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(54)

AN ADAPTIVE MULTIFUNCTIONAL CHUCK

(57) An adaptive multifunctional chuck, comprises a base, a housing, a bracket; wherein the upper surface of the base is provided in fixed connection to the housing, a bracket and a protective housing, and the protective housing is provided with a switch; the top of the housing is provided with an outlet opened to the atmosphere, and the top plate insides the housing is provided with a display screen, a single-chip microcomputer and a data storage device; the base is further provided with a first seating groove, a second seating groove, and a third seating groove on the upper surface, wherein the first seating groove is provided with a powertrain, the second seating groove is provided with a battery, and the third seating groove is provided with a valve; the base is provided with three via holes through the body, wherein a pressure sensor, a check valve and a valve are respectively provided in the three via holes through the sealing structure; the lower surface of the base is opened with an inner annular groove which is provided with a sealing ring; the single-chip microcomputer is electrically connected to the display screen, the data storage device, the powertrain, the battery, and the pressure sensor, respectively.

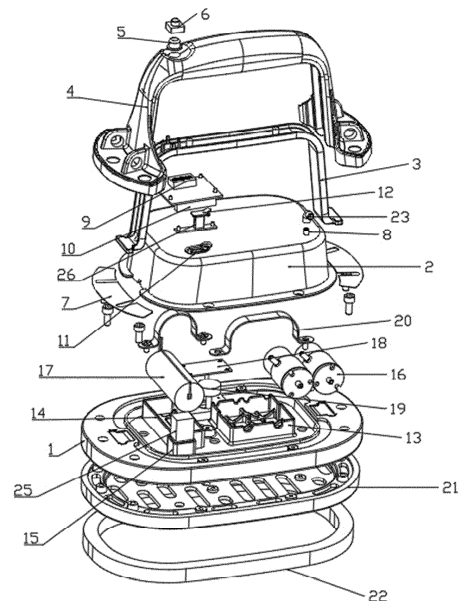


FIG. 3

Description

Technical Field

[0001] The invention relates to the field of vacuum chuck device, in particular to an adaptive multifunctional chuck.

Background

[0002] In the current construction and renovation industry, it is necessary to manually carry flat materials such as tiles and window and door glass. Before moving, it required workers to wear protective equipment and to separate the flat materials which are stacked up, which leads to the stacked flat materials being adsorbed to each other with difficulties of being separate and also causes the strong possibility of being slip from workers' hands if any carelessness due to their smooth surfaces, causing an increase in the rate of defective products.

[0003] The manual chucks on the current market are operated through the adsorption of flat materials for carrying, but the manual chucks rely on manual pressure for adsorption, which is easy to cause insufficient pressure and lead the flat material to be fallen.

[0004] In addition, some electric vacuum chucks are on the market, with the following problems in the prior arts:

- (1) The suction force level cannot be adjusted during operation, with excessive suction force easily crushing the glass, tiles and other fragile flat materials, and with insufficient suction force easily causing unstable adsorption and other phenomena.
- (2) The working pressure and power fail to be provided with a visualization function.
- (3) The product will cause safety hazards to the internal electrical components after encountering water or other liquids.

Summary of the Invention

[0005] To overcome the defects of the above background in the prior arts, the invention provides an adaptive multifunctional chuck to solve the above technical problem.

[0006] To solve the above technical problem, the invention provides the following technical solutions: An adaptive multifunctional chuck, wherein comprises a base, a housing, a bracket; the upper surface of the base is provided in fixed connection to the housing, a bracket and a protective housing, and the protective housing is provided with a switch; the top of the housing is provided with an outlet opened to the atmosphere, and the top plate insides the housing is provided with a display screen, a single-chip microcomputer and a data storage device;

[0007] The base is further provided with a first seating

groove, a second seating groove, and a third seating groove on the upper surface, wherein the first seating groove is provided with a powertrain, the second seating groove is provided with a battery, and the third seating groove is provided with a valve; the base is provided with three via holes through the body, wherein a pressure sensor, check valve and valve are respectively provided in the three via holes through the sealing structure; the lower surface of the base is opened with an inner annular groove which is provided with a sealing ring;

[0008] The single-chip microcomputer is electrically connected to the display screen, the data storage device, the powertrain, the battery, and the pressure sensor, respectively.

[0009] Further, the protective housing is provided with an inner cavity corresponding to the bracket, and the bracket is provided inside the inner cavity of the protective housing.

[0010] Further, the protective housing is provided with a switch dust plug corresponding to the position of the switch.

[0011] Further, the protective housing is provided with warning labels attached to the connection of both ends with the base.

[0012] Further, the display screen, microcontroller, and data memory are respectively fixedly connected to the inner top plate of the housing by brackets, and the data interface is opened at the top of the housing corresponding to the data memory, and a data interface dust plug is provided at the data interface.

[0013] Further, the base is provided inside with an aluminum alloy keel frame.

[0014] Further, the base is provided with a U-shaped strap clamp for securing the powertrain and the battery, and the base is fixedly connected to the U-shaped strap clamp.

[0015] Further, the outlet is connected with an outlet connector at the end away from the housing.

[0016] Compared with the prior art, the invention has the following advantages and beneficial effect: the device with reasonable structure and convenient application, can realize the adjustment, monitoring and display screen of suction force under working condition through the cooperation of single-chip microcomputer, switch, pressure sensor and display screen, to achieve the timely adjustment of the suction force according to the demand, and to facilitate the real-time monitoring of power through the battery indication of the device through the display screen.

Brief Description of the Drawings

[0017]

FIG. 1 is a schematic diagram showing a first perspective three-dimensional view of an adaptive multifunctional chuck provided by the invention.

FIG. 2 is a schematic diagram showing a second

perspective three-dimensional view of an adaptive multifunctional chuck provided by the invention.

FIG. 3 is a schematic diagram showing an exploded view of the first perspective of an adaptive multifunctional chuck provided by the invention.

FIG. 4 is a schematic diagram showing an exploded view of the second perspective of an adaptive multifunctional chuck provided by the invention.

FIG. 5 is a schematic diagram showing the control system chart of an adaptive multifunctional chuck provided by the invention.

FIG. 6 is a schematic diagram showing the circuit of an adaptive multi-functional chuck provided by the invention.

1. the base; 2. the housing; 3. the bracket; 4. the protective housing; 5. the switch; 6. the switch dust plug; 7. the warning labels; 8. the outlet; 9. the display screen; 10. the single-chip microcomputer; 11. the data interface; 12. the data interface dust plug; 13. the first seating groove; 14. the second seating groove; 15. the third seating groove; 16. the powertrain; 17. the battery; 18. the pressure sensor; 19. the check valve; 20. the U-shaped strap clamp; 21. the aluminum alloy keel frame; 22. the sealing ring; 23. the outlet connector; 24. the inner annular groove; 25. the valve; 26. the data storage device; 27. the via holes.

Description of Embodiments

[0018] To make the technical solutions provided by the invention more comprehensible, exemplary embodiments according to the application are described below in detail with reference to the accompanying drawings.

[0019] Referring to the attached drawings, as a preferred embodiment of the invention, an adaptive multifunctional chuck comprises a base 1, a housing 2, a bracket 3; the upper surface of the base 1 is provided in fixed connection to the housing 2, a bracket 2 and a protective housing 4, and the protective housing 4 is provided with a switch 5; the top of the housing 2 is provided with an outlet 8 opened to the atmosphere, and the top plate inside the housing 2 is provided with a display screen 9, a single-chip microcomputer 100 and a data storage device 26;

[0020] The base 1 is further provided with a first seating groove 13, a second seating groove 14, and a third seating groove 15 on the upper surface, wherein the first seating groove 13 is provided with a powertrain 16, the second seating groove 14 is provided with a battery 17, and the third seating groove 15 is provided with a valve 25; the base 1 is provided with three via holes 27 through the body, wherein a pressure sensor 18, check valve 19 and valve 25 are respectively provided in the three via holes 27 through the sealing structure; the lower surface of the base 1 is opened with an inner annular groove 24 which is provided with a sealing ring 22;

[0021] The single-chip microcomputer 10 is electrically

connected to the display screen 9, the data storage device 26, the powertrain 16, the battery 17, and the pressure sensor 18, respectively.

[0022] As a preferred embodiment of the invention, the protective housing 4 is provided with an inner cavity corresponding to the bracket 3, and the bracket 3 is provided inside the inner cavity of the protective housing 4.

[0023] As a preferred embodiment of the invention, the protective housing 4 is provided with a switch dust plug 6 corresponding to the position of the switch 5.

[0024] As a preferred embodiment of the invention, the protective housing 4 is provided with warning labels 7 attached to the connection of both ends with the base 1.

[0025] As a preferred embodiment of the invention, the display screen 9, microcontroller 10, and data memory 26 are respectively fixedly connected to the inner top plate of the housing 2 by brackets, and the data interface 11 is opened at the top of the housing 2 corresponding to the data memory 26, and a data interface dust plug 12 is provided at the data interface 11.

[0026] As a preferred embodiment of the invention, the base 1 is provided inside with an aluminum alloy keel frame 21.

[0027] As a preferred embodiment of the invention, the base 1 is provided with a U-shaped strap clamp 20 for securing the powertrain 16 and the battery 17, and the base 1 is fixedly connected to the U-shaped strap clamp 20.

[0028] As a preferred embodiment of the invention, the outlet 8 is connected with an outlet connector 23 at the end away from the housing 2.

[0029] In the specific implementation of the invention, during the application of the device, the user can control the operation of the device by means of switch 5, maintaining the switch 5 for 5 seconds to complete the power on of the device. When the switch 5 is clicked after switching on, the powertrain 16 will start working and the air in the middle of the bottom of the base 1 and the adsorption object will be extracted and discharged through the outlet 8 in order to form a negative pressure in the middle part of the device and the adsorption object to complete the adsorption of the object. The pressure sensor 18 will monitor the pressure at the adsorption place through the via holes 27 and transmit to the single-chip microcomputer 10 and will discontinue the extraction when reaching the pressure value.

[0030] When finishing the object transportation, the device will be disconnected from the adsorbed object when the pressure at the adsorption place returns to normal pressure by double-clicking the switch 5 continuously to start the pressure relief operation.

[0031] The device is also equipped with 'low power mode' and 'high power mode', which can be switched between the two modes by pressing switch 5 three times in succession.

[0032] The display screen 9 will show the remaining battery power of the device 17 and the suction force value under working condition in real time.

[0033] At the same time, when there is water or other liquid on the object to be adsorbed, the water or liquid will be discharged through the outlet 8 provided at the top of the housing 2, in order to protect the electronic components inside the device and to extend the service life of the device.

[0034] In addition, the protective housing 4 is made of aerospace aluminum die-casting process, with the overall weight of the device lighter than one-third compared to similar products on the market.

[0035] The invention and the embodiments thereof are described hereinabove, and this description is not restrictive. What is shown in the drawings is only one of the embodiments of the invention, and the actual structure is not limited thereto. In summary, structural methods and embodiments similar to the technical solution without departing from the inventive purpose of the invention made by inspired ordinary technicians in the art without creative efforts shall all fall within the protection scope of the invention.

Claims

1. An adaptive multifunctional chuck, wherein comprises a base (1), a housing (2), a bracket (3); the upper surface of the base (1) is provided in fixed connection to the housing (2), a bracket (2) and a protective housing (4), and the protective housing (4) is provided with a switch (5); the top of the housing (2) is provided with an outlet (8) opened to the atmosphere, and the top plate inside the housing (2) is provided with a display screen (9), a single-chip microcomputer (10) and a data storage device (26);

the base (1) is further provided with a first seating groove (13), a second seating groove (14), and a third seating groove (15) on the upper surface, wherein the first seating groove (13) is provided with a powertrain (16), the second seating groove (14) is provided with a battery (17), and the third seating groove (15) is provided with a valve (25); the base (1) is provided with three via holes (27) through the body, wherein a pressure sensor (18), check valve (19) and valve (25) are respectively provided in the three via holes (27) through the sealing structure; the lower surface of the base (1) is opened with an inner annular groove (24) which is provided with a sealing ring (22);

the single-chip microcomputer (10) is electrically connected to the display screen (9), the data storage device (26), the powertrain (16), the battery (17), and the pressure sensor (18), respectively.

2. An adaptive multifunctional chuck according to claim 1, wherein the protective housing (4) is provided with

an inner cavity corresponding to the bracket (3), and the bracket (3) is provided inside the inner cavity of the protective housing (4).

3. An adaptive multifunctional chuck according to claim 1, wherein the protective housing (4) is provided with a switch dust plug (6) corresponding to the position of the switch (5).
4. An adaptive multifunctional chuck according to claim 1, wherein the protective housing (4) is provided with warning labels (7) attached to the connection of both ends with the base (1).
5. An adaptive multifunctional chuck according to claim 1, wherein the display screen (9), microcontroller (10), and data memory (26) are respectively fixedly connected to the inner top plate of the housing (2) by brackets, and the data interface (11) is opened at the top of the housing (2) corresponding to the data memory (26), and a data interface dust plug (12) is provided at the data interface (11).
6. An adaptive multifunctional chuck according to claim 1, wherein the base (1) is provided inside with an aluminum alloy keel frame (21).
7. An adaptive multifunctional chuck according to claim 1, wherein the base (1) is provided with a U-shaped strap clamp (20) for securing the powertrain (16) and the battery (17), and the base (1) is fixedly connected to the U-shaped strap clamp (20).
8. An adaptive multifunctional chuck according to claim 1, wherein the outlet (8) is connected with an outlet connector (23) at the end away from the housing (2).

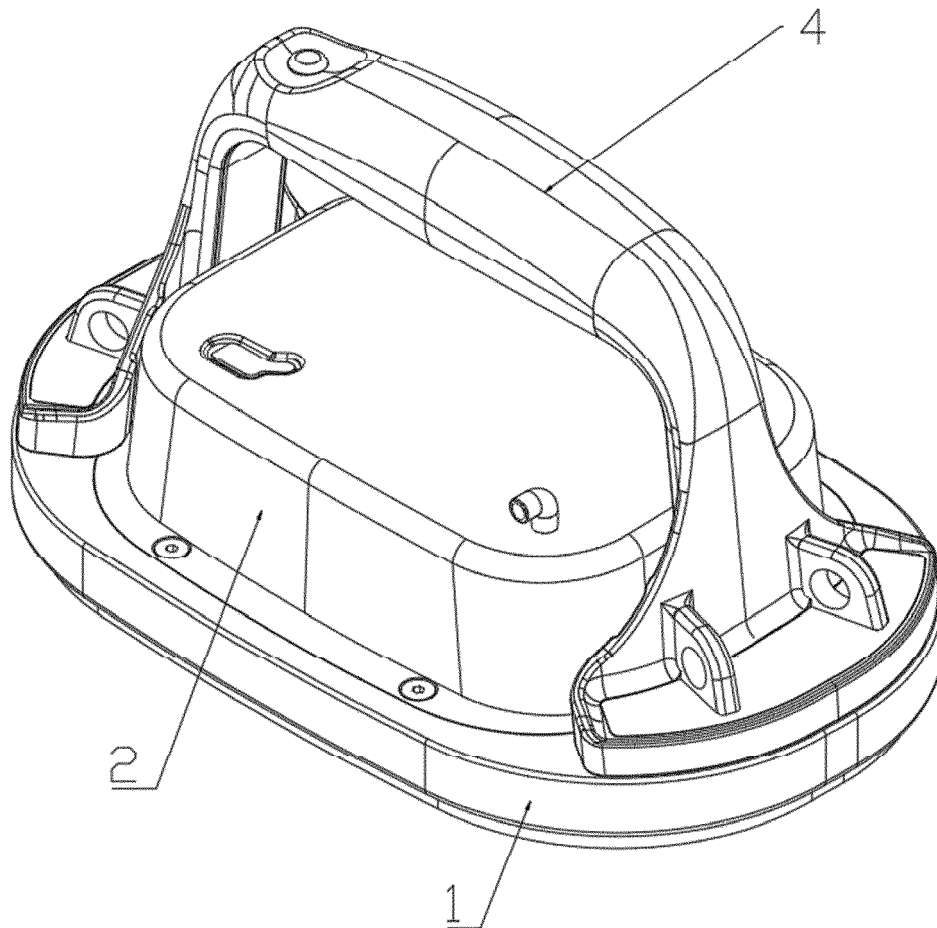


FIG. 1

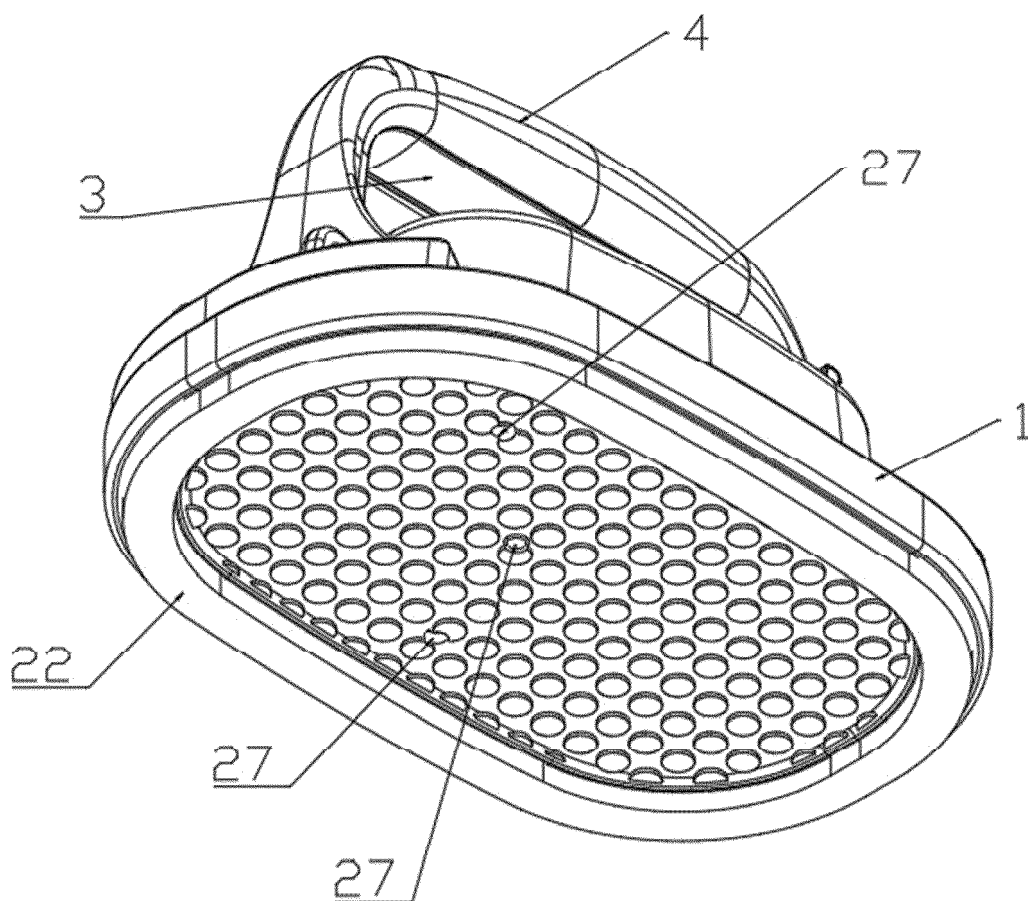


FIG. 2

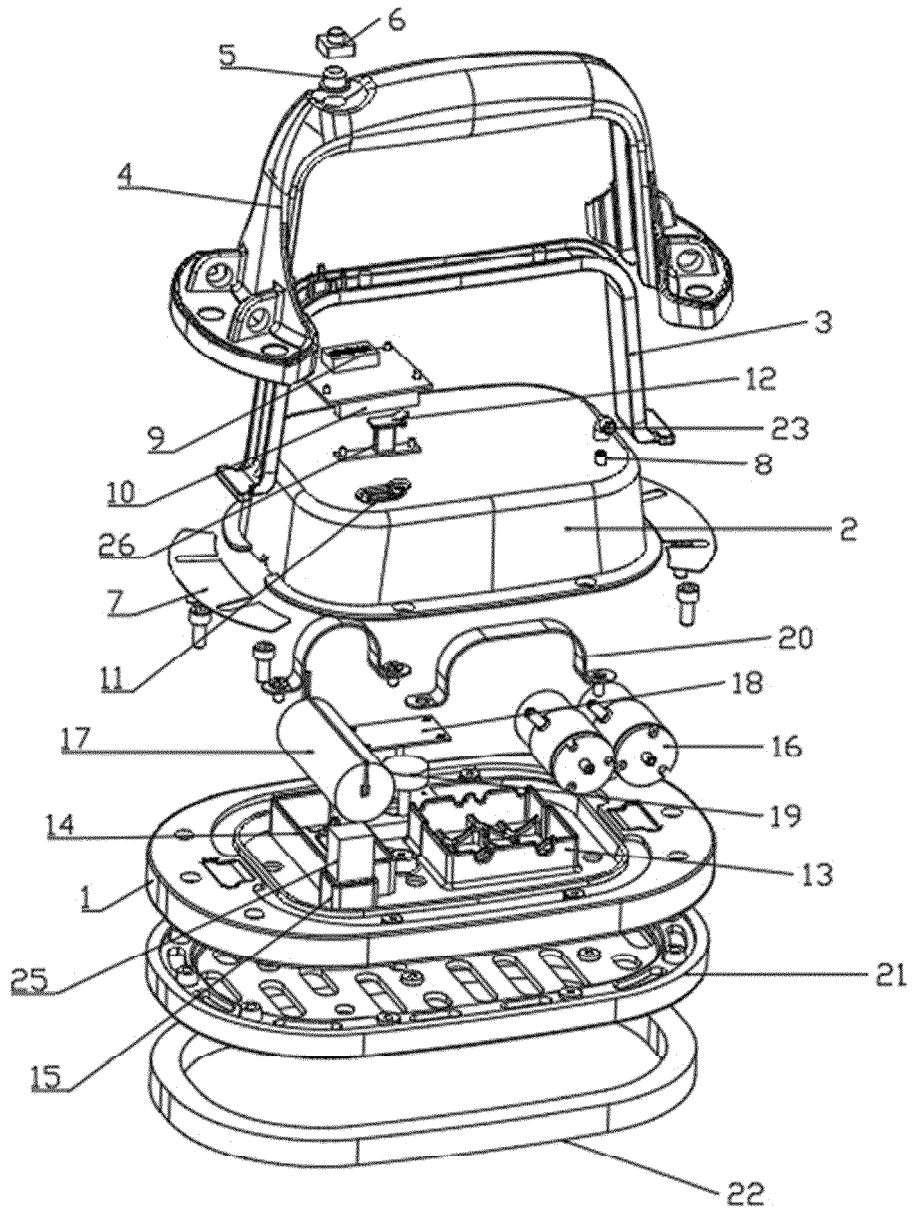


FIG. 3

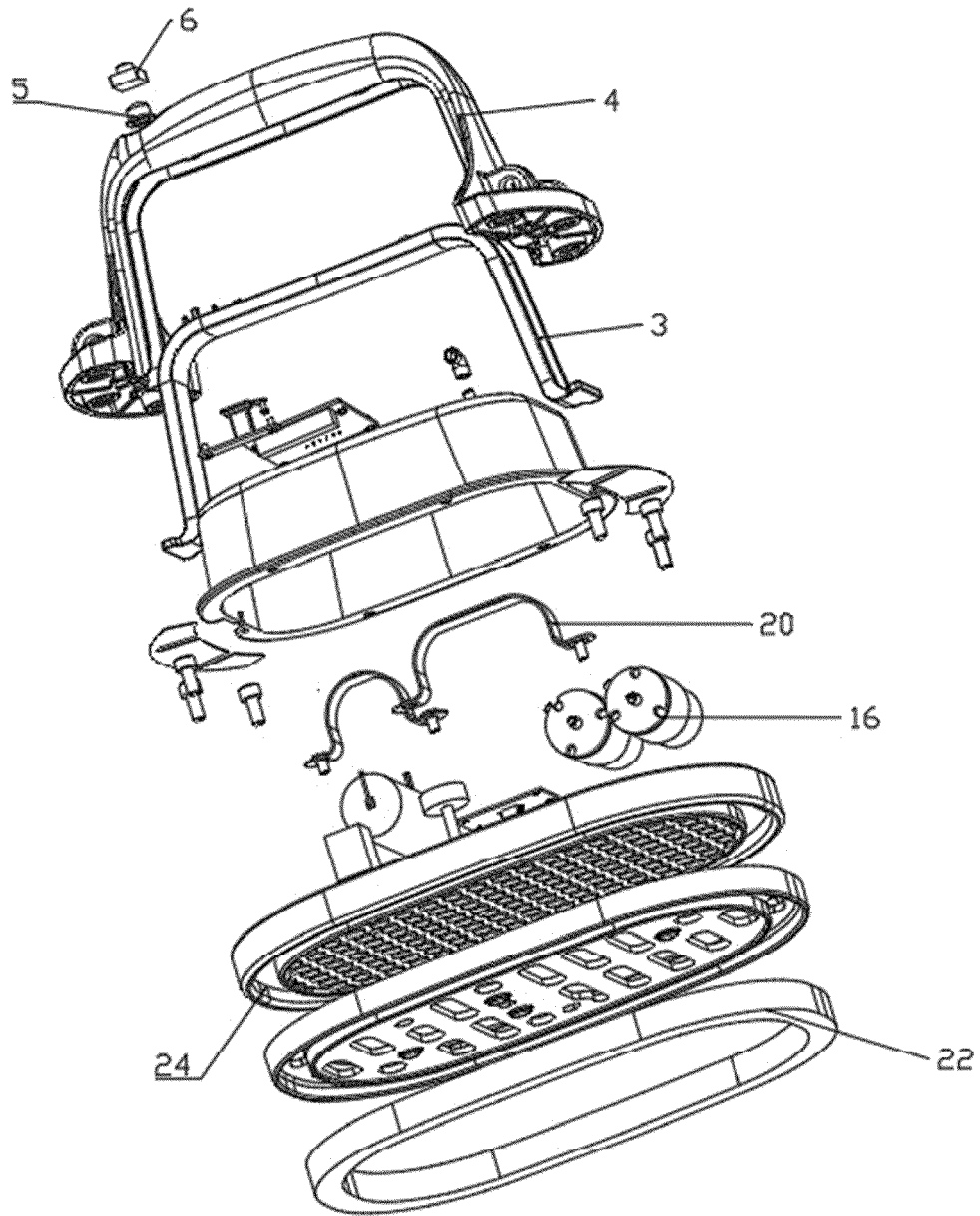


FIG. 4

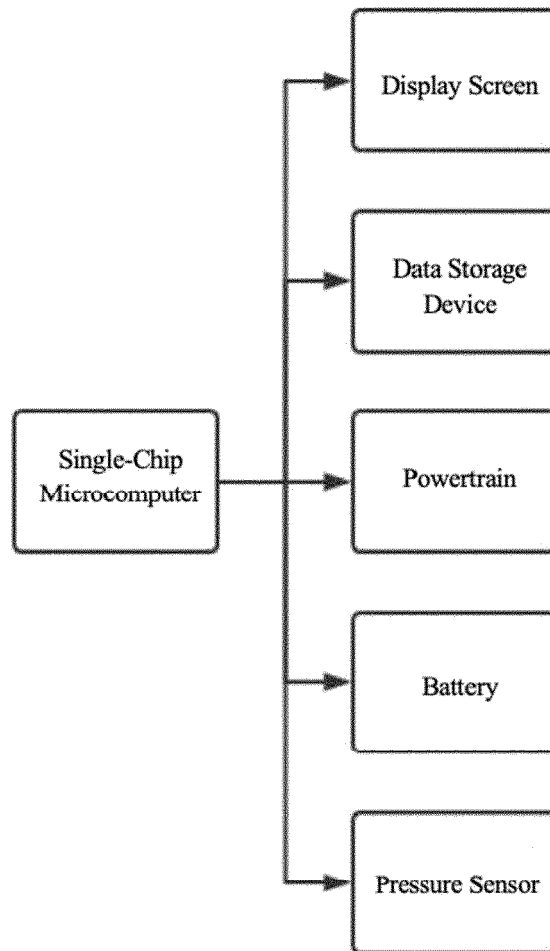
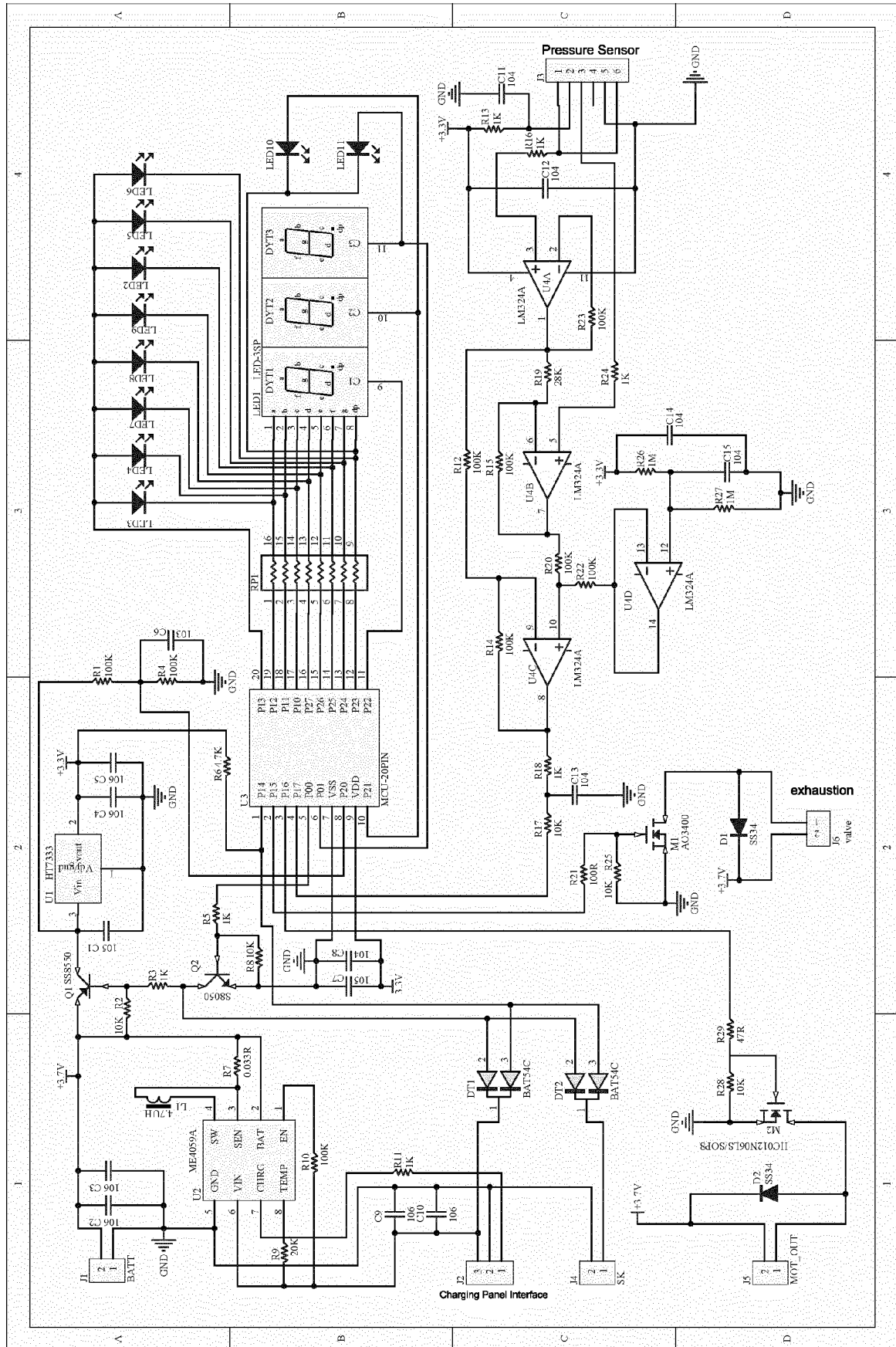


FIG. 5





EUROPEAN SEARCH REPORT

Application Number

EP 23 15 5828

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 11 007 814 B1 (ZHAN HUI [CN]) 18 May 2021 (2021-05-18) * the whole document * -----	1-8	INV. B25B11/00
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TECHNICAL FIELDS SEARCHED (IPC)

B25B

The present search report has been drawn up for all claims

1

Place of search

The Hague

Date of completion of the search

4 August 2023

Examiner

Pothmann, Johannes

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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