discussed above, the bullet-shaped applicator head 516 is removably threaded onto the piston 514. The bullet-shaped applicator head may be unscrewed from the piston and replaced with a spherical-shaped applicator head 700, shown in FIG. 20. A spherical-shaped distal end portion 702 of the applicator head extends from an applicator main body portion 704, which corresponds to the main body portion 654 of the bullet-shaped applicator head. The spherical-shaped applicator head includes an engagement portion (not shown) corresponding to the engagement portion 656 of the bullet-shaped applicator head. The spherical-shaped applicator head may be used to apply percussive massage to larger areas of the body to reduce the force on the treated area and to allow the angle of application to be varied.

[0114] The bullet-shaped applicator head 516 may also be unscrewed and replaced with a disk-shaped applicator head 720 shown in FIG. 21. A disk-shaped distal end portion 722 of the applicator head extends from an applicator main body portion 724, which corresponds to the main body portion 654 of the bullet-shaped applicator head. The disk-shaped applicator head includes an engagement portion (not shown) corresponding to the engagement portion 656 of the bullet-shaped applicator head. The disk-shaped applicator head may be used to apply percussive massage to a larger area of the body to reduce the force on the treated area.

[0115] The bullet-shaped applicator head 516 may also be unscrewed and replaced with a Y-shaped applicator head 740 shown in FIG. 22. A Y-shaped distal end portion 742 of the applicator head extends from an applicator main body portion 744, which corresponds to the main body portion 654 of the bullet-shaped applicator head. The Y-shaped applicator head includes an engagement portion (not shown) corresponding to the engagement portion 656 of the bullet-shaped applicator head. The Y-shaped applicator head includes an applicator base 750. A first finger 752 and a second finger 752 extend from the applicator base and are spaced apart as shown. The two fingers of the Y-shaped applicator head may be used to apply percussive massage to muscles on both sides of the spine without applying direct pressure to the spine.

[0116] The portable electromechanical percussive massage applicator 100 may be provided with power and controlled in a variety of manners. FIG. 23 illustrates an exemplary battery control circuit 800, which comprises in part the circuitry mounted on the battery controller PCB 252. In FIG. 23, previously identified elements are numbered with like numbers as before.

[0117] The battery control circuit 800 includes the power adapter input jack 254. In the illustrated embodiment, the input power provided to the jack as a DC input voltage of approximately 30 volts DC. Other voltages may be used in other embodiments. The input voltage is provided with respect to a circuit ground reference 810. The input voltage is applied across a voltage divider circuit comprising a first voltage divider resistor 820 and a second voltage divider resistor 822. The resistances of the two resistors are selected to provide a signal voltage of approximately 5 volts when the DC input voltage is present. The signal voltage is provided through a high resistance voltage divider output resistor 824 as a DCIN signal.

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[0118] The DC input voltage is provided through a rectifier diode 830 and a series resistor 832 to a DC input bus 834. The rectifier diode prevents damage to the circuitry if the polarity of the DC input voltage is inadvertently reversed. The voltage on the DC input bus is filtered by an electrolytic capacitor 836.

[0119] The DC input voltage on the DC input bus 834 is provided through a 10-volt Zener diode 840 and a series resistor 842 to the voltage input of a voltage regulator 844. The input of the voltage regulator is filtered by a filter capacitor 846. In the illustrated embodiment, the voltage regulator is a HT7550-1 voltage regulator, which is commercially available from Holtek Semiconductor, Inc., of Taiwan. The voltage regulator provides an output voltage of approximately 5 volts on a VCC bus 848, which is filtered by a filter capacitor 850.

[0120] The voltage on the VCC bus is provided to a battery charger controller 860. The controller receives the DCIN signal from the voltage divider output resistor 824. The battery charger controller is responsive to the active high state of the DCIN signal to operate in the manner described below to control the charging of the battery unit 214. When the DCIN signal is low to indicate that the charging voltage is not present, the controller does not operate.

[0121] The battery charger controller 860 provides a pulse width modulation (PWM) output signal to the input of a buffer circuit 870, which comprises a PNP bipolar transistor 872 having a collector connected to the circuit ground reference 810. The PNP transistor has an emitter connected to the emitter of an NPN bipolar transistor 874. The bases of the two transistors are interconnected and form the input to the buffer circuit. The two transistor bases are connected to receive the PWM output signal from the controller. The commonly connected bases are also connected to the commonly connected emitters via a base-emitter resistor 876. The collector of the NPN connected to the VCC bus 848.

[0122] The commonly connected emitters of the PNP transistor 872 and the NPN transistor 874 are connected to an anode of a protection diode 878. A cathode of the protection diode is connected to the VCC bus 848. The protection diode prevents the voltage on the commonly connected emitters from exceeding the voltage on the VCC bus by more than one forward diode drop (e.g., approximately 0.7 volt). The commonly connected emitters of the two transistors are also connected through a resistor 880 to a first terminal of a coupling capacitor 882. A second terminal of the coupling capacitor is connected to a gate terminal of a power metal oxide semiconductor transistor (MOSFET) 884. In the illustrated embodiment, the MOSFET comprises an STP9527 P-Channel Enhancement Mode MOSFET, which is commercially available from Stanson Technology in Mountain View, California. The gate terminal of the MOSFET is also connected to an anode of a protection diode 886, which has a cathode connected a source (S) terminal of the MOSFET. The protection diode prevents the voltage on the gate terminal from exceeding the voltage on the source terminal by more than the forward diode voltage of the protection diode (e.g., approximately 0.7 volt). The gate terminal of the MOSFET is also connected to the source terminal of the MOSFET by a pull-up resistor 888. The source of the MOSFET is connected to the DC input bus 834.

[0123] A drain (D) of the MOSFET 884 is connected to an input node 892 of a buck converter 890. The buck converter further includes an inductor 894 connected between the input node and an output node 896. The output node (also identified as VBAT) is connected to a positive terminal of the battery unit 214. A negative terminal of the battery unit is connected to the circuit ground 810 via a low-resistance current

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sensing resistor 900. The input node is further connected to a cathode of a free-wheeling diode 902, which has an anode connected to the circuit ground. A first terminal of a resistor 904 is also connected to the input node. A second terminal of the resistor is connected to a first terminal of a capacitor 906. A second terminal of the capacitor is connected to the circuit ground. Accordingly, a complete circuit path is provided from the circuit ground, through the free-wheeling diode, through the inductor, through the battery unit, and through the current sensing resistor back to the circuit ground.

[0124] The battery charger controller 860 controls the operation of the buck converter 890 by applying an active low pulse on the PWM output connected to the buffer circuit 870, which responds by pulling down the voltage on the commonly connected emitters of the two transistors 872, 874 to a voltage near the ground reference potential. The low transition to the ground reference potential is coupled through the resistor 880 and the coupling capacitor 882 to the gate terminal of the MOSFET 884 to turn on the MOSFET and couple the DC voltage on the DC input bus 834 to the input node 892 of the buck converter 890. The DC voltage causes current to flow though the inductor 894 to the battery unit 214 to charge the battery unit. When the PWM signal from the battery charger controller is turned off (returned to an inactive high state), the MOSFET is turned off and no longer provides a DC voltage to the input node of the buck converter; however, the current flowing in the inductor continues to flow through the battery unit and back through the free-wheeling diode as the inductor discharges to continue charging the battery unit until the inductor is discharged. The width and repetition rate of the active low pulses generated by the battery charger controller determine the current applied to charge the battery unit in a known manner. In the illustrated embodiment, the PWM signal has a nominal repetition frequency of approximately 62.5 kHz.

[0125] The battery charger controller 860 controls the width and repetition rate of the pulses applied to the MOSFET 894 in response to feedback signals from the battery unit 214. A battery voltage sensing circuit 920 comprises a first voltage feedback resistor 922 and a second voltage feedback resistor 924. The two resistors are connected in series from the output node 896 to the circuit ground 810 and are thus connected across the battery unit. A common voltage sensing node 926 of the two resistors is connected to a voltage sensing (VSENSE) input of the controller. The battery charger controller monitors the voltage sensing input to determine the voltage across the battery unit to determine when the battery unit is at or near a maximum voltage of approximately 25.2 volts such that the charging rate should be reduced. In the illustrated embodiment, a filter capacitor 928 is connected from the voltage sensing node to the circuit ground to reduce noise on the voltage sensing node.

[0126] As described above, the negative terminal of the battery unit 214 is connected to the circuit ground 810 via the low-resistance current sensing resistor 900, which may have a resistance of, for example, 0.1 ohm. A voltage develops across the current sensing resistor proportional to the current flowing through the battery unit when charging. The voltage is provided as an input to a current sensing (ISENSE) input of the battery charger controller 860 via a high-resistance (e.g., 20,000-ohm) resistor 930. The current sensing input is filtered by a filter capacitor 932. The battery charger controller monitors the current flowing through the battery unit and thus through the current sensing resistor to determine when the current flow decreases as the charge on the battery unit nears a maximum charge. The battery charger controller

may also respond to a large current through the battery unit and reduce the pulse width modulation to avoid exceeding a maximum magnitude for the charging current.

[0127] The output node 896 of the buck converter 890 is also the positive voltage node of the battery unit 214. The positive battery voltage node is connected to a first terminal 940 of the on/off switch 256. A second terminal 942 of the on-off switch is connected to a voltage output terminal 944, which is identified as VOUT. The voltage output terminal is connected to the first contact 206A of the battery assembly 132. The first contact of the battery assembly engages the first leaf spring contact 204A when the battery assembly is inserted into the battery receiving tray 200. When the switch is closed, the first terminal and the second terminal of the switch are electrically connected to couple the battery voltage to the voltage output terminal. The voltage output terminal is coupled to an output voltage sensing circuit 950, which comprises a first voltage divider resistor 952 and a second voltage divider resistor 954 connected in series between the voltage output terminal and the circuit ground. A common node 956 between the two resistors is connected to a VOUT sensing input of the battery charger controller 860. The common node is also connected to the circuit ground by a Zener diode 958, which clamps the voltage at the common node to no more than 4.7 volts. The resistances of the two resistors are selected such that when the switch is closed and the output voltage is applied to the output terminal, the voltage on the common node and the VOUT sensing input of the controller is approximately 4.7 volts to indicate that the switch is closed and that the battery voltage is being provided to the selected terminal of the battery assembly.

[0128] A second contact 206B of the battery assembly 132 is connected to a battery charge (CHRG) output signal of the battery charger controller 860 via a signal line 960. The battery charge output signal may be an analog signal having a magnitude indicative of the charging state of the battery unit 214. In the illustrated embodiment, the battery charge output signal is a pulsed digital signal operating in accordance with the Inter-Integrated Circuit (I^2C) protocol, which encodes the charging state of the battery as a series of digital pulses. The second battery assembly contact engages the second leaf spring contact 204B when the battery assembly is inserted into the battery-receiving tray 200.

[0129] A third contact 206C of the battery assembly 132 is connected to the negative terminal of the battery unit 214 via a line 970 and is identified as the battery ground (GND) that is provided to the motor control PCB 160 as described below. Note that the battery ground is coupled to the circuit ground by the 0.1-ohm current sensing resistor 900. The current flowing out of the positive terminal of the battery unit to the motor control PCB and back to the negative terminal of the battery unit does not flow through the current sensing resistor. The third battery assembly contact engages the third leaf spring contact 204C when the battery assembly is inserted into the battery-receiving tray 200.

[0130] The battery charger controller 860 drives the dual-color LEDs 260 on the battery controller PCB. The controller includes a first output (LEDR) that drives the red-emitting LEDs in the dual-color LEDs and includes a second output (LEDG) that drives the green-emitting LED in the dual-color LEDs. A first current limiting resistor 980 couples the first output to the anodes of the red-emitting LEDs in a first set of three dual-color LEDs. A second current limiting resistor 982 couples the second output to the anodes of the green-emitting LEDs in the first set of three dual-color LEDs. A third current limiting resistor 984 couples the first output to the anodes of the red-emitting LEDs in a second set of three dual-color LEDs.

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A fourth current limiting resistor 986 couples the second output to the anodes of the green-emitting LEDs in the second set of three dual-color LEDs.

[0131] In the illustrated embodiment, the dual-color LEDs 260 are driven with different duty cycles to indicate the present state of charge of the battery unit 214. For example, in a first state, the first output (LEDR) of the controller 860 is driven with a 100 percent duty cycle and the second output (LEDG) of the controller is not driven such that only the red-emitting LEDs are illuminated to indicate that the battery unit needs be charged. In a second state, the first output is driven with a 75 percent duty cycle and the second output is driven with a 25 percent duty cycle such that the resulting perceived color is a mixture of red and green. In a third state, the first output and the second output are both driven with a respective 50 percent duty cycle. In a fourth state, the first output is driven with a 25 percent duty cycle and the second output is driven with a 75 percent duty cycle. In a fifth state, the first output is not driven and the second output is driven with a 100 percent duty cycle such that the color is entirely green to indicate that the battery unit is at or near a fully charged state. The duty cycles at which the two outputs are driven may be interleaved such that the two outputs are not on at the same time. Other than at the first state, the duty cycles are repeated at a rate sufficiently high that the enabled LEDs appear to be on at all times without a perceptible flicker. When the battery controller is in the first state, the battery controller may blink the red-emitting LEDS on and off at a perceptible rate to remind the user that the charge on the battery is low and should be charged before continuing to use the percussive massage applicator 100. In certain embodiments, the first state may be further segmented into two charge ranges. In a first range of charges within the first state, the red LEDs are driven with a constant illumination to indicate that the charge on the charge on the battery unit is low and that the battery unit should be charged soon. In a second range of charges, the red LEDs are blinked to indicate that the charge in the battery unit is very low and that the battery unit should be charged promptly.

[0132] FIG. 24 illustrates an exemplary motor controller circuit 1000, which comprises in part the circuitry mounted on the motor controller PCB 160. In FIG. 24, previously identified elements are numbered with like numbers as before. As described above, the battery assembly 132 provides the positive battery output voltage VOUT on the first leaf spring contact 204A of the receiving tray 200 when the battery assembly is inserted into the receiving tray. The positive battery output voltage is identified as VBAT in FIG. 24. The CHRG signal from the battery assembly is provided to the second leaf spring contact 204B when the battery assembly is inserted into the receiving tray. The battery ground (GND) is provided to the third leaf spring contact 204C when the battery assembly is inserted into the receiving tray. The DC voltage, the battery ground and the CHRG signal are coupled via a three-wire cable 1010 to a cable jack 1012. The first plug 170 on the motor controller PCB plugs into the cable jack to receive the DC voltage on a first pin 1020, to receive the CHRG signal on a second pin 1022, and to receive the battery ground (GND) on a third pin 1024. The battery ground (GND) from the third pin of the first plug is electrically connected to a local circuit ground 1026.

[0133] The DC voltage (VBAT) on the first pin 1020 of the first plug 170 is filtered by a filter capacitor 1030 connected between the first pin of the first plug and the local circuit ground 1026. The DC voltage is also provided to a first terminal of a current limiting resistor 1032. A second terminal of the current

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limiting resistor is provided to the voltage input terminal of a voltage regulator 1040. The voltage regulator receives the battery voltage and converts the battery voltage to 5 volts. The 5-volt output of the voltage regulator is provided on a local VCC bus 1042. The local VCC bus is filtered by a filter capacitor 1044, which is connected between the local VCC bus and the local circuit ground. In the illustrated embodiment, the voltage regulator is a 78L05 three-terminal regulator, which is commercially available from a number of manufacturers, such as, for example, National Semiconductor Corporation of Santa Clara, California.

[0134] The CHRG signal on the second pin 1022 of the first plug 170 is provided to a charge (CHRG) input of a motor controller 1050 via a series resistor 1052. The charge input to the motor controller is filtered by a filter capacitor 1054. The motor controller receives the 5 volt supply voltage from the VCC bus 1042.

[0135] The DC voltage from the first pin 1020 of the first plug is also provided directly to a first pin 1060 of the five-pin second plug 172. The second plug 172 is connectable to a second jack 1070 having a corresponding number of contacts. The second jack is connected via a five-wire cable 1072 to the motor 310.

[0136] A second pin 1080 of the second plug is a tachometer (TACH) pin, which receives a tachometer signal from the motor 310 indicative of the present angular velocity of the motor. For example, the tachometer signal may comprise one pulse for every revolution of the shaft 312 of the motor or one pulse per partial revolution. The tachometer signal is provided to a first terminal of a first resistor 1084 in a voltage divider circuit 1082. A second terminal of the first resistor is connected to a first terminal of a second resistor 1086 in the voltage divider circuit. A second terminal of the second resistor is connected to the local circuit ground. A common node 1088 between the first and second resistors in the voltage divider circuit is connected to the base of an NPN bipolar transistor 1090. An emitter of the NPN transistor is connected to ground. A collector of the NPN transistor is connected to the VCC bus 1042 via a pull-up resistor 1092. The NPN transistor inverts and buffers the tachometer signal from the motor and provides the buffered signal to a TACH input of the motor controller. The buffered signal varies between +5 volts (VCC) and the local circuit ground potential when the tachometer signal varies between the local circuit ground potential and the DC voltage potential from the battery.

[0137] A third pin 1100 of the second plug 172 is a clockwise/counterclockwise (CW/CCW) signal generated by the motor controller 1050 and coupled to the third pin via a current limiting resistor 1102. The state of the CW/CCW signal determines the rotational direction of the motor 310. In the illustrated embodiment, the CW/CCW signal is maintained at a state to cause clockwise rotation; however, the rotation can be changed to the opposite direction in other embodiments.

[0138] A fourth pin 1110 of the second plug 172 is connected to the local circuit ground 1026, which corresponds to the battery ground connected to the negative terminal of the battery unit 214 in FIG. 23.

[0139] A fifth pin 1120 of the second plug 172 receives a pulse width modulation (PWM) signal generated by the motor controller 1050. The PWM signal is coupled to the fifth pin via a current limiting resistor 1122. The motor 310 is responsive to the duty cycle and the frequency of the PWM signal to rotate at a selected angular velocity. As described below, the motor controller controls the PWM signal to maintain the angular velocity at one of three selected rotational speeds.

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[0140] The motor controller 1050 has a switch-in (SWIN) input that receives an input signal from the pushbutton switch 162. The pushbutton switch has a first contact connect to the local circuit ground 1026 and has a second contact connected to the VCC bus 1042 via a pull-up resistor 1130. The second contact is also connected to the local circuit ground via a filter capacitor 1132. The second is also connected to the SWIN input of the motor controller. The input signal is held high by the pull-up resistor until the switch contacts are closed by actuating the pushbutton switch. When the switch is actuated to close the contacts, the input signal is pulled to 0 volts (e.g., the potential on the local circuit ground). The filter capacitor reduces the switch contact bounce noise. The motor controller may include internal debounce circuitry to eliminate the effects of the switch contact bounce. The motor controller is initialized in an off-state wherein no PWM signal is provided to the motor 310, and the motor does not rotate. The motor controller is responsive to a first activation of the switch to advance from the off-state to a first on-state wherein the PWM signal provided to the motor is selected to cause the motor to rotate at a first (low) speed. A subsequent activation of the switch advances the motor controller to a second on-state wherein the PWM signal provided to the motor is selected to cause the motor to rotate at a second (medium) speed. A subsequent activation of the switch advances the motor controller to a third on-state wherein the PWM signal provided to the motor is selected to cause the motor to rotate at a third (high) speed. A subsequent activation of the switch returns the motor controller to the initial off-state wherein no PWM signal is provided to the motor and the motor does not rotate. In the illustrated embodiment, the three rotational speeds of the motor are 1,800 rpm (low), 2,500 rpm (medium) and 3,200 rpm (high).

[0141] The motor controller 1050 generates a nominal PWM signal associated with the currently selected on-state (e.g., low, medium or high speed). Each on-state corresponds to a selected rotational speed as described above. The motor controller monitors the tachometer signal (TACH) received from the pin 1080 of the five-pin plug 172 via the voltage divider 1082 and the NPN transistor 1090. If the received tachometer signal indicates that the motor speed is below the selected speed, the motor controller adjusts the PWM signal (e.g. increases the pulse width or increases the repetition rate or both) to increase the motor speed. If the received tachometer signal indicates that the motor speed is above the selected speed, the motor controller adjusts the PWM signal (e.g. decreases the pulse width or decreases the repetition rate or both) to decrease the motor speed.

[0142] The motor controller 1050 generates a first set of three LED control signals (LEDS1, LEDS2, LEDS3). The first signal (LEDS1) in the first set is coupled via a current limiting resistor 1150 to the anode of the first speed indication LED 166A. The first signal in the first set is activated to illuminate the first speed indication LED when the motor controller is in the first on-state to drive the motor at the first (low) speed. The second signal (LEDS2) in the first set is coupled via a current limiting resistor 1152 to the anode of the second speed indication LED 166B. The second signal in the first set is activated to illuminate the second speed indication LED when the motor controller is in the second on-state to drive the motor at the second (medium) speed. The third signal (LEDS3) in the first set is coupled via a current limiting resistor 1154 to the anode of the third speed indication LED 166C. The third signal in the first set is activated to illuminate the third speed indication LED when the motor controller is in the third on-state to drive the motor at the third (high) speed. In the embodiment of Fig. 24, the cathodes of the speed-

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indicator LEDs are grounded, and the three LED control signals are applied to the anodes of the respective LEDs such that each LED is illuminated when the respective control signal is active high. In other embodiments described below, the anodes of the indicator LEDs are connected to the VCC bus 1042, and the three LED control signals are applied to the cathodes of the respective LEDs through the respective current limiting resistors such that each LED is illuminated when the respective control signal is active low.

[0143] The motor controller 1050 is further responsive to the CHRG signal from the input plug 170. As discussed above, the CHRG signal is generated by the battery charger controller 860 to indicate the state of charge of the battery unit 214. The motor controller determines the present state of charge of the battery unit from the CHRG input signal and displays the state of charge on the five battery charge state LEDs 168A, 168B, 168C, 168D, 168E which are visible through the main body endcap 140. As illustrated the cathode of each battery charge state LED is grounded. The motor controller generates a second set of five LED control signals (LEDC1, LEDC2, LEDC3, LEDC4, LEDC5). The first signal (LEDC1) in the second set is coupled via a current limiting resistor 1170 to the anode of the first charge LED 168A. The first signal in the second set is activated to illuminate the first charge indication LED when the battery unit has a lowest range of charge. The motor controller may blink the first charge indication LED at a perceptible rate to indicate the lowest range of charge. The color (e.g., red) of the light emitted by the first charge LED may differ from the color (e.g., green) of the light emitted by the other LEDS to further indicate the lowest range of charge (e.g., no more than 20 percent of charge remaining). The second signal (LEDC2) in the second set is coupled via a current limiting resistor 1172 to the anode of the second charge indication LED 168B. The second signal in the second set is activated to illuminate the second charge indication LED when the battery unit has a second range of charge (e.g., 21-40 percent of charge remaining). The third signal (LEDC3) in the second set is coupled via a current limiting resistor 1174 to the anode of the third charge indication LED 168C. The third signal in the second set is activated to illuminate the third charge indication LED when the battery unit has a third range of charge (e.g., 41-60 percent of charge remaining). The fourth signal (LEDC4) in the second set is coupled via a current limiting resistor 1176 to the anode of the fourth charge indication LED 168D. The fourth signal in the second set is activated to illuminate the fourth charge indication LED when the battery unit has a fourth range of charge (e.g., 61-80 percent of charge remaining). The fifth signal (LEDC5) in the second set is coupled via a current limiting resistor 1178 to the anode of the fifth charge indication LED 168B. The fifth signal in the second set is activated to illuminate the fifth charge indication LED when the battery unit has a fifth range of charge (e.g., 81-100 percent of charge remaining). It should be understood that the ranges of charge are only approximations and are provided as examples. In the embodiment of Fig. 24, the cathodes of the charge indication LEDs are grounded, and the five LED control signals are applied to the anodes of the respective LEDs such that each LED is illuminated when the respective control signal is active high. In other embodiments described below, the anodes of the five charge indication LEDs are connected to the VCC bus 1042, and the five LED control signals are applied to the cathodes of the respective LEDs through the respective current limiting resistors such that each LED is illuminated when the respective control signal is active low.

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[0144] The portable electromechanical percussive massage applicator 100 described herein advantageously allows a massage therapist to effectively apply percussion massage over an extended time duration without excessive tiring and without being tethered to an electrical power cord. The reduced noise level of the portable electromechanical percussive massage applicator described herein allows the device to be used in quiet environment such that the person being treated with the device is able to relax and enjoy any ambient music or other soothing sounds provided in the treatment room.

[0145] Figs. 25 and 26 illustrate an alternative embodiment of the mechanical structure of a percussive massage device 1200. Fig. 25 is a lower plan view looking up at the motor assembly 300 in the upper body portion 112 with the lower cover 114 and the battery assembly 132 removed. The upper body portion is shown in phantom to focus the drawing on the motor assembly and the linkage. In Fig. 25, the previously described reciprocation assembly 126 with the flexible interconnection linkage 512 between the motor assembly and the piston 514 is replaced with a reciprocation assembly 1210 having a solid linkage 1212 between the motor assembly and a piston 1214. The solid linkage is shown in more detail in an exploded view in Fig. 26. An annular bearing 1220 within a bearing holder 1222 at the proximal end of the solid linkage engages the cylindrical crank pivot 370 of the cylindrical crank 360 as described above. The distal end of the solid linkage includes a pivot bore 1230 that is positioned over a cylindrical protrusion 1234 of a proximal extended portion 1232 of the piston. The pivot bore extends into a bearing recess 1240 of the distal end of the solid linkage. The bearing recess receives a bearing 1242. An unthreaded portion of a pivot screw 1244 extends through the center of the bearing and engages a threaded bore 1246 in the proximal extended portion of the piston. The pivot bore of the solid linkage pivots with respect to the pivot screw to allow the movement of the solid linkage to impose reciprocating motion onto the piston. The distal end of the piston receives a selectably removable applicator head 1248 (shown in phantom lines in Fig. 25). The applicator head may be, for example, one of the applicator heads shown in Figs. 20-22 or an applicator head having a different configuration.

[0146] In many applications of the percussive massage applicator 100, the pressure applied to a particular location on a body may vary depending on the nature of the tissue in the location (e.g., types of muscle, thickness of overlying fat, and the like). If the applicator is being used to apply pressure to a location that is very sensitive, the applied pressure should be relatively small. On the other hand, if the applicator is being used to apply pressure to a large muscle, the applied pressure should be relatively large. Feedback from the person to whom the applicator is being applied will determine an acceptable magnitude of the pressure that provides beneficial massaging without causing undue pain; however, the magnitude of the pressure is not readily quantifiable so that the person wielding the applicator can reproduce the acceptable magnitude of pressure at the same location in subsequent massage sessions or even when returning to the same location in the same massage session. Thus, a need exists for a system and method for quantifying the applied pressure so that the applied pressure can be reproduced.

[0147] Fig. 27 illustrates a modified motor controller circuit 1500, which is similar to the motor controller circuit 1000 of Fig. 24. In the motor controller circuit of Fig. 27, many of the components are the same as the components in Fig. 24 and operate in the same manner. The same components in Fig. 27 are labeled with the same element numbers as in Fig. 24.

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[0148] The modified motor controller circuit 1500 of Fig. 27 includes certain modifications from the motor controller circuit 1000 of Fig. 24. For example, the controller 1050 of Fig. 24 is replaced with a controller 1510 in Fig. 27. In one embodiment, the controller in Fig. 27 is a peripheral interface controller (PIC) such as the Microchip PIC16F677 8-Bit CMOS Microcontroller, which is commercially available from Microchip Technology, Inc., of Chandler, Arizona. Other similar controllers from other suppliers may also be used. The controller in Fig. 27 may be the same controller as the controller in Fig. 24; however, as described below, additional input/output terminals are used in the embodiment of Fig. 27.

[0149] As a further example, the current limiting resistor 1032 in Fig. 24 is replaced in Fig. 27 with a first Zener diode 1520 and a second Zener diode 1522 connected in series between the VBAT input terminal 1020 and the voltage input terminal (Vin) of a voltage regulator 1040. For example, the two Zener diodes may have voltage values of 3 volts to thereby limit the voltage (e.g., 25.2 volts) from the battery unit 214 to less than 20 volts, which is the maximum input voltage to the voltage regulator.

[0150] As further shown in Fig. 27, the pulse width modulation signal (now labeled "PWM_C") from the controller 1500 is not connected directly to the PWM input of the motor 310 via the current limiting resistor 1122. Rather, the PWM_C signal passes through the current limiting resistor as before and is connected to the base of an NPN bipolar transistor 1530. The collector of the transistor is connected to the local circuit ground. The base of the transistor is also connected to the local circuit ground via a pulldown resistor 1532. The collector of the transistor is connected to the fifth pin 1120 of the second plug 172 and is thus connected to the motor via the second jack 1070 and the five-wire cable 1072. The collector of the transistor is also connected to the VCC bus 1042 via a pullup resistor 1534. The PWM signal functions as before except that the PWM_C signal from the controller is inverted and buffered by the transistor.

[0151] The modified motor controller circuit 1500 of Fig. 27 further includes a load current sensing circuit 1550. The load current sensing circuit comprises a current sensing resistor 1552 having a first terminal connected to the fourth pin 1110 of the second plug 172 and having a second terminal connected the local circuit ground 1026. Thus, rather than the return current from the motor 310 flowing directly to the local circuit ground as in Fig. 24, the return current in Fig. 27 flows through the current sensing resistor before reaching the local circuit ground. Accordingly, a voltage develops across the first terminal of the current sensing resistor with respect to the local circuit ground. In the illustrated embodiment, the current sensing resistor is a precision resistor having a resistance of approximately 50 milliohms and a precision of 1% or better. The voltage on the first terminal of the current sensing resistor is proportional to the current flowing through the current sensing resistor. For example, when the current flowing through the current sensing resistor has a magnitude of 1 ampere, the voltage on the first terminal of the current sensing resistor has a magnitude of 50 millivolts. Thus, the voltage on the first terminal of the current sensing resistor can be monitored to determine the instantaneous current flowing from the ground (current return) of the motor to the local circuit ground.

[0152] A first filter capacitor 1560 (e.g., a 100,000-picofarad capacitor) cis connected across the current sensing resistor 1552 from the first terminal of the current sensing resistor to the local circuit ground. A first filter resistor 1562 (e.g., a 100,000-ohm resistor) is connected from the first terminal of the current sensing resistor to an analog input pin of the controller 1510. The analog input pin is labeled as "LOAD"

in Fig. 27 to indicate that the input signal received on the input pin represents the load current of the motor 310. A second filter capacitor 1564 (e.g., a 100,000 picofarad capacitor) and a third filter capacitor 1566 (e.g., a 100-microfarad electrolytic capacitor) are connected from the analog (LOAD) input pin to the local circuit ground. A second filter resistor 1568 (e.g., a 300,000-ohm resistor) is also connected from the analog input pin to the local circuit ground. Because the motor 310 is driven by pulse width modulation, the current flowing from the motor to the local circuit ground via the current sensing resistor 1552 comprises a sequence of current pulses, which are sensed by the current sensing resistor to generate a corresponding sequence of voltage pulses. The two filter capacitors and the two filter resistors operate as a low-pass filter to convert the sequence of voltage pulses into a DC voltage signal having a magnitude that varies slowly as the average magnitude of the current pulses vary. The voltage developed across the second filter resistor and the second and third filter capacitors is provided to the analog input pin of the controller. Accordingly, a voltage directly proportional to the average motor load current is applied to the LOAD input pin of the controller.

[0153] In the embodiment of Fig. 27, the cathodes of the five charge-indicating LEDs 168A-E are connected to the respective control signals LEDC1-5 of the controller 1510 via the respective current-limiting resistors 1170, 1172, 1174, 1176, 1178, respectively. The anode of each charge-indicating LED is connected to the VCC bus 1042. Each charge-indicating LED is illuminated when the respective control signal is active low to allow current to flow through the LED.

[0154] In the embodiment of Fig. 27, the cathodes of the three speed-indicating LEDs 166A-C are connected to the respective control signals LEDS1-3 of the controller 1510 via the respective current-limiting resistors 1150, 1152, 1154, respectively. The anode of each speed-indicating LED is connected to the VCC bus 1042. Each speed-indicating LED is illuminated when the respective control signal is active low to allow current to flow through the LED.

[0155] The controller 1500 in Fig. 27 generates three additional output signals LEDP1, LEDP2 and LEDP3 on respective output pins. The LEDP1 output signal is connected via a current limiting resistor 1570 to the cathode of a first power-indicator LED 1572A, which has an anode connected to the VCC bus 1042. The first power-indicator LED is illuminated when the LEDP1 output signal is active low. The LEDP2 output signal is connected via a current limiting resistor 1574 to the cathode of a second power-indicator LED 1572B, which has an anode connected to the VCC bus. The second power-indicator LED is illuminated when the LEDP2 output signal is active low. The LEDP3 output signal is connected via a current limiting resistor 1576 to the cathode of a third power-indicator LED 1572C, which has an anode connected to the VCC bus. The third power-indicator LED is illuminated when the LEDP3 output signal is active low. As described below, the first, second and third power-indicator LEDs are selectively illuminated in response to the magnitude of the current sensed by the current sensing resistor 1552. In the illustrated embodiment, the cathodes of the respective power-indicator LEDs are driven with respective active low signals. In other embodiments, the cathodes may be connected to the VCC bus and the anodes may be driven with active low output signals from the controller such as described above with respect to LEDs in the embodiment of Fig. 24. The three additional LEDs are shown on a perspective view of the modified percussive massage device 1200 in Fig. 28 and in a perspective view of a modified motor control

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printed circuit board 1580 in Fig. 29. In Fig. 28, the motor enclosure 120 of the previously describe embodiment is replaced with a modified motor enclosure 1582, which is shorter and which has a larger diameter to accommodate a motor (not shown) having a different configuration. Also, the fingertip opening 234 in the lower body 114 is eliminated.

[0156] The magnitude of the load current flowing through the sensing resistor 1552 is related to the pressure applied to the massage applicator 100 to force the applicator head 516 of the massage applicator against a location on a body or against another obstacle. For example, when the applicator head is allowed to reciprocate freely, the load current will be a minimal amount of current needed to turn the motor 310 and to reciprocate the applicator head and to turn and reciprocate the components coupling the output shaft of the motor to the applicator head. In contrast, when the applicator head is pressed forcibly against a location on a body or against another obstacle, the motor requires additional current to maintain a selected rotational speed at the increased pressure. Thus, in the illustrated embodiment, the magnitude of the load current through the motor is measured and is compared to ranges of load current corresponding to different magnitudes of applied force to determine the instantaneous load current. The measurement and the comparison features are described below.

[0157] The motor control functions and the display of the operating speed are performed within the controller 1510 correspond to the functions described above with respect to the controller 1050 of Fig. 27. Fig. 30 illustrates a flowchart 1600 of the operation of the pressure measurement and display functions of the embodiment of Fig. 27.

[0158] The operation of the controller 1510 starts with a power sequence in an activity block 1610 wherein the controller starts operating when power is first applied via the on/off switch 256 on the battery assembly 132. The controller first performs functions defined by internal programmable memory to initialize various internal settings in a system initialization activity block 1612.

[0159] After the system initialization, the controller 1510 advances to an input/output (I/O) port initialization activity block 1614 wherein the controller initializes the input/output (I/O) ports. As indicated above, in the illustrated embodiment, the controller comprises a Microchip PIC16F677 8-Bit CMOS Microcontroller. The illustrated controller has 18 I/O pins and each pin is configurable to perform many different functions. In the initialization activity block, the pins are configured in accordance with the intended functionality. For example, the LEDS1, LEDS2, LEDS3, LEDC1, LEDC2, LEDC3, LEDC4, LEDC5, LEDP1, LEDP2 and LEDP3 pins are configured as output pins. The PWM_C pin is configured as a pulse width modulation output pin, which is supported by internal logic within the controller to generate a PWM signal at a selected frequency and a selected duty cycle. The CW/CCW pin is configured as an output pin. The LOAD pin is configured as an analog input pin to receive the voltage having a magnitude corresponding to the sensed value of the motor current. The TACH pin is configured as a digital input pin to receive the tachometer pulses from the motor 310. The CHRG pin is configured as an I^2C to receive an input sequence from the battery controller PCB 252 having a digital value representing the charge state of the battery unit 214. The SWIN pin is configured as a digital input to receive the high or low state of the central pushbutton switch 162.

[0160] After initializing the I/O pins in the block 1614, the controller 1510 advances to a motor speed state set-to-zero activity block 1616 wherein the controller sets the desired motor speed state to 0 (e.g., off). The controller also applies control signals to the internal PWM logic to cause the PWM logic to discontinue sending PWM signals to the PWM_C output pin. On the initial pass through the activity block after initially powering up, the controller may have already set the motor speed state to zero during the initialization process.

[0161] After setting the motor speed state to 0, the controller 1510 advances to a display activity block 1620 wherein the controller selectively activates the signals on the LEDC1-5 output pins to display the battery charge via the battery charge indicator LEDs 168A-E. The controller obtains the battery charge information from the battery controller PCB 252 via the I2C signal on the CHRG input pin.

[0162] After activating the battery charge LEDs, the controller 1510 advances to a speed switch reading activity block 1622 wherein the controller reads the digital value on the SWIN input pin to determine the state of the pushbutton switch 162, which functions as a motor speed state selection switch as described above. A digital value of 0 indicates that the switch has been activated by a user. A digital value of 1 indicates that the switch has not been activated. The controller may be programmed with an internal debounce routine to assure that the controller only responds once to each activation of the pushbutton switch.

[0163] After reading the value on the SWIN input pin, the controller 1510 advances to a decision block 1624 in which the controller determines whether the pushbutton (speed change) switch 162 is active (e.g., the digital value on the SWIN pin is low). If the switch is inactive, the controller returns to the display activity block 1620 and continues to display the battery charge as described above and continues to read the value on the SWIN input pin in the activity block 1622. The controller will continue to loop to display the battery charge and read the pushbutton switch until the value on the SWIN input pin becomes active low.

[0164] If the pushbutton switch 162 is active when the controller 1510 evaluates the state of the switch in the decision block 1624, the controller advances to a speed change activity block 1630 wherein the controller increments the motor speed state from 0 to 1 and sets the internal PWM logic to output pulses on the PWM_C output pin to drive the motor 310 at the slowest motor speed (e.g., 1,800 rpm in the illustrated embodiment). Within the speed change activity block, the controller also activates the LEDS1 signal to cause the first motor speed indicator LED 168A to illuminate.

[0165] After setting the motor speed to the lowest level in the block 1630, the controller 1510 advances to a block 1632 wherein the controller performs a calibration procedure in which the controller first determines a no-load current magnitude $I_{NO\text{-}LOAD}$ when no pressure is applied to the applicator head 516. The steps within the calibration procedure block are described in more detail below with respect to Fig. 31. As described below, the controller returns from the calibration procedure with a calibration flag set if the calibration procedure completes successfully and returns from the calibration procedure with the calibration flag reset (cleared) if the calibration procedure does not complete successfully.

[0166] After completing the calibration procedure in the block 1632, the controller 1510 advances to a decision block 1640 wherein the controller tests the status of the calibration flag. If the calibration flag is

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set, the controller advances to an activity block 1650. Otherwise, the controller skips the activity block 1650 and advances to an activity block 1660.

[0167] The activity block 1650 is a current measurement and pressure display activity block wherein the controller inputs the analog voltage value on the LOAD input pin representing the magnitude of the average current through the current sensing resistor 1552, determines a load current magnitude, and selectively activates one of the pressure indicator LEDs 1572A, 1572B, 1572C to indicate a range of pressure being applied to the applicator head 516. The steps within the current measurement and pressure display block are described in more detail below with respect to Fig. 32. The controller than advances to the activity block 1660.

[0168] The activity block 1660 is a charge display activity block wherein the controller 1510 inputs the digital value on the CHRG input pin and selectively activates the signals on the LEDC1-5 output pins to display the battery charge via the battery charge indicator LEDs 168A-E.

[0169] After displaying the battery charge in the charge display activity block 1660, the controller advances to a speed switch reading activity block 1662 wherein the controller reads the digital value on the SWIN input pin to determine the state of the pushbutton switch 162 as described above for the speed switch reading activity block 1622.

[0170] After reading the value on the SWIN input pin, the controller 1510 advances to a decision block 1664 in which the controller determines whether the pushbutton (speed change) switch 162 is active (e.g., the digital value on the SWIN pin is low).

[0171] If the switch is inactive when evaluated in the decision block 1664, the controller 1510 returns to the decision block 1640 where the controller again determines whether the calibration flag is set or clear. If the calibration flag is set, the controller then displays the new current magnitude in the pressure display activity block 1650, displays the battery charge in the charge display activity block 1660, reads the pushbutton switch in the speed switch reading activity block 1662, and checks the reading in the decision block 1664 to determine whether the switch is active. Otherwise, the controller skips the block 1650 and performs the steps in the blocks 1660, 1662 and 1664. The controller remains in the five-block loop (calibration flag set) or four-block loop (calibration flag clear) until the pushbutton switch is activated. In the illustrated embodiment, the functions performed in the loop are timed such that the current is measured approximately eight times per second. The timing may be accomplished by software delays, by implementing a countdown timer, or by other known methods for controlling loop timing. Until the pushbutton switch is activated, the controller will remain in the loop as long as power is being provided from the battery assembly 132.

[0172] If the pushbutton switch 162 is active when the controller 1510 evaluates the state of the switch in the decision block 1664, the controller advances to a speed change activity block 1670 wherein the controller increments the motor speed state by 1. The controller then advances to a decision block 1672 wherein the controller determines whether the new motor speed state is greater than 3. If the motor speed state is greater than 3, the controller returns to the motor speed state set-to-zero activity block 1616 wherein the controller sets the desired motor speed state to 0 (e.g., off). The controller also applies control signals to the internal PWM logic to cause the PWM logic to discontinue sending PWM signals to the PWM_C

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output pin. The controller also deactivates the signals on the LEDS1, LEDS2 and LEDS3 output pins such that all of the speed indicator LEDs 168A, 168B and 168C are turned off. The controller then continues in the four-block loop comprising the blocks 1616, 1620, 1622 and 1624 until the pushbutton switch is again activated to restart the motor 310.

[0173] If the new motor speed state is no more than 3 when the controller 1510 reaches the decision block 1672, the controller advances to a motor speed setting block 1680 wherein the controller sets the motor speed to a value corresponding to the new motor speed state. If the new motor speed state is 2, the controller applies control signals to the internal PWM logic to cause the PWM logic to send PWM signals to the PWM_C output pin to cause the motor 310 to rotate at the medium speed (e.g., 2,500 rpm in the illustrated embodiment). Within the motor speed setting block, the controller also deactivates the previously active signal on the LEDS1 output pin and activates the signal on the LEDS2 output pin to turn on the second speed indicator LED 168B. If the new motor speed state is 3, the controller applies control signals to the internal PWM logic to cause the PWM logic to send PWM signals to the PWM_C output pin to cause the motor 310 to rotate at the high speed (e.g., 3,200 rpm in the illustrated embodiment). The controller deactivates the previously active signal on the LEDS2 output pin and activates the signal on the LEDS3 output pin to turn on the third speed indicator LED 168C.

[0174] After setting the new motor speed in the motor speed setting block 1680, the controller 1510 returns to the decision block 1640 wherein the controller checks the status of the calibration flag and then performs either the five-block loop (calibration flag set) or the four-block loop (calibration flag clear) as described above. The controller remains in the five-block loop or the four-block loop until the switch is activated. The controller repeats the actions in the loop approximately 8 times per second until the pushbutton switch is activated or until power is no longer being provided from the battery assembly 132.

[0175] Fig. 31 illustrates steps within the perform calibration procedure block 1632 of Fig. 30. The calibration procedure is performed when the user initially activates the central pushbutton (speed change) switch 162 to cause the controller 1510 to turn on the motor 310 and set the speed at the lowest level (level 1) as described above with respect to Fig. 30.. The documentation with the percussive massage device 100 instructs the user that calibration is performed when power is initially applied and further instructs the user to not activate the speed selection switch to increase the speed and to not apply pressure against the applicator head 516.

[0176] In a first activity block 1700, the controller 1510 activates the power indication LEDs 1572A, 1572B, 1572C in a flashing pattern to alert the user that the calibration procedure is being performed. The pattern may be a counting pattern with the illuminated LEDs representing a binary count, a shifting pattern wherein one LED is illuminated at a time or another selected pattern that changes to indicate the calibration procedure is active. While continuing to flash the LEDs, the controller advances to an activity block 1702 wherein the controller inputs the analog voltage value on the LOAD input pin representing the magnitude of the average current through the current sensing resistor 1552. The controller saves (records) the initial current magnitude and advances to a decision block 1704 wherein the controller determines whether the speed selection switch 162 has been activated by the user during the calibration procedure. If the speed selection switch has been activated, the controller exits the calibration procedure without completing the

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calibration process. When exiting the calibration procedure early, the controller resets (clears) the calibration flag in an activity block 1706, turns of the LEDs in an activity block 1708 and then exits the calibration procedure via a block 1710.

[0177] If the user does not activate the speed selection switch 162 during the calibration procedure, the controller 1510 advances from the decision block 1704 to a decision block 1720 wherein the controller determines whether 40 current samples have been saved, which represents approximately 5 seconds of sampling at approximately 8 samples per second. If the 40 samples have not been saved, the controller returns to the activity block 1702 wherein the controller inputs the next sample and then checks to determine whether the speed selection switch has been activated. The controller continues in this current sampling loop until 40 current samples are saved or until the user interrupts the calibration procedure by activating the speed selection switch.

[0178] When the controller 1510 determines that 40 current samples have been saved (recorded), the controller advances from the decision block 1720 to an activity block 1722 wherein the controller averages the 40 current samples to determine an average current. Then, in a decision block 1722, the controller determines whether the average current exceeds 1,000 milliamperes. If the user has complied with the calibration procedure instructions and has not applied pressure against the applicator head 516 during the calibration procedure, the average current should not exceed 1,000 milliamperes. If the average current exceeds 1,000 milliamperes, the controller advances to the activity block 1706 to reset (clear) the calibration flag, turns off the flashing LEDs in the block 1708 and exits the calibration procedure via the block 1710.

[0179] If the average of the current samples is no more than 1,000 milliamperes, the controller 1510 advances from the decision step 1730 to an activity block 1732 wherein the controller saves the average current as the no-load current value $I_{NO\text{-}LOAD}$. The no-load current value is used in the pressure measurement steps described below with respect to Fig. 32. The controller sets the calibration flag to indicate that the calibration procedure was successful and that the no-load current value can be used in the current measurement and pressure display procedure 1650 as described below.

[0180] After saving the no-load current magnitude and setting the calibration flag in the block 1732, the controller 1510 advances to an activity block 1734 wherein the controller activates the three pressure indicator LEDs 1572A, 1572B, 1572C together for approximately one second to inform the user that the calibration procedure was completed successfully. Alternatively, the controller may indicate successful completion of the calibration procedure by multiple flashes (e.g., two flashes) of the three LEDs together. In a further alternative, the three LEDs may be activated in a selected sequence to indicate the successful completion of the calibration procedure. The controller than advances to the activity block 1708 to turn off the LEDs and then exits the calibration procedure via the block 1710.

[0181] The procedure 1650 of inputting voltages, determining current magnitudes and displaying pressure is illustrated in more detail in Fig. 32. In a first activity block 1800, the controller 1510 inputs a current magnitude sample by measuring the voltage across the current sensing resistor 1552 as described above. The controller then advances to an activity block 1802 wherein the controller calculates a rolling average I_{AVG} of the last eight current samples. The first seven times through the overall measurement loop, the

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controller may average less than eight samples; however, the full averaging will occur after the percussive massage device 100 has been operating for at least one second.

[0182] After generating the average current in the block 1802, the controller 1510 advances to an activity block 1804 wherein the controller calculates a current difference ΔI between the average current I_{AVG} (determined in the block 1802) and the no-load current $I_{NO\text{-}LOAD}$ (determined in the calibration procedure 1616 of Fig. 31). After calculating the current difference ΔI, the controller advances to a branching decision block 1806 wherein the controller branches to one of three pressure display routines based on the selected speed level.

[0183] If the selected speed is at level 1 (low speed), the controller 1510 branches from the branching decision block 1806 to a first pressure display routine 1810. The first pressure display routine includes a respective first decision block 1812, a respective second decision block 1814, and a respective third decision block 1816.

[0184] If the selected speed is at level 2 (medium speed), the controller 1510 branches from the branching decision block 1806 to a second pressure display routine 1820. The second pressure display routine includes a respective first decision block 1822, a respective second decision block 1824, and a respective third decision block 1826.

[0185] If the selected speed is at level 3 (high speed), the controller 1510 branches from the branching decision block 1806 to a third pressure display routine 1830. The third pressure display routine includes a respective first decision block 1832, a respective second decision block 1834, and a respective third decision block 1836.

[0186] Within the first pressure display routine 1810, the controller 1510 first determines in the respective first decision block 1812 whether the difference ΔI between the average current I_{AVG} and the no-load current $I_{NO\text{-}LOAD}$ is less than 300 milliamperes. If the difference is less than 300 milliamperes, the controller advances to an activity block 1840 wherein the controller turns off all of the pressure indicator LEDs 1752A, 1752B, 1752C to indicate that no pressure or only a small amount of pressure is being applied to the application head 516. For example, in one embodiment, an applied pressure of less than 0.1 kilogram will not increase the average current over the no-load current by 300 milliamperes at the first (low) speed level.

[0187] If the controller 1510 determines in the respective first decision block 1812 that the difference ΔI between the average current and the no-load current is at least 300 milliamperes, the controller advances to the respective second decision block 1814 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 600 milliamperes. If the difference is less than 600 milliamperes, the controller advances to an activity block 1842 wherein the controller turns on the first pressure indicator LED 1752A to indicate that the pressure is in a first pressure range. For example, in one embodiment, an applied pressure in a first pressure range of approximately 0.1 kilogram to 0.5 kilogram will cause an average load current in a range of approximately 300 milliamperes to approximately 599 milliamperes greater than the no-load current at the first (low) speed level.

[0188] If the controller 1510 determines in the respective second decision block 1814 that the difference ΔI between the average current and the no-load current is at least 600 milliamperes, the controller advances

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to the respective third decision block 1816 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 900 milliamperes. If the difference is less than 900 milliamperes, the controller advances to an activity block 1844 wherein the controller turns on the second pressure indicator LED 1752B to indicate that the pressure is in a second pressure range. For example, in one embodiment, an applied pressure in a second pressure range of approximately 0.5 kilogram to approximately 1.5 kilograms will cause an average load current in a range of approximately 600 milliamperes to approximately 899 milliamperes greater than the no-load current at the first (low) speed level.

[0189] If the controller 1510 determines in the respective third decision block 1816 that the difference ΔI between the average current and the no-load current is at least 900 milliamperes, the controller advances to an activity block 1846 wherein the controller turns on the third pressure indicator LED 1752C to indicate that the pressure is in a third pressure range. For example, in one embodiment, an applied pressure in a third pressure range greater than approximately 2.5 kilograms will cause an average load current at least 900 milliamperes greater than the no-load current at the first (low) speed level.

[0190] Within the second pressure display routine 1820, the controller 1510 first determines in the respective first decision block 1822 whether a difference ΔI between the average current and the no-load current is less than 600 milliamperes. If the difference is less than 600 milliamperes, the controller advances to the activity block 1840 wherein the controller turns off all of the pressure indicator LEDs 1752A, 1752B, 1752C to indicate that no pressure or only a small amount of pressure is being applied to the application head 516. For example, in one embodiment, an applied pressure of less than 0.1 kilogram will not increase the average current over the no-load current by 600 milliamperes at the second (medium) speed level.

[0191] If the controller 1510 determines in the respective first decision block 1822 that the difference ΔI between the average current and the no-load current is at least 600 milliamperes, the controller advances to the respective second decision block 1824 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 900 milliamperes. If the difference is less than 900 milliamperes, the controller advances to the activity block 1842 wherein the controller turns on the first pressure indicator LED 1752A to indicate that the pressure is in a first pressure range. For example, in one embodiment, an applied pressure in the first pressure range of approximately 0.1 kilogram to 0.5 kilogram will cause an average load current in a range of approximately 600 milliamperes to approximately 899 milliamperes greater than the no-load current at the second (medium) speed level.

[0192] If the controller 1510 determines in the respective second decision block 1824 that the difference ΔI between the average current and the no-load current is at least 900 milliamperes, the controller advances to the respective third decision block 1826 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 1,200 milliamperes. If the difference is less than 1,200 milliamperes, the controller advances to the activity block 1844 wherein the controller turns on the second pressure indicator LED 1752B to indicate that the pressure is in a second pressure range. For example, in one embodiment, an applied pressure in the second pressure range of approximately 0.5 kilogram to approximately 1.5 kilograms will cause an average load current in a range of approximately

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900 milliamperes to approximately 1,199 milliamperes greater than the no-load current at the first (medium) speed level.

[0193] If the controller 1510 determines in the respective third decision block 1826 that the difference ΔI between the average current and the no-load current is at least 1,200 milliamperes, the controller advances to the activity block 1846 wherein the controller turns on the third pressure indicator LED 1752C to indicate that the pressure is in a third pressure range. For example, in one embodiment, an applied pressure in the third pressure range greater than approximately 2.5 kilograms will cause an average load current at least 1,200 milliamperes greater than the no-load current at the second (medium) speed level.

[0194] Within the third pressure display routine 1830, the controller 1510 first determines in the respective first decision block 1832 whether a difference ΔI between the average current and the no-load current is less than 900 milliamperes. If the difference is less than 900 milliamperes, the controller advances to the activity block 1840 wherein the controller turns off all of the pressure indicator LEDs 1752A, 1752B, 1752C to indicate that no pressure or only a small amount of pressure is being applied to the application head 516. For example, in one embodiment, an applied pressure of less than 0.1 kilogram will not increase the average current over the no-load current by 900 milliamperes at the third (high) speed level.

[0195] If the controller 1510 determines in the respective first decision block 1832 that the difference ΔI between the average current and the no-load current is at least 900 milliamperes, the controller advances to the respective second decision block 1834 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 1,200 milliamperes. If the difference is less than 1,200 milliamperes, the controller advances to the activity block 1842 wherein the controller turns on the first pressure indicator LED 1752A to indicate that the pressure is in a first pressure range. For example, in one embodiment, an applied pressure in the first pressure range of approximately 0.1 kilogram to 0.5 kilogram will cause an average load current in a range of approximately 900 milliamperes to approximately 1,199 milliamperes greater than the no-load current at the third (high) speed level.

[0196] If the controller 1510 determines in the respective second decision block 1834 that the difference ΔI between the average current and the no-load current is at least 1,200 milliamperes, the controller advances to the respective third decision block 1836 wherein the controller determines whether the difference ΔI between the average current and the no-load current is less than 1,500 milliamperes. If the difference is less than 1,500 milliamperes, the controller advances to the activity block 1844 wherein the controller turns on the second pressure indicator LED 1752B to indicate that the pressure is in a second pressure range. For example, in one embodiment, an applied pressure in the second pressure range of approximately 0.5 kilogram to approximately 1.5 kilograms will cause an average load current in a range of approximately 1,200 milliamperes to approximately 1,499 milliamperes greater than the no-load current at the first (medium) speed level.

[0197] If the controller 1510 determines in the respective third decision block 1836 that the difference ΔI between the average current and the no-load current is at least 1,500 milliamperes, the controller advances to the activity block 1846 wherein the controller turns on the third pressure indicator LED 1752C to indicate that the pressure is in a third pressure range. For example, in one embodiment, an applied pressure in the

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third pressure range greater than approximately 2.5 kilograms will cause an average load current at least 1,500 milliamperes greater than the no-load current at the third (high) speed level.

[0198] By first establishing a no-load current magnitude and then determining the applied pressure based on the difference between the measured current and the no-load current, the pressure indications produced by individual units will be similar. The no-load currents may vary from unit to unit because of differences in friction levels within the reciprocating mechanism for example; however, the differences in current caused by applied pressure will be similar. Thus, the pressure indications provided by different units will be similar.

[0199] In the embodiment illustrated in Fig. 32, each of the pressure indicator LEDs 1572A, 1572B, 1572C is illuminated only for the specific range of current differences for the selected motor speed. Accordingly, as the applied pressure increases, the three pressure indicator LEDs illuminate such that only one LED is illuminated at any time (other than during the calibration procedure 1616 described above).

[0200] In an alternative embodiment illustrated by a flowchart 1850 in Fig. 33, the first pressure indicator LED 1572A is illuminated for the first active range of applied pressures and remains illuminated for the second and third ranges of applied pressures. Similarly, the second pressure indicator LED 1572B is illuminated for the second range of applied pressures and remains illuminated for the third range of applied pressures. The third pressure indicator LED 1572C is illuminated only for the third range of applied pressures. Thus, when the applied pressure increases to the higher ranges in the alternative embodiment, the pressure indicator LEDs provide a cumulative lighting effect rather than a discrete effect as in the illustrated embodiment. In Fig. 33, the modified sequencing of the pressure indicator LEDs is implemented by having the controller 1510 exit the block 1846 and advance to the block 1844 and by having the controller exit the block 1844 and advance to the block 1842. The controller exits the procedure from the block 1842 as previously described. Thus, when the controller activates the third pressure indicator to indicate the highest applied pressure range, the controller also activates the second pressure indicator LED and the first pressure indicator LED before exiting the modified procedure. When the controller activates the second pressure indicator to indicate the middle applied pressure range, the controller also activates the first pressure indicator LED before exiting the modified procedure. When the controller activates the first pressure indicator LED to indicate the lowest applied pressure range, the controller only activates the first pressure indicator LED before exiting the modified procedure.

[0201] The flowcharts in Figs. 32 and 33 represent an implementation of the decision process for determining which, if any, of pressure indicator LEDs 1572A, 1572B, 1572C to activate. The decision process may also be implemented in other manners, such as, for example, lookup tables or the like.

[0202] In the illustrated embodiment, the differences between the average current and the no-load current are characterized in four ranges for each motor speed, which results in the illumination of no pressure indicator LEDs at the lowest range of current differences caused by little or no applied pressure; the illumination of the first pressure indicator LED 1572A at a second range of current differences caused by applied pressure in a first range; the illumination of the second pressure indicator LED 1572B at a third range of current differences caused by applied pressure in a second range; and the illumination of the third pressure indicator LED 1572C at a fourth range of current differences caused by applied pressure in a third

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range. In other embodiments, the current differences may be divided into more than four ranges (e.g., eleven current ranges) and more pressure indicators (e.g., ten pressure indicator LEDs) may be used to indicate the additional ranges of pressure applied against the applicator head.

[0203] In further alternative embodiments, the signals representing the pressure ranges may be encoded (e.g., binary encoded) such that three LEDs may be indicate up to seven active pressure ranges. In such an embodiment, a condition of no LEDs being illuminated represents zero or near zero pressure applied to the applicator head; and each of the seven possible combinations of one or more illuminated LEDs represents a respective one of seven pressure ranges. The encoded signals may also be used to control a numeric display (e.g., an LCD) of pressure ranges.

[0204] The above-described relationships between particular current magnitudes and particular pressure ranges are examples of ranges. The specific relationship between the ranges of measured current and the ranges of applied pressure may vary from unit to unit.

[0205] In the illustrated embodiment, the calibration procedure to establish the no-load current $I_{NO\text{-}LOAD}$ is performed at the lowest speed (level 1). The same no-load current is used to determine the pressure at all three operational speeds as described above. In alternative embodiments, a separate no-load current may be established for each of the three operational speeds. In the alternative embodiment, the current difference is calculated based on the no-load current for the selected speed.

[0206] As illustrated in Fig. 35, in certain embodiments, a modified percussive massage device 1900 may be used with a wireless remote device 1910 (e.g., a smartphone), which obtains and stores data representing the use of the percussive massage device. Fig. 34 illustrates a further modified motor controller circuit 1920, which is similar to the motor controller circuit 1500 of Fig. 27 except that the motor controller circuit of Fig. 34 includes a Bluetooth transceiver (BT XCVR) 1930 (referred to herein as a Bluetooth interface), which is coupled to selected LED driver outputs of the controller 1510. The Bluetooth transceiver is an example of a radio frequency wireless communication device that may be used. In particular, the Bluetooth interface includes a plurality of input/output (I/O) ports (e.g., six I/O ports), which are configured as input ports. The six input ports are identified as I0, I1, I2, I3, I4 and I5. The first port (I0) is connected to the LEDS1 output of the controller. The second port (I1) is connected to the LEDS2 output of the controller. The third port (I2) is connected to the LEDS3 output of the controller. The fourth port (I3) is connected to the LEDP1 output of the controller. The fifth port (I4) is connected to the LEDP2 output of the controller. The sixth port (I5) is connected to the LEDP3 output of the controller.

[0207] The Bluetooth interface 1930 receives "AT" command signals from the remote control device 1910 by signals sent from the remote control device to the Bluetooth interface. For example, sending an "AT+PIO??" command to the Bluetooth interface causes the Bluetooth interface to respond with three hexadecimal characters in which the status (e.g., a digital "1" or a digital "0") of each of twelve input/output pins is encoded as a bit in one of the hexadecimal characters. The remote control device decodes the bits corresponding to the input pins I1-I5 to determine the speed and the pressure value (e.g., current magnitude range) when the command is sent to the Bluetooth interface.

[0208] The remote control device 1920 periodically sends the "AT+PIO??" command to the Bluetooth interface to obtain the speed and pressure readings. The remote control device stores the readings in

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memory along with the date and time of the readings and along with further information such as the identity of the person receiving the percussive massage. Thus, the remote control device is enabled to maintain a history of the percussive massage provided to a person. The person may retrieve the saved information to obtain the speed, pressure and duration of previous treatments. Based on the qualitative experience from a previous treatment, the person may repeat the previous treatment or modify one or more of the parameters (e.g., speed, pressure, duration) for a current treatment to attempt to obtain an improved experience.

[0209] The foregoing is shown in Fig. 36, which illustrates a flowchart 1950 of the operation of the remote control device (e.g., smartphone) 1900 of Fig. 35 and the further modified motor controller circuit 1910 of Fig. 34 within the percussive massage device 100. In a first activity block 1960, the remote control device establishes Bluetooth communication with the modified motor controller circuit such that the remote control device is paired with the percussive massage device. After establishing communication, the remote control device sends a status request command to the modified motor controller circuit in an activity block 1962. The remote control device receives the status information from the modified motor controller circuit in an activity block 1964. In an activity block 1966, the remote control device parses the status information to separate the six bits representing the motor speed and the pressure. In an activity block 1970, the remote control device displays the current motor speed and pressure. The remote control device stores the motor speed and the pressure along with the date and time when the status information is received. The remote control device then returns to the activity block 1962 to send another status request commend to the modified motor controller circuit to obtain updated status information. The process of repeatedly requesting status information may be timed by programmable delays or by internal timers within the remote control device. After a massage session is ended, the saved status information along with the data and time may be reviewed by the user. Depending on the results of a previous massage session, the user may choose to increase or decrease the pressure, increase or decrease the speed, increase or decrease the duration of the application of a particular pressure and speed, or a combination of variations. The user may also determine that the previous massage session was particularly helpful and may choose to reproduce the previous settings for a current setting.

[0210] In certain embodiments, the remote device (e.g., smartphone) includes application software (an "app") to enable the user to indicate certain portions of a recipient's body that are receiving percussive massages during segments of an overall massage session. For example, the app may display one or more images of a recipient's body (e.g., generic pictorial images) having target areas may be selected by the user to indicate that a massage segment is beginning on a certain portion of the recipient's body (e.g., the left trapezius muscle). The app records the information, as discussed above, as the massage segment is being performed. At the end of the massage segment, the user again selects the same target area to indicate the end of the massage segment or selects a new target area to start a new massage segment at a different location, which automatically ends the previous segment. The identification of the massage location is saved in the memory of the remote device along with the speed, pressure and duration of the massage segment in association with the name of the recipient. The stored information may also include feedback from the recipient and the user regarding the perceived effectiveness of the massage segment. When the recipient returns for a new massage session, the user may access the stored information from previous

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massage sessions and use the stored information to repeat the locations, speeds, pressures and durations of the previous segments or to modify one or more parameters of certain segments (e.g., decrease the pressure and increase the duration of the massage segment applied to the trapezius muscle). The stored information for a particular recipient may also be transferred to cloud storage to maintain a long-term percussive massage history.

[0211] As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all the matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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CLAIMS

1. A battery-powered percussive massage device comprising:

an enclosure having a cylindrical bore, the cylindrical bore extending along a longitudinal axis;

a piston located within the cylindrical bore, the piston having a first end and a second end, the piston constrained to move only along the longitudinal axis of the cylindrical bore;

a motor positioned within the enclosure, the motor having a rotatable shaft, the shaft having a central axis, the central axis of the shaft perpendicular to the longitudinal axis of the cylindrical bore;

a crank coupled to the shaft, the crank including a pivot, the pivot offset from the central axis of the shaft;

a reciprocation linkage having a first end and a second end, the first end of the reciprocation linkage coupled to the pivot of the crank, the second end of the reciprocation linkage coupled to the first end of the piston;

an applicator head having a first end and a second end, the first end of the applicator head coupled to the second end of the piston, the second end of the applicator head exposed outside the cylindrical bore;

a battery assembly extending from the enclosure, the battery assembly providing DC electrical power; and

a motor controller within the enclosure, the motor controller receiving DC electrical power from the battery assembly and selectively providing DC electrical power to the motor to control the speed of the motor, the motor controller further including a sensor that senses a sensed magnitude of an electrical current flowing through the motor, the motor controller responsive to the sensed magnitude of the electrical current to display a pressure indication signal corresponding to the sensed magnitude of the electrical current.

2. The percussive massage device of Claim 1, wherein the applicator head is removably coupled to the piston.

3. The percussive massage device of Claim 1, wherein:

the reciprocation linkage is rigid; and

the second end of the reciprocation linkage is pivotally coupled to the first end of the piston.

4. The percussive massage device of Claim 1, wherein:

the reciprocation linkage is flexible; and

the second end of the reciprocation linkage is fixed to the first end of the piston.

5. The percussive massage device of Claim 1, wherein the motor controller includes a radio frequency transceiver, which selectively transmits a signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

6. The percussive massage device of Claim 1, wherein the motor controller determines an applied current magnitude by subtracting a no-load current measured at no load from the sensed current magnitude, the motor controller displaying the pressure in response to the applied current magnitude.

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7. A method of operating a percussive massage device comprising:

rotating a shaft of an electric motor to rotate a pivot of a crank about a centerline of the shaft;

coupling the pivot of the crank to a first end of an interconnection linkage of a reciprocation assembly;

coupling a second end of the interconnection linkage to a first end of a piston constrained to move along a longitudinal centerline;

coupling a second end of the piston to an applicator head wherein rotational movement of the pivot of the crank causes reciprocating longitudinal movement of the piston and the applicator head;

measuring an electrical current through the motor, the electrical current having a magnitude responsive to a pressure applied to the applicator head; and

displaying at least one of a plurality of pressure indicators, each of the plurality of pressure indicators corresponding to a range of pressures, each range of pressures corresponding to a range of current magnitudes.

8. The method of Claim 7, wherein the applicator head is removably coupled to the piston.

9. The method of Claim 7, wherein:

the interconnection linkage is rigid; and

the second end of the interconnection linkage is pivotally coupled to the first end of the piston.

10. The method of Claim 7, wherein:

the interconnection linkage is flexible; and

the second end of the interconnection linkage is fixed to the first end of the piston.

11. The method of Claim 7, further comprising selectively transmitting a radio frequency signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

12. The method of Claim 11, further comprising receiving the transmitted radio frequency signal by a remote communication device; storing speed and pressure along with a time when the radio frequency signal is received; and selectively retrieving the stored speed, pressure and time to display the speed, pressure and time on the remote communication device.

13. The method of Claim 7, further comprising determining a no-load current and subtracting the no-load current from a measured current to determine the current magnitude.

14. A percussive massage device comprising:

a source of electrical energy;

an electric motor configured to rotate about a shaft;

a piston constrained to move in a reciprocating motion within a cylinder;

a linkage configured to couple the electrical motor to the piston such that rotation of the electrical motor causes the piston to reciprocate;

an applicator head removably coupled to the piston; and

a motor controller coupled to the source of electrical energy and coupled to the motor, the motor controller configured to selectively provide electrical energy to the motor cause the

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motor to rotate, the motor controller including a pressure indication system, the pressure indication system configured to measure a magnitude of a current flowing through the electric motor, the magnitude of the current responsive to pressure applied against the applicator head, the magnitude of the current including a plurality of current ranges, the pressure indication system including a pressure indication display having a plurality of display states, each display state corresponding to a respective one of the current ranges.

15. The percussive massage device of Claim 14, wherein the pressure indication display comprises a first display device, a second display device and a third display device, each display device having a respective non-illuminated state and a respective illuminated state, wherein:

the first display device is in the respective non-illuminated state if the magnitude of the current is less than a first threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the first threshold magnitude and less than a second threshold magnitude;

the second display device is in the respective non-illuminated state if the magnitude of the current is less than the second threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the second threshold magnitude and is less than a third threshold magnitude; and

the third display device is in the respective non-illuminated state if the magnitude of the current is less than the third threshold magnitude and is in the respective illuminated state when the magnitude of the current is at least as great as the third threshold magnitude.

16. The percussive massage device of Claim 14, wherein the motor controller includes a radio frequency transceiver, which selectively transmits a signal that includes a representation of the speed of the motor and the range of pressure applied to the applicator head.

17. The percussive massage device of Claim 14, wherein:

the linkage is rigid; and

an end of the linkage is pivotally coupled to an end of the piston.

18. The percussive massage device of Claim 14, wherein:

the linkage is flexible; and

an end of the linkage is fixed to an end of the piston.

19. The percussive massage device of Claim 14, wherein the motor controller reduces the magnitude of current as measured by a no-load current to produce a calibrated current, which is used to determine the range of pressure.

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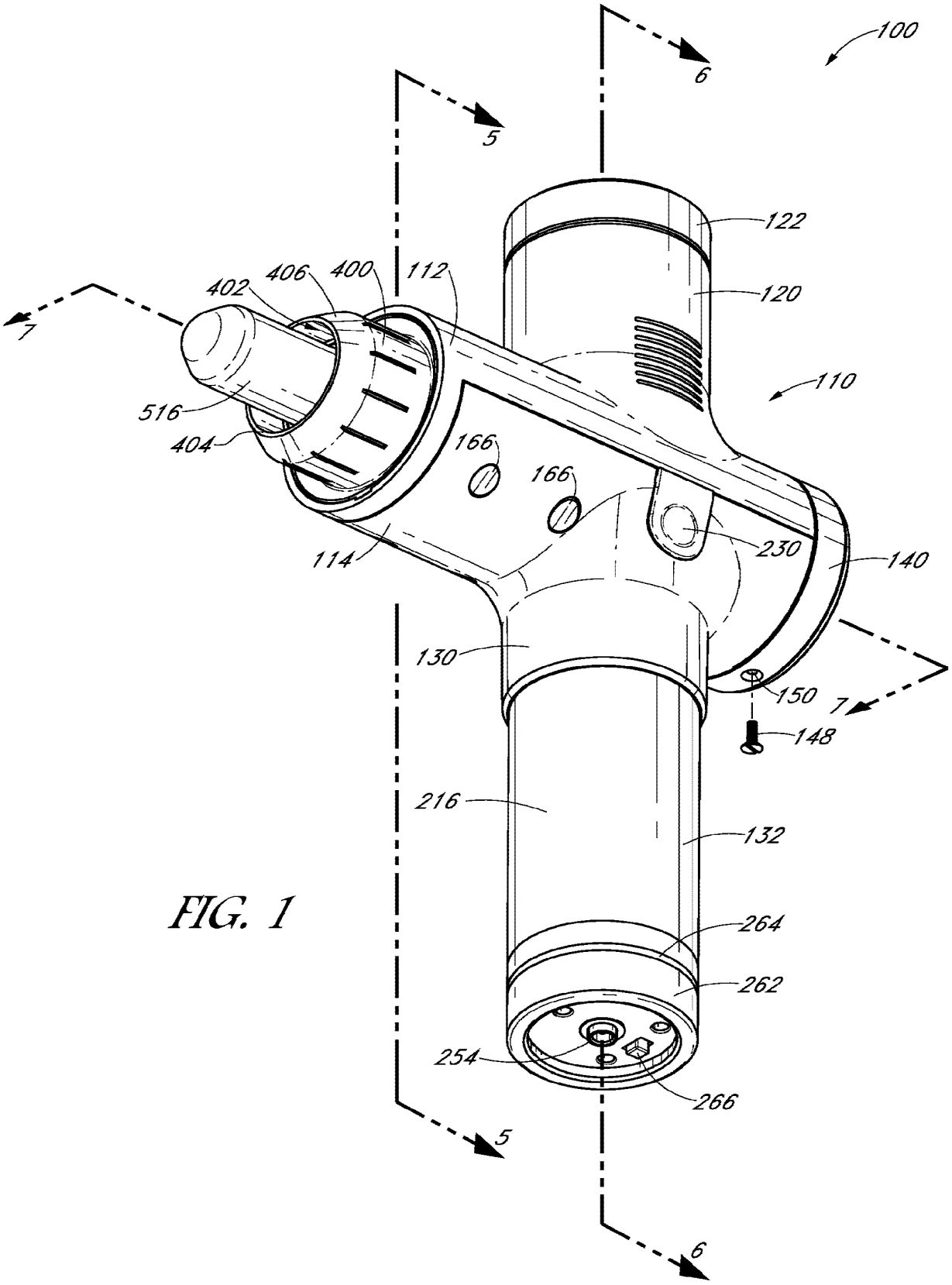

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FIG. 1

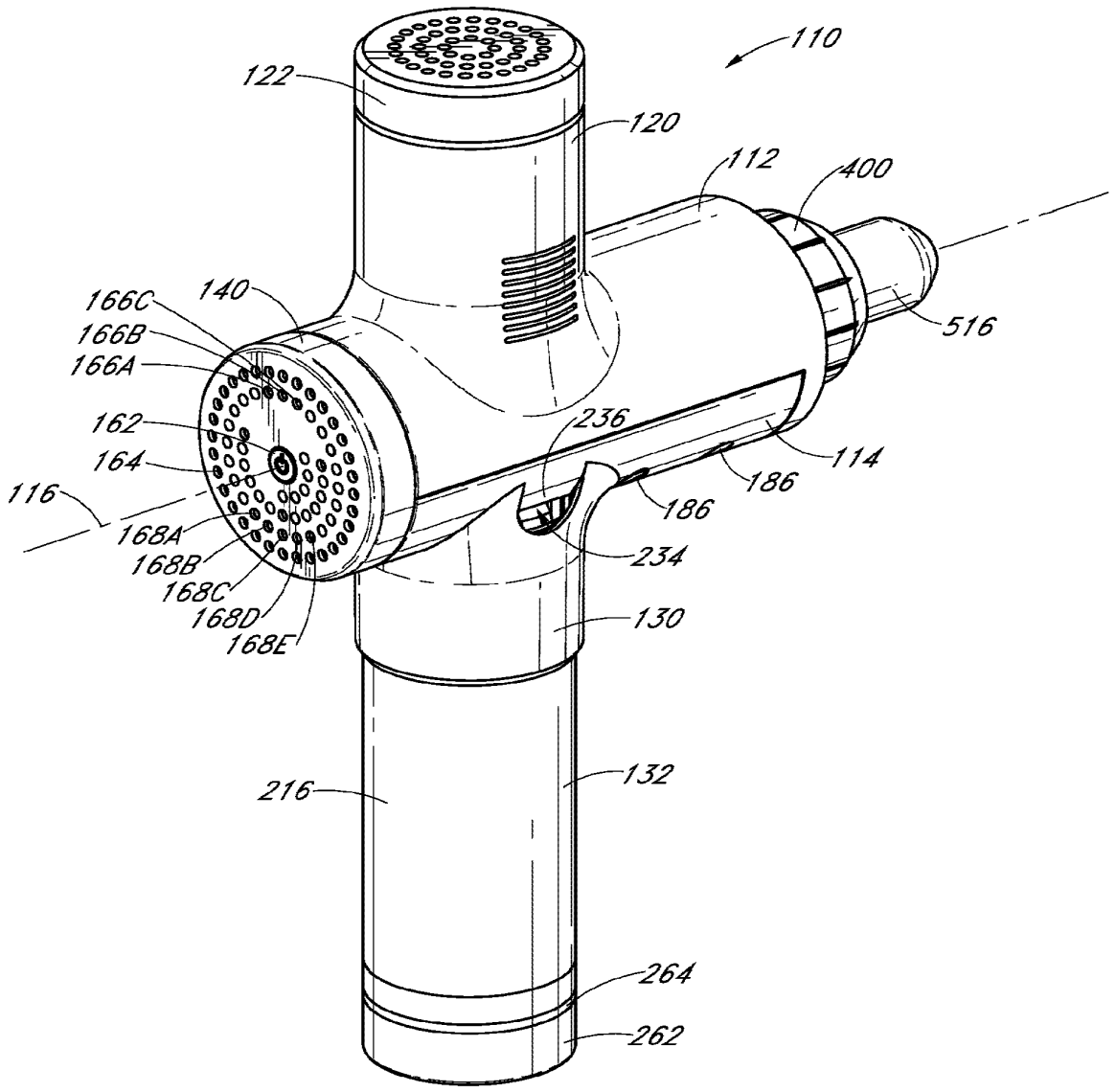

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FIG. 2

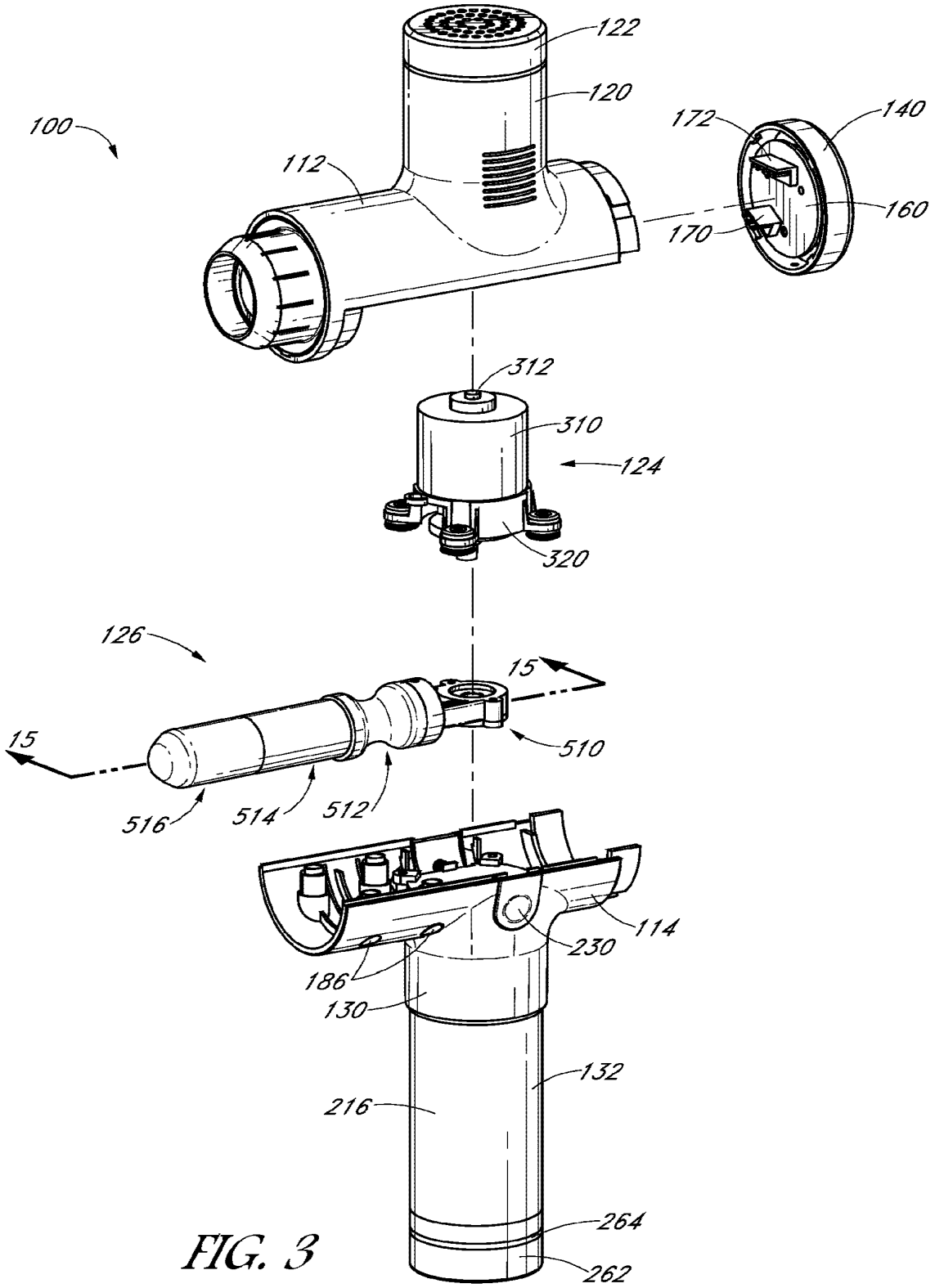


FIG. 3

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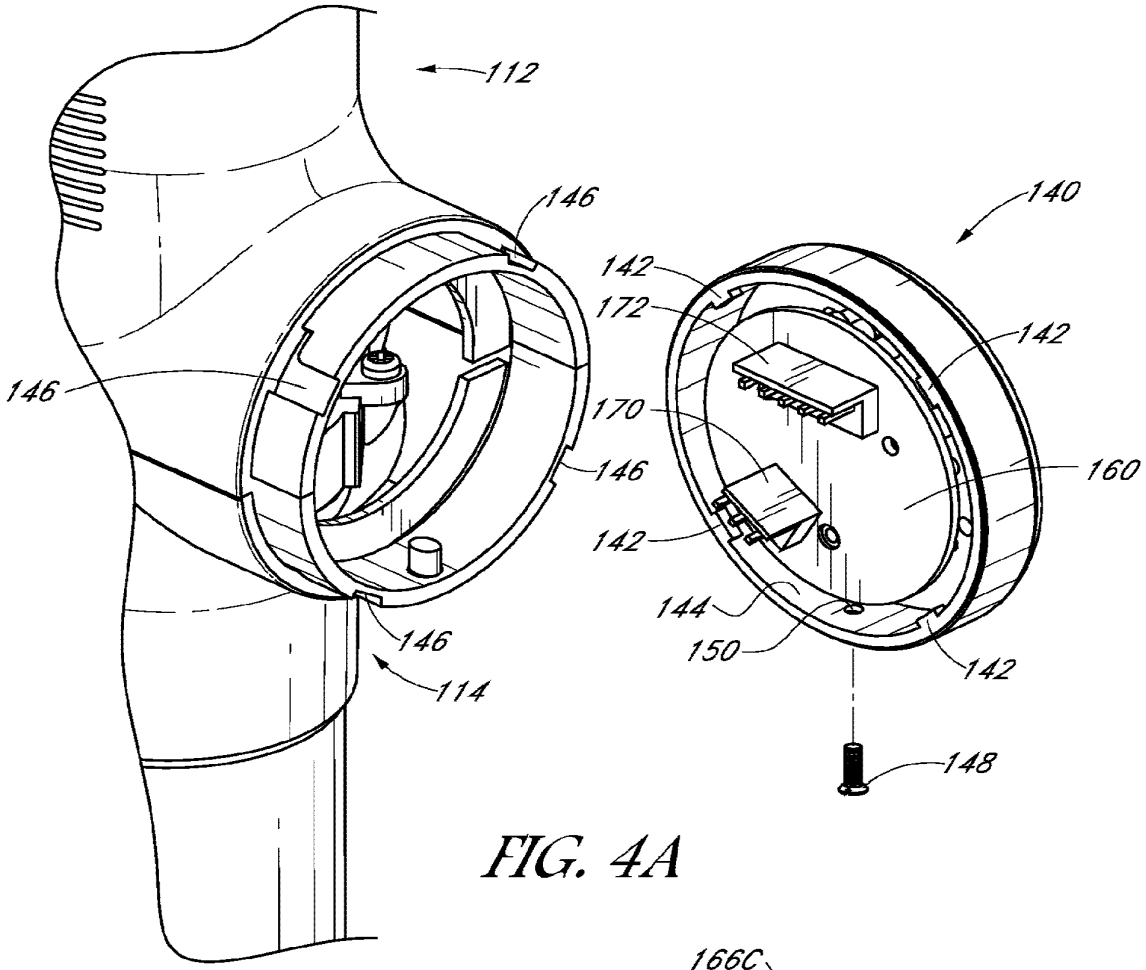


FIG. 4A

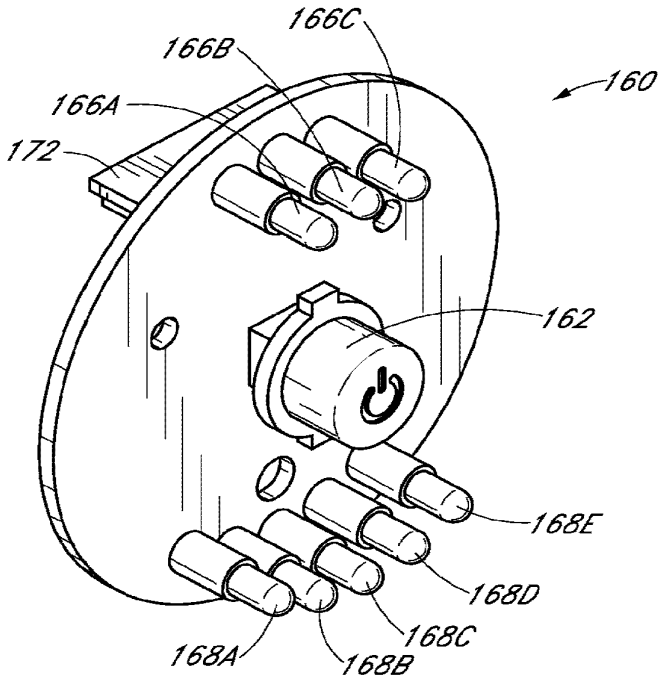


FIG. 4B

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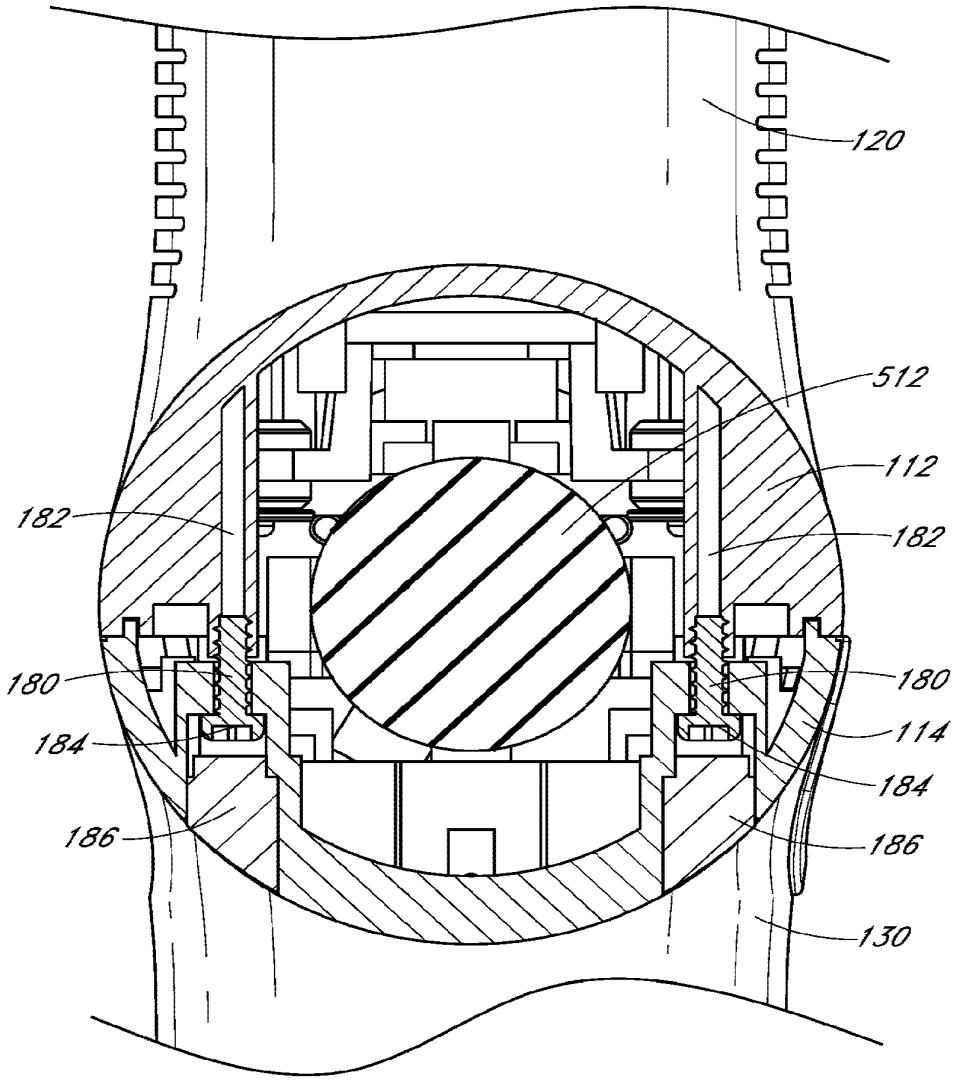


FIG. 5

Petitioner Therabody Ex-1004, 1581

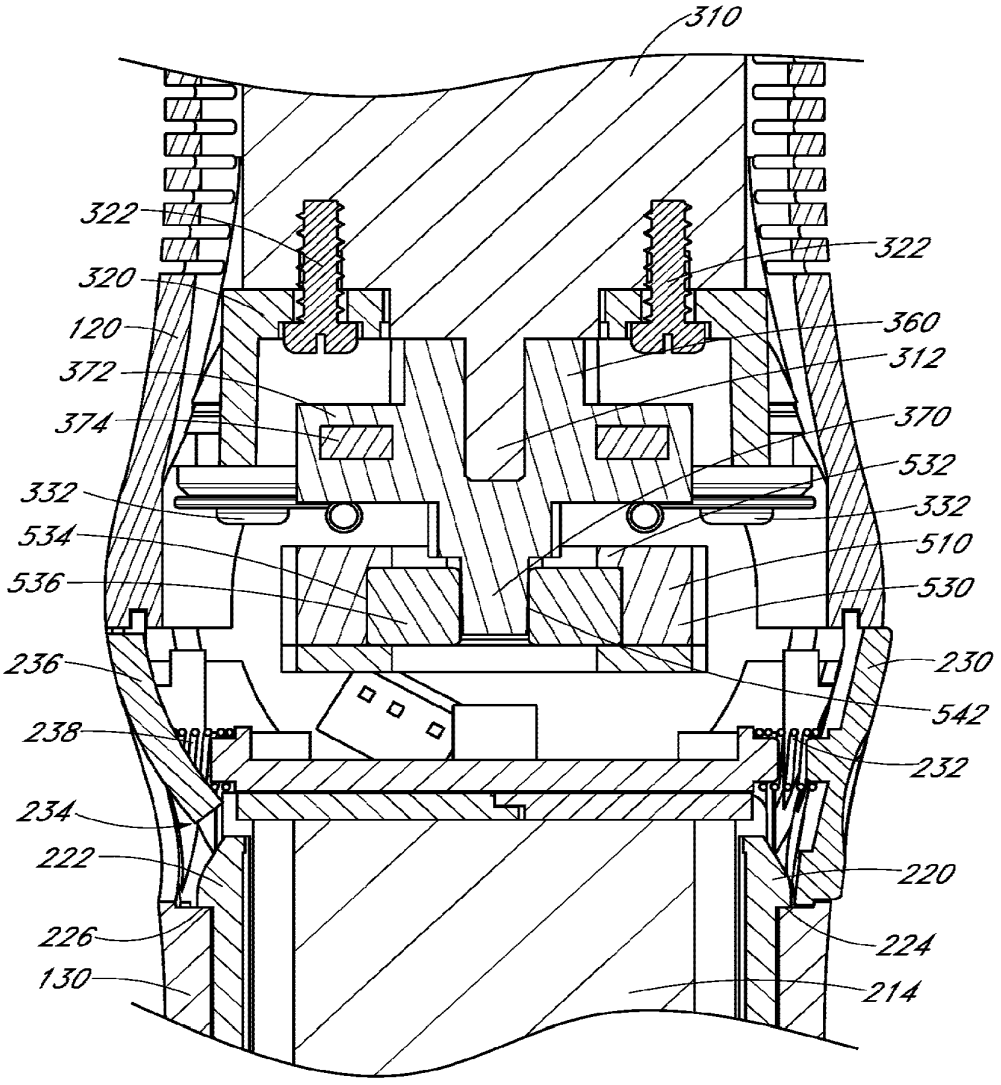


FIG. 6

Petitioner Therabody Ex-1004, 1582

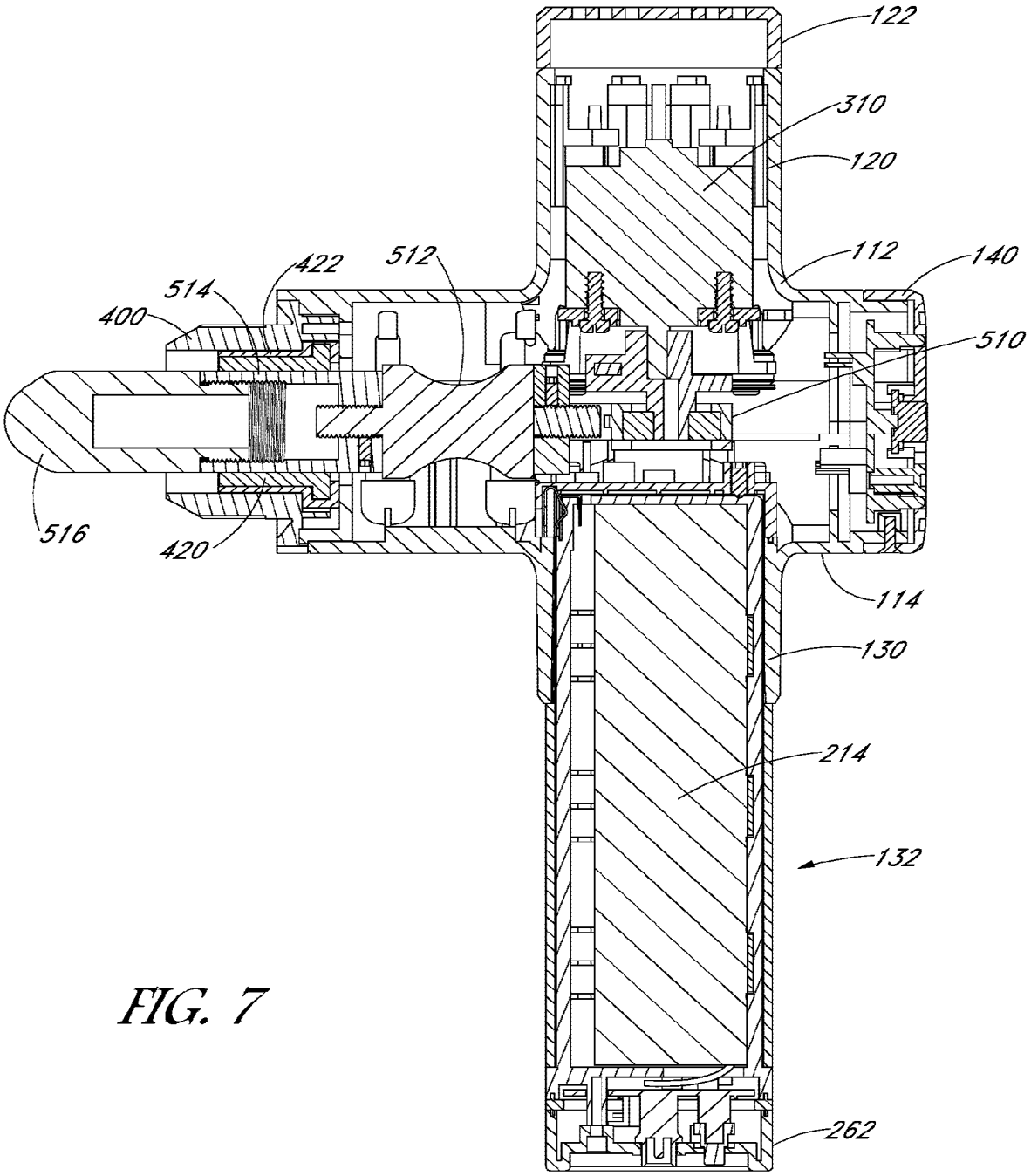


FIG. 7

Petitioner Therabody Ex-1004, 1583

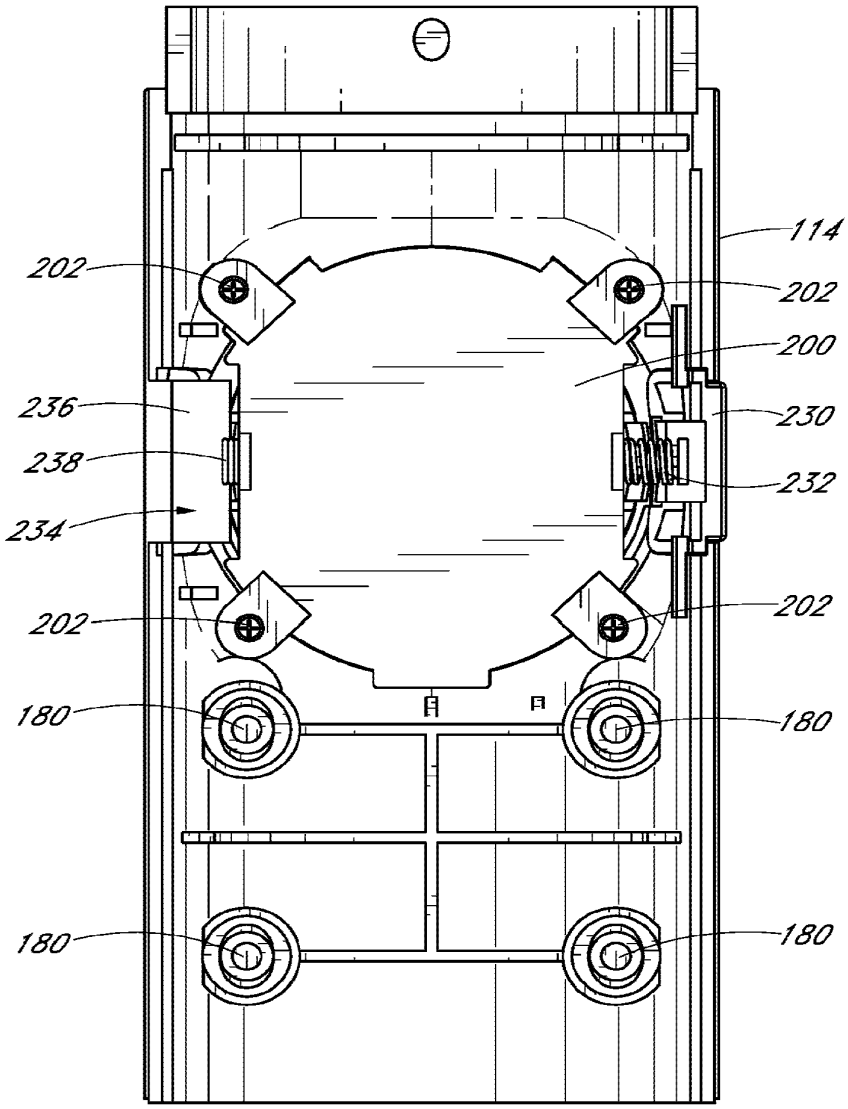


FIG. 8

Petitioner Therabody Ex-1004, 1584

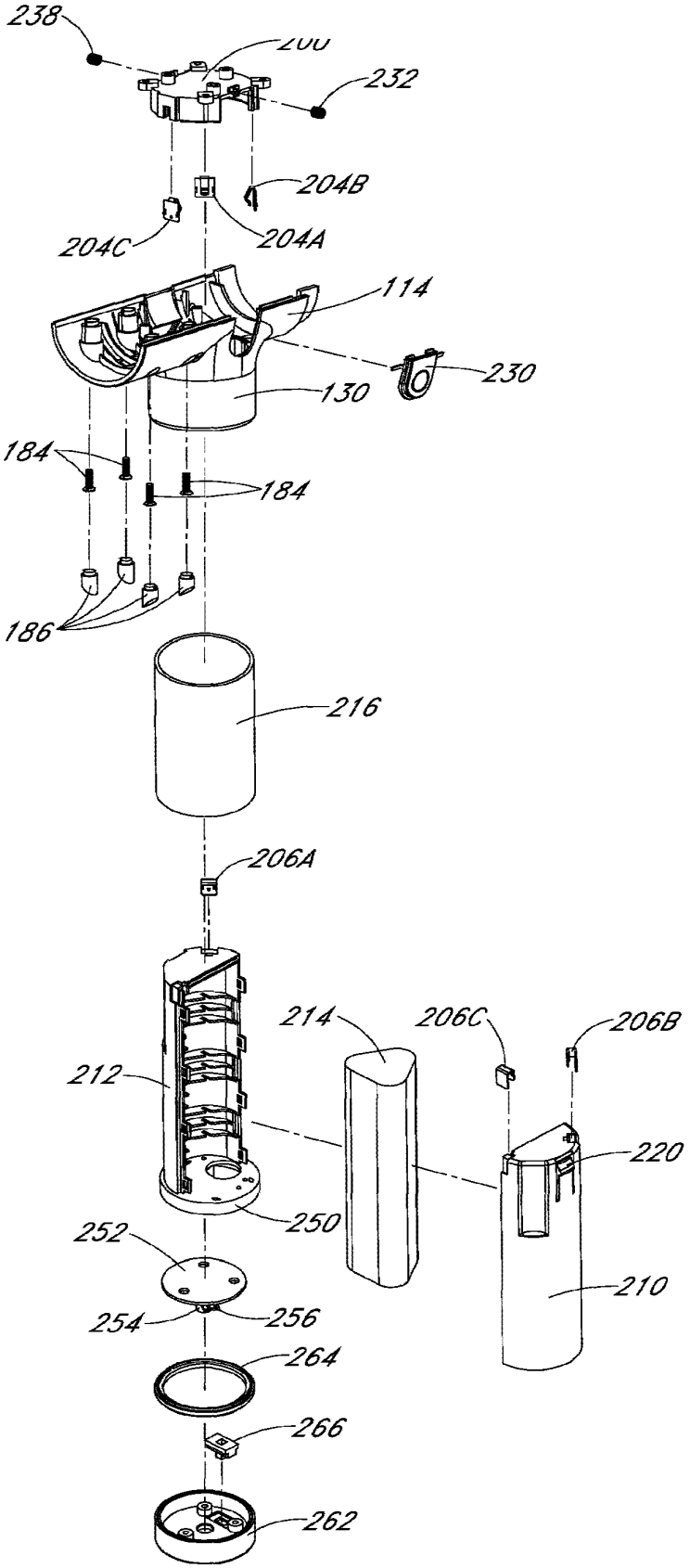


FIG. 9

Petitioner Therabody Ex-1004, 1585

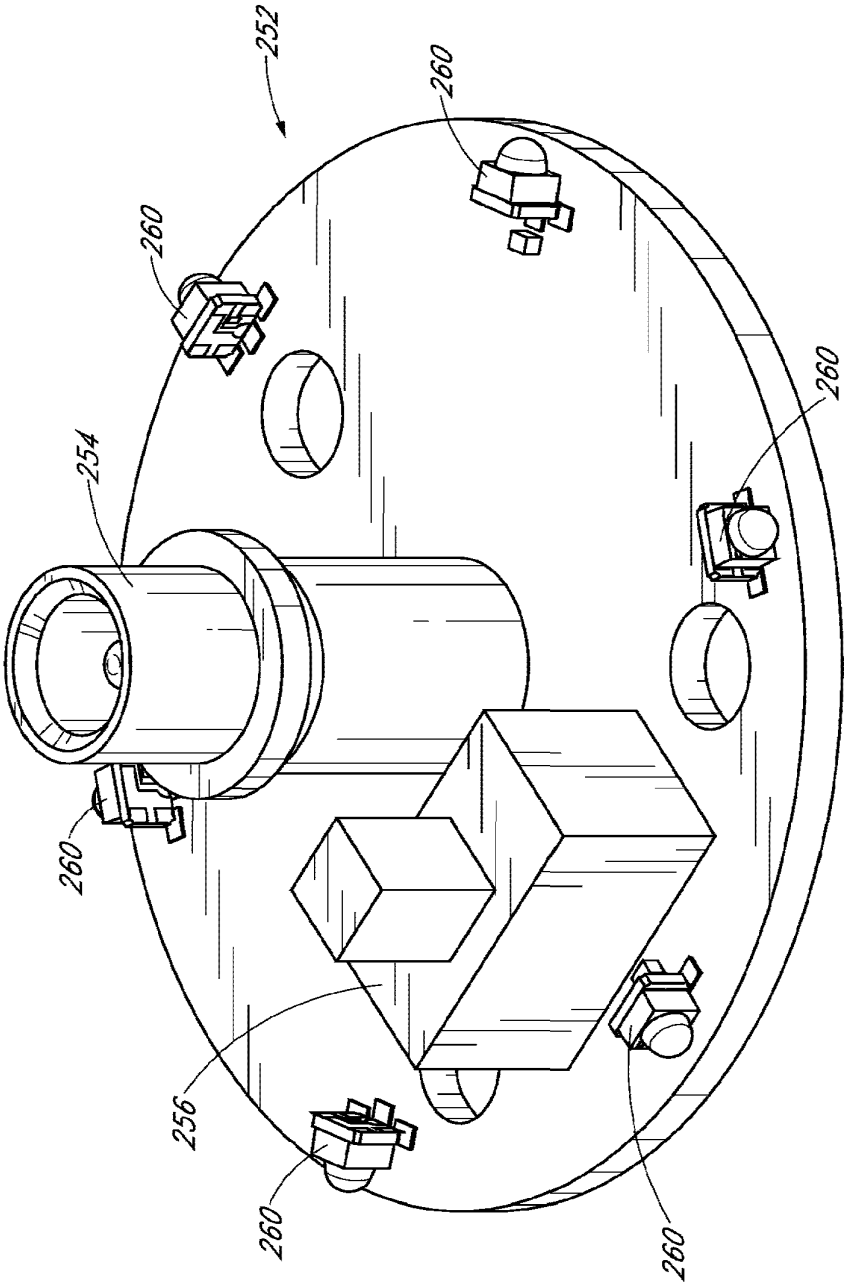


FIG. 10

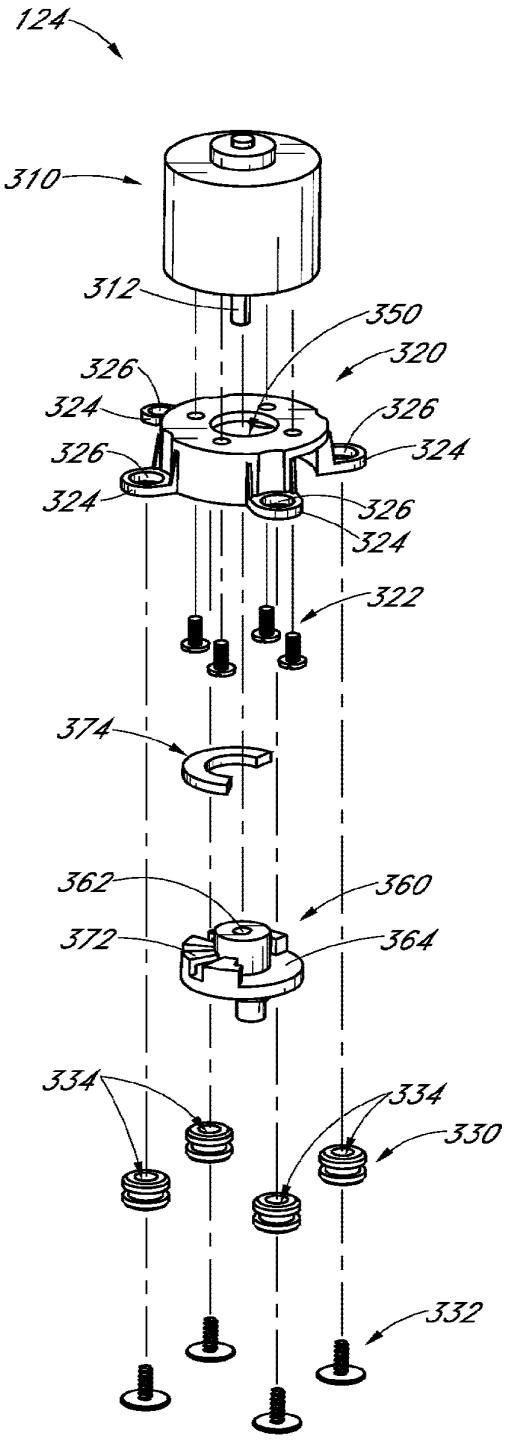


FIG. 11A

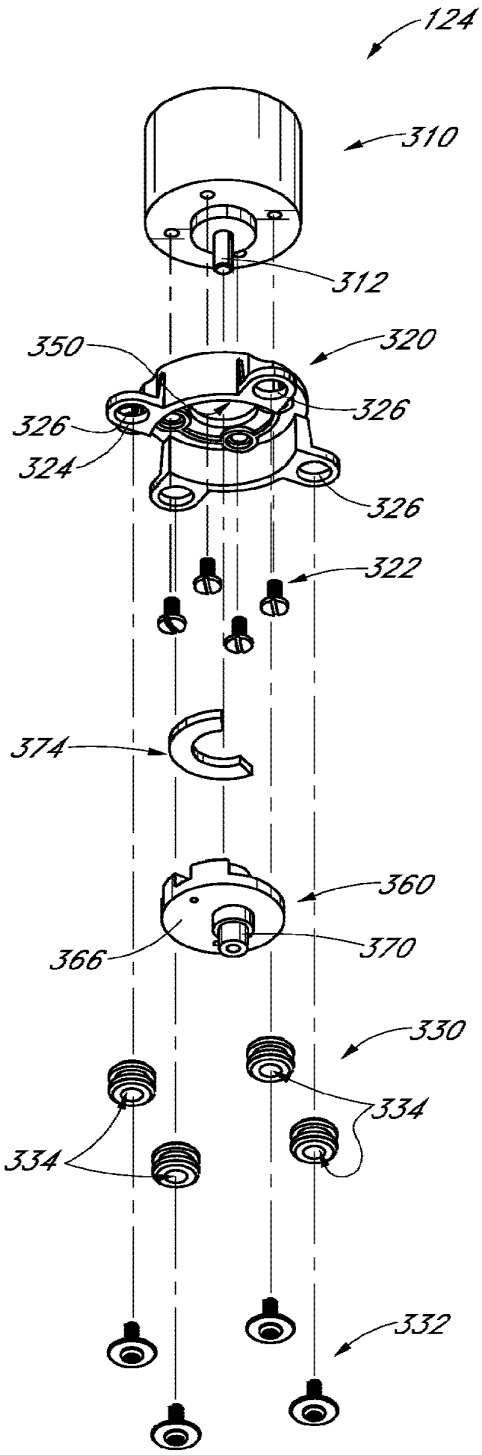


FIG. 11B

Petitioner Therabody Ex-1004, 1587

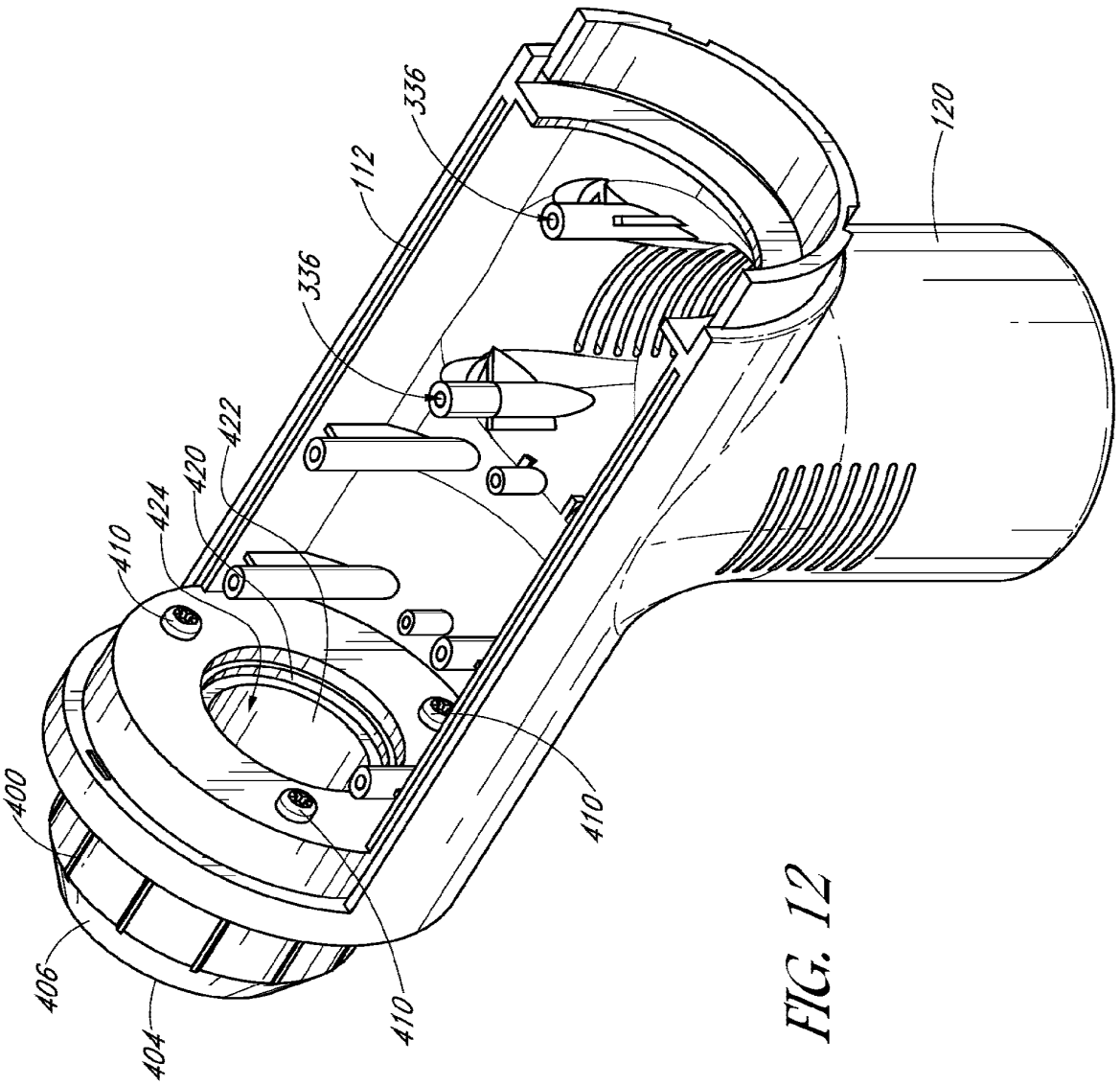


FIG. 12