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

(11) EP 3 524 122 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.08.2019 Bulletin 2019/33

(51) Int Cl.:
A47L 11/40 *(2006.01)*

(21) Application number: **18250023.1**

(22) Date of filing: **28.09.2018**

(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:
KH MA MD TN

(30) Priority: **13.02.2018 PCT/CN2018/076678**
25.07.2018 US 201816044892

(71) Applicant: **HiZero Technologies Co., Ltd**
518101 Guangdong (CN)

(72) Inventor: **LI, Yang**
Shenzhen, 518101 (CN)

(74) Representative: **Atkinson & Company**
Intellectual Property Limited
7 Moorgate Road
Rotherham S60 2BF (GB)

(54) CLEANING DEVICE

(57) A cleaning device includes a cleaning head (10), a body (20), and a locking mechanism (30). The body (20) is hinged to the cleaning head (10). The locking mechanism (30) includes a first magnetic member (31) provided on the cleaning head (10) and a second magnetic member (32) provided on the body (20) and attracted to the first magnetic member (31) when the body (20) stands upright. The body (20) is locked to the cleaning head (10) by the magnetic attraction between the first magnetic member (31) and the second magnetic member (32).

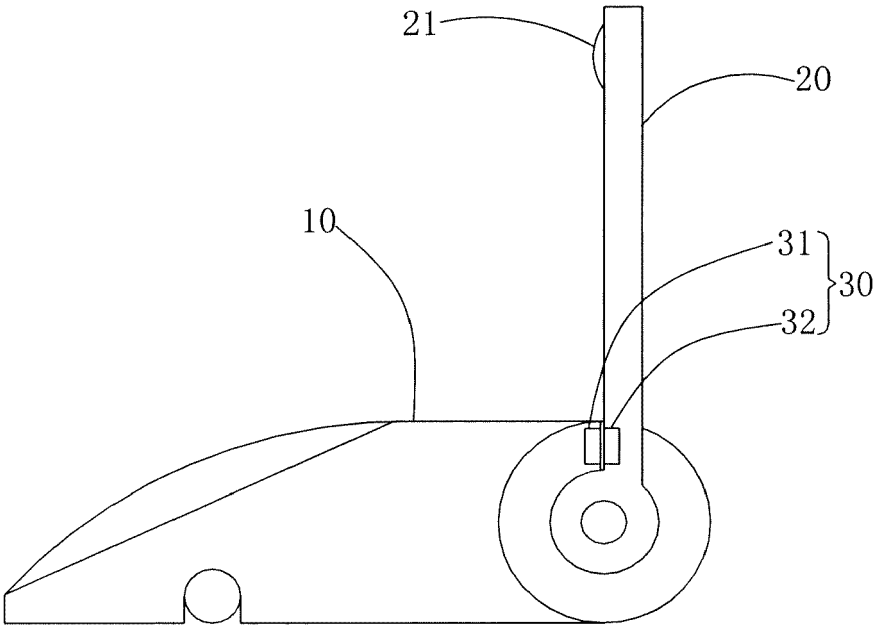

FIG. 1

EP 3 524 122 A1

Description

RELATED APPLICATIONS

[0001] This application is a continuation-in-part of and claims priority to PCT/CN2018/076678, filed on February 13, 2018, which is incorporated herein by reference.

FIELD OF THE DISCLOSURE

[0002] The present disclosure relates to the technical field of cleaning equipment and in particular to a cleaning device.

BACKGROUND OF THE DISCLOSURE

[0003] Environmental health is an important factor affecting the quality of life. Therefore, as people's requirements for quality of life continue to increase, the requirements for environmental hygiene are correspondingly higher and higher. However, the work pressure of modern people is increasing day by day. There is an urgent need to reduce the heavy workload associated with cleaning, so there is a lot of equipment for cleaning the ground to improve environmental sanitation. Some cleaning devices use a combination of a cleaning head and a body, such as an upright vacuum cleaner. The body is pivotally attached to the cleaning head. The cleaning head is used to clean the floor. The body is used to push the cleaning head. When the cleaning device is not being used, the body is positioned to be erect with respect to the cleaning head and then locked to the cleaning head by a locking mechanism. When the cleaning device is to be used, the cleaning head is unlocked from the body so that the body can be tilted with respect to the cleaning head. The locking mechanism currently used for this type of cleaning device locks the upright body to the cleaning head using elastic force, and the durability of the locking mechanism is low. After locking the body several times, the locking mechanism will appear loose or fail, and the related components crack so that the upright body can no longer lock onto the cleaning head.

SUMMARY OF THE DISCLOSURE

[0004] According to various embodiments of the present application, a cleaning device is provided. The cleaning device includes: a body; a cleaning head hinged to the body; and a locking mechanism, including a first magnetic attraction element disposed on the cleaning head and a second magnetic attraction element disposed on the body. The first magnetic member attracts the second magnetic member when the body is rotated to a vertical position relative to the cleaning head, and the body is locked to the cleaning head by the magnetic attraction between the first magnetic member and the second magnetic member. The details of one or more embodiments of the disclosure are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the disclosure will be apparent from the description and drawings and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] In order to more clearly explain the embodiments of the present disclosure or the technical solutions relative to the prior art, the drawings to be used in the description of the embodiments or the prior art will be briefly described below. Obviously, the drawings in the following description are only some embodiments of the present disclosure. For those skilled in the art, drawings of other embodiments can also be obtained based on these drawings without any creative work.

Fig. 1 is a side view of a working state of a cleaning device of a first embodiment;

Fig. 2 is a side view of another working state of the cleaning device of the first embodiment;

Fig. 3 is the side view of the cleaning device of a second embodiment;

Fig. 4 is an enlarged view of portion A of Fig. 3;

Fig. 5 is a partial structural schematic of the cleaning device of a third embodiment; and

Fig. 6 is a partial structural schematic of the cleaning device of a fourth embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0006] In order to facilitate an understanding of the present disclosure, the present disclosure will be more fully described below. However, the present disclosure may be embodied in many different forms and is not limited to the embodiments described herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete. 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 belongs. The terminology used in the description of the present disclosure herein is for the purpose of describing particular embodiments only and is not intended to limit the present disclosure.

Embodiment 1

[0007] Referring to Figs. 1 and 2, the cleaning device of an embodiment includes a cleaning head 10, a body 20, and a locking mechanism 30. The body 20 is hinged to the cleaning head 10. The locking mechanism 30 includes a first magnetic member 31 disposed on the clean-

ing head 10 and a second magnetic member 32 disposed on the body 20. As shown in Fig. 1, when the body 20 is upright, the first magnetic member 31 couples to the second magnetic member 32, and the body 20 is locked to the cleaning head by the magnetic attraction between the first magnetic member 31 and the second magnetic member 32. As shown in Fig. 2, when a cleaning operation is required, the user pulls the body 20 backward to overcome the magnetic attraction force between the first magnetic member 31 and the second magnetic member 32, so that the second magnetic member 32 is moved away from the first magnetic member 31.is. At this time, the body 20 can be tilted freely, and the cleaning device performs the cleaning work.

[0008] A handle 21 is provided at one end of the body 20 remote from the cleaning head 10. An outer surface of the handle 21 is provided with an elastic layer so that the person feels comfortable when holding the handle 21. The first magnetic member 31 and the second magnetic member 32 are equal in number and are arranged in a one-to-one correspondence. The number of first magnetic members 31 and the number of second magnetic members 32 is one or two. When the cleaning device includes one first magnetic member 31 and one second magnetic member 32, the first magnetic member 31 and the second magnetic member 32 are located on one side of the cleaning head 10. When the cleaning device includes two first magnetic members 31 and two second magnetic members 32, one of the first magnetic members 31 and one of the second magnetic member 32 are located on each lateral side of the cleaning head 10, which can enable the body 20 to be biased laterally when it is locked upright on the cleaning head 10. In turn, the body 20 can be better locked on the cleaning head 10. In the present embodiment, the number of first magnetic members 31 and the number of second magnetic members 32 is two, and one of each of the first magnetic members 31 and the second magnetic members 32 are located on each side of the cleaning head 10. In this embodiment, when the second magnetic member 32 is attracted to the first magnetic member 31, a spaced is defined between the first magnetic member 31 and the second magnetic member 32. The arrangement is such that collision damage between the first magnetic member 31 and the second magnetic member 32 does not occur.

[0009] The first magnetic member 31 and the second magnetic member 32 are magnets. When the body 20 stands upright, the second magnetic member 32 is driven by the body 20 near the first magnetic member 31, and the second magnetic member 32 cuts into the magnetic field of the first magnetic member 31 from a lateral side of the first magnetic member 31. The first magnetic member 31 also cuts into the magnetic field of the second magnetic member 32 from one side of the second magnetic member 32. The magnetic flux of the first magnetic member 31 and the second magnetic member 32 gradually increase under the influence of the magnetic fields of each other. When the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright. The magnetic fluxes of the first magnetic member 31 and the second magnetic member 32 both reach the maximum, and the magnetic attraction forces of the first magnetic member 31 and the second magnetic member 32 also reach the maximum, so that the body 20 can be securely locked on the cleaning head 10. The attraction of the first magnetic member 31 and the second magnetic member 32 is achieved through this movement. When the first magnetic member 31 and the second magnetic member 32 are separated, the first magnetic member 31 can be driven by the body 20to cut the magnetic field line laterally separated from the second magnetic member 32 until it moves to the side of the second magnetic member 32, so that it eliminates the need to overcome the excessive magnetic attraction of the magnetic pole of the first magnetic member 31 and the magnetic pole of the second magnetic member 32. The first magnetic member 31 is made easier to separate from the second magnetic member 32 for the purpose of easily tilting the body 20.

[0010] Each of the first magnetic member 31 and the second magnetic member 32 has a rectangular parallelepiped shape or a cylindrical shape. If the first magnetic member 31 and the second magnetic member 32 each have a rectangular parallelepiped shape, the first magnetic member 31 and the second magnetic member 32 each include two square end faces four square sides located between the square end faces. When the second magnetic member 32 is attracted to the first magnetic member 31, a square end face of the second magnetic member 32 is facing a square end face of the first magnetic member 31 or a square side of the second magnetic member 32 faces a square side of the first magnetic member 31. If the first magnetic member 31 and the second magnetic member 32 each have a cylindrical shape, the first magnetic member 31 and the second magnetic member 32 each include a curved side surface and two circular flat end faces. When the second magnetic member 32 is attracted to the first magnetic member 31, a circular flat end face of the second magnetic member 32 is facing a circular flat end face of the first magnetic member 31 or a curved side surface of the second magnetic member 32 is facing a curved side surface of the first magnetic member 31.

[0011] In this embodiment, the first magnetic member 31 and the second magnetic member 32 each have a rectangular parallelepiped shape. When the second magnetic member 32 is attracted to the first magnetic member 31, the curved side surface of the second magnetic member 32 faces the curved side surface of the first magnetic member 31. The first magnetic member 31 is detachably mounted on the cleaning head 10, and the second magnetic member 32 is detachably mounted on the body 20. For example, the first magnetic member 31 is connected to the cleaning head 10 by screws, and the second magnetic member 32 is connected to the body

20 by screws.

[0012] The above cleaning device, by providing the locking mechanism 30 that includes a first magnetic member 31 mounted on the cleaning head 10 and a second magnetic member 32 mounted on the body 20, so that the upright body 20 can be locked to the cleaning head 10 by the magnetic attraction between the first magnetic member 31 and the second magnetic member 32. Compared with the conventional locking mechanism for locking the body 20 and the cleaning head 10, the locking mechanism 30 of the cleaning device of the present invention is accomplished by the magnetic attraction force of the first magnetic member 31 and the second magnetic member 32. Thus, it does not easily fail and the life of the locking mechanism is improved.

Embodiment 2

[0013] The difference between the present embodiment and the first embodiment is that, referring to Figs. 3 and 4, the locking mechanism also includes a first noise reduction layer 33 covering the first magnetic member 31. The first noise reduction layer 33 can prevent the second magnetic member 32 from directly colliding with the first magnetic member, thereby protecting the first magnetic member 31 and the second magnetic member 32 from damage. The first noise reduction layer 33 can also reduce noise when the second magnetic member 32 is attracted to first magnetic member 31.

[0014] In the present embodiment, the first noise reduction layer 311 is made of cloth. In other embodiments, the first noise reduction layer 311 can be made of an elastomeric material, such as rubber.

Embodiment 3

[0015] The difference between the present embodiment and the second embodiment is as follows: referring to Fig. 5, the locking mechanism 30 does not include the first noise reduction layer 33 but includes a second noise reduction layer 34 covering the second magnetic member 32. The second noise reduction layer 34 can prevent the second magnetic member 32 from directly colliding with the first magnetic member, thereby protecting the first magnetic member 31 and the second magnetic member 32 from damage. Moreover, the second noise reduction layer 34 can also reduce noise when the second magnetic member 32 is attracted to the first magnetic member 31.

[0016] In the present embodiment, the second noise reduction layer 321 is made of cloth. In other embodiments, the second noise reduction layer 321 can be made of an elastic material, such as rubber.

Embodiment 4

[0017] The difference between the present embodiment and the second embodiment is as follows: referring to Fig. 6, the locking mechanism includes a first noise reduction layer 33 covering the first magnetic member 31 and a second noise reduction layer 34 covering the second magnetic member 32. The first noise reduction layer 33 and the second noise reduction layer 34 can prevent the second magnetic member 32 from directly colliding with the first magnetic member, thereby protecting the first magnetic member 31 and the second magnetic member 32 from damage. The first noise reduction layer 33 and the second noise reduction layer 34 can also reduce noise when the second magnetic member 32 is attracted to the first magnetic member 31.

Embodiment 5

[0018] The difference between the present embodiment and the first embodiment is that the first magnetic member 31 is a magnet and the second magnetic member 32 is a magnetic conductive metal. The magnetic conductive metal may be any one of iron, cobalt, and nickel. When the body 20 stands upright, the second magnetic member 32 cuts into the magnetic field of the first magnetic member 31 from one side of the first magnetic member 31. Under the action of the magnetic field of the first magnetic member 31, the magnetic flux of the second magnetic member 32 gradually increases. When the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright, and the magnetic flux of the second magnetic member 32 reaches a maximum. The magnetic attraction force between the first magnetic member 31 and the second magnetic member 32 also reaches a maximum, so that the body 20 can be securely locked on the cleaning head 10.

[0019] When pulling the body 20 to separate the second magnetic member 32 from the first magnetic member 31, the second magnetic member 32 laterally leaves the first magnetic member 31. It is not necessary to overcome the excessive magnetic attraction of the magnetic pole of the first magnetic member 31 and the magnetic pole of the second magnetic member 32. Thus, it makes the first magnetic member 31 easier to separate from the second magnetic member 32.

Embodiment 6

[0020] The difference between the present embodiment and the first embodiment is that the first magnetic member 31 is an iron block and the second magnetic member 32 is a magnetic conductive metal. T magnetic conductive metal may be any one of iron, cobalt, and nickel.

[0021] When the body 20 is upright, the second magnetic member 32 is adjacent to the first magnetic member 31, and the first magnetic member 31 is cut into the magnetic field of the second magnetic member 32 from one side of the second magnetic member 32 with respect to the second magnetic member 32. Under the action of the

magnetic field of the second magnetic member 32, the magnetic flux of the first magnetic member 31 gradually increases, and when the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright, and the magnetic flux of the first magnetic member 31 reaches the maximum. The magnetic attraction force between the first magnetic member 31 and the second magnetic member 32 also reaches a maximum, so that the body 20 can be securely locked on the cleaning head 10.

[0022] When pulling the body 20 to separate the second magnetic member 32 from the first magnetic member 31, the second magnetic member 32 laterally leaves the first magnetic member 31. It is not necessary to overcome the excessive magnetic attraction of the magnetic pole of the first magnetic member 31 and the magnetic pole of the second magnetic member 32. Thus, it makes the first magnetic member 31 is easier to separate from the second magnetic member 32.

Embodiment 7

[0023] The difference between the present embodiment and the first embodiment is that the first magnetic member 31 is an electromagnet and the second magnetic member 32 is a magnetic conductive metal. The magnetic conductive metal can be any one of iron, cobalt, and nickel.

[0024] When driving the body 20 upright, the first magnetic member 31 is first energized to generate a magnetic field, and then the body 20 is driven upright. The second magnetic member 32 cuts into the magnetic field of the first magnetic member 31 from one side of the first magnetic member 31. Under the action of the magnetic field of the first magnetic member 31, the magnetic flux of the second magnetic member 32 gradually increases, and when the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright, and the magnetic flux of the second magnetic member 32 reaches the maximum. The magnetic attraction force between the first magnetic member 31 and the second magnetic member 32 also reaches a maximum, so that the body 20 can be securely locked on the cleaning head 10.

[0025] When pulling the body 20 to separate the second magnetic member 32 from the first magnetic member 31, the power supplied to the first magnetic member 31 is first disconnected. At this time, the magnetic field of the first magnetic member 31 disappears. There is no magnetic attraction between the first magnetic member 31 and the second magnetic member 32, and the second magnetic member 32 can be easily separated from the first magnetic member 31.

Embodiment 8

[0026] The difference between the present embodiment and the first embodiment is that the first magnetic member 31 is a magnetic conductive metal and the second magnetic member 32 is an electromagnet. The magnetic conductive metal can be any one of iron, cobalt, and nickel.

[0027] When driving the body 20 is to be upright, the first magnetic member 31 is first energized to generate a magnetic field, and then the body 20 is driven upright. The second magnetic member 32 is adjacent to the first magnetic member 31. The first magnetic member 31 cuts into the magnetic field of the second magnetic member 32 from one side of the second magnetic member 32. Under the action of the magnetic field of the second magnetic member 32, the magnetic flux of the first magnetic member 31 gradually increases, and when the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright, and the magnetic flux of the first magnetic member 31 reaches the maximum. The magnetic attraction force between the first magnetic member 31 and the second magnetic member 32 also reaches a maximum, so that the body 20 can be securely locked to the cleaning head 10.

[0028] When pulling the body 20 to separate the second magnetic member 32 from and the first magnetic member 31, the power supplied to the second magnetic member 32 is first disconnected. At this time, the magnetic field of the second magnetic member 32 disappears. There is no magnetic attraction between the first magnetic member 31 and the second magnetic member 32. The second magnetic member 32 can be easily separated from the first magnetic member 31 when the body is pulled.

Embodiment 9

[0029] The difference between the present embodiment and the first embodiment is that the first magnetic member 31 and the second magnetic member 32 are both electromagnets.

[0030] When driving the body 20 upright, the first magnetic member 31 and the second magnetic member 32 are energized at the same time to generate a magnetic field, and then the body 20 is driven upright. The second magnetic member 32 is adjacent to the first magnetic member 31. With respect to the second magnetic member 32, the first magnetic member 31 cuts into the magnetic field of by the second magnetic member 32 from one side of the second magnetic member 32. Under the action of the magnetic field of the second magnetic member 32, the magnetic flux of the first magnetic member 31 gradually increases, and when the second magnetic member 32 is facing the first magnetic member 31, the second magnetic member 32 stops moving. At this time, the body 20 stands upright, and the magnetic flux of the

first magnetic member 31 and the magnetic flux of the second magnetic member 32 reach a maximum. The magnetic attraction force between the first magnetic member 31 and the second magnetic member 32 also reaches a maximum, so that the body 20 can be securely locked on the cleaning head 10.

[0031] When pulling the body 20 to separate the second magnetic member 32 from the first magnetic member 31, the power supplied to the second magnetic member 32 is first disconnected, and at this time, the magnetic field of the second magnetic member 32 disappears. There is no magnetic attraction between the first magnetic member 31 and the second magnetic member 32. Thus, it makes the second magnetic member 32 more easy to separate from the first magnetic member 31.

[0032] The technical features of the above described embodiments may be combined in any combination. In order to succinctly describe the description, all possible combinations of the various technical features in the above embodiments are not described. However, as long as there is no contradiction in the combination of these technical features, it should be considered as the scope of the present specification.

[0033] The above-described embodiments are merely illustrative of several embodiments of the present invention, and the description thereof is more specific and detailed, but is not to be construed as limiting the scope of the invention. It should be noted that a number of variations and modifications may be made by those skilled in the art without departing from the spirit and scope of the invention. Therefore, the scope of protection of the present invention should be determined by the appended claims.

Claims

1. A cleaning device comprising:

a body;
a cleaning head hinged to the body; and
a locking mechanism comprising a first magnetic member disposed on the cleaning head and a second magnetic member disposed on the body, when the body rotates vertically relative to the cleaning head, the first magnetic member attracts the second magnetic member, and the body is locked to the cleaning head by a magnetic attraction between the first magnetic member and the second magnetic member.

2. The cleaning device according to claim 1, wherein the body is provided with a handle at an end remote from the cleaning head.

3. The cleaning device according to claim 2, wherein an elastic layer is provided on an outer surface of the handle.

4. The cleaning device according to claim 1, wherein the first magnetic member and the second magnetic member are located on one side of the cleaning head.

5. The cleaning device according to claim 1, wherein the number of the first magnetic members and the second magnetic members is two, the two first magnetic members and the two second magnetic members are located on lateral sides of the cleaning head, respectively.

6. The cleaning device according to claim 1, wherein the first magnetic member and the second magnetic member are each in the shape of a rectangular parallelepiped.

7. The cleaning device according to claim 6, when the second magnetic member is attracted to the first magnetic member, an end face of the second magnetic member is facing an end surface of the first magnetic member.

8. The cleaning device according to claim 1, wherein the first magnetic member and the second magnetic member each have a cylindrical shape.

9. The cleaning device according to claim 8, when the second magnetic member is attracted to the first magnetic member, a circular flat end face of the second magnetic member is facing a circular flat end face of the first magnetic member.

10. The cleaning device according to claim 8, when the second magnetic member is attracted to the first magnetic member, a curved side surface of the second magnetic member is facing a curved side surface of the first magnetic member.

11. The cleaning device according to claim 1, wherein the first magnetic member and the second magnetic member are spaced apart when the second magnetic member is attracted to the first magnetic member,.

12. The cleaning device according to claim 1, wherein the locking mechanism further comprises a first noise reduction layer, and the first noise reduction layer covers the first magnetic member.

13. The cleaning device according to claim 1, wherein the locking mechanism further comprises a second noise reduction layer, and the second noise reduction layer covers the second magnetic member.

14. The cleaning device according to claim 1, wherein at least one of:

the first magnetic member and the second mag-

netic member are magnets, or
the first magnetic member and the second magnetic member are electromagnets.

15. The cleaning device according to claim 1, wherein at least one of:

the first magnetic member and the second magnetic member are respectively a magnet and a magnetic conductive metal, or
the first magnetic member and the second magnetic member are respectively an electromagnet and a magnetic conductive metal.

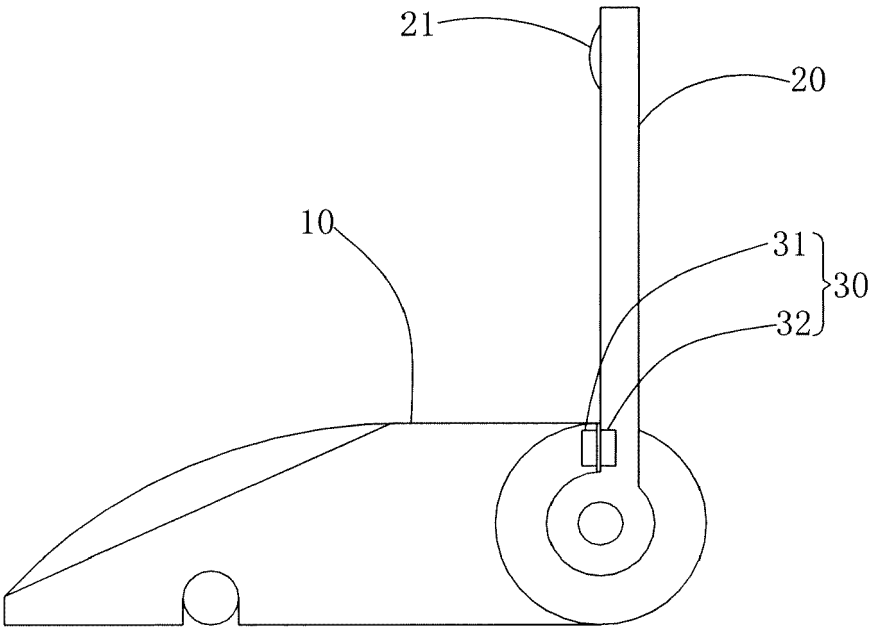

FIG. 1

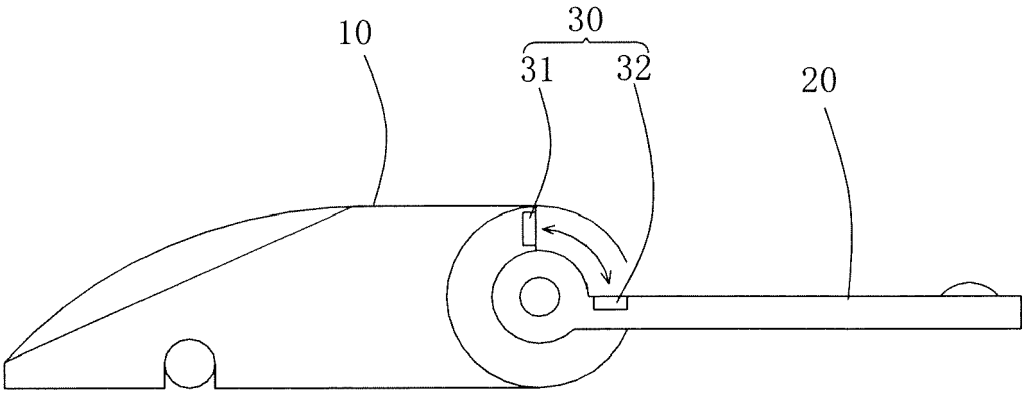

FIG. 2

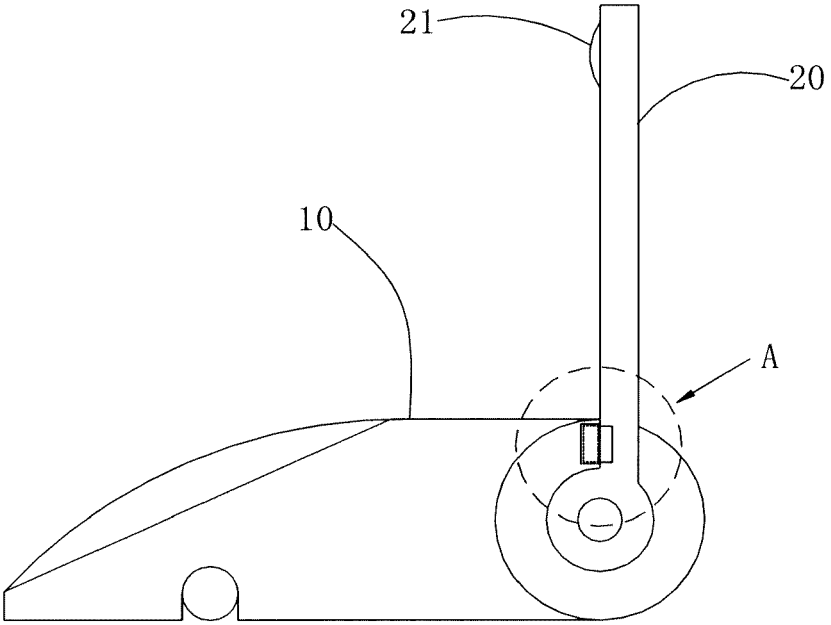

FIG. 3

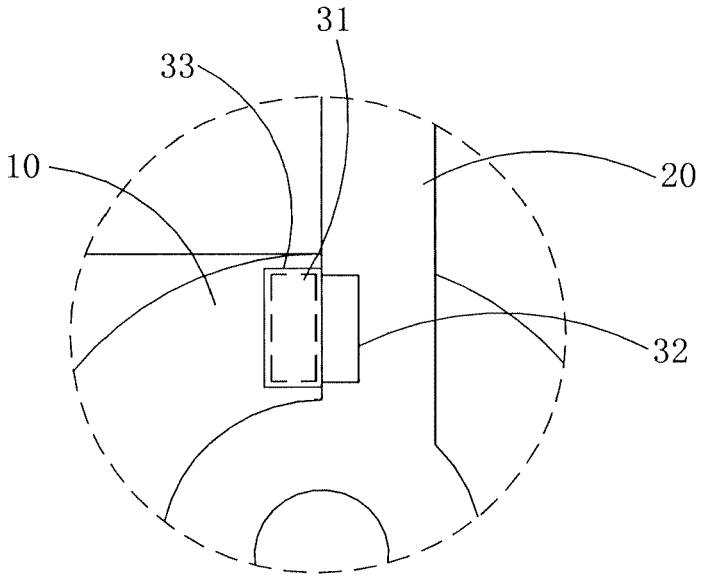

FIG. 4

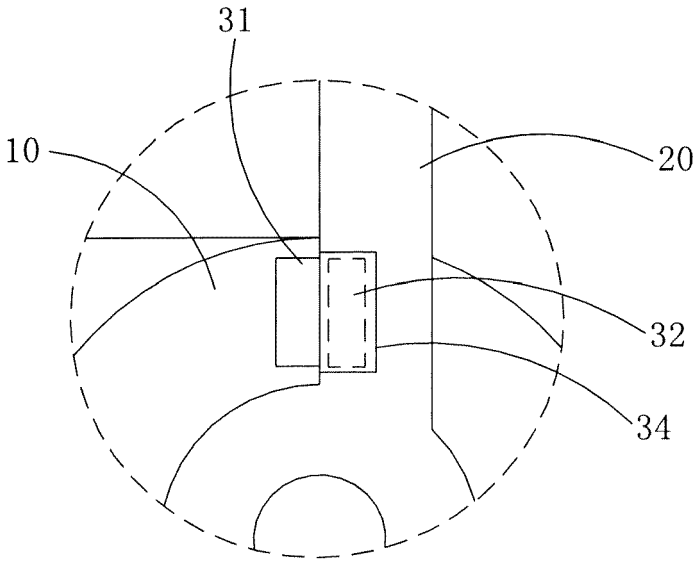

FIG. 5

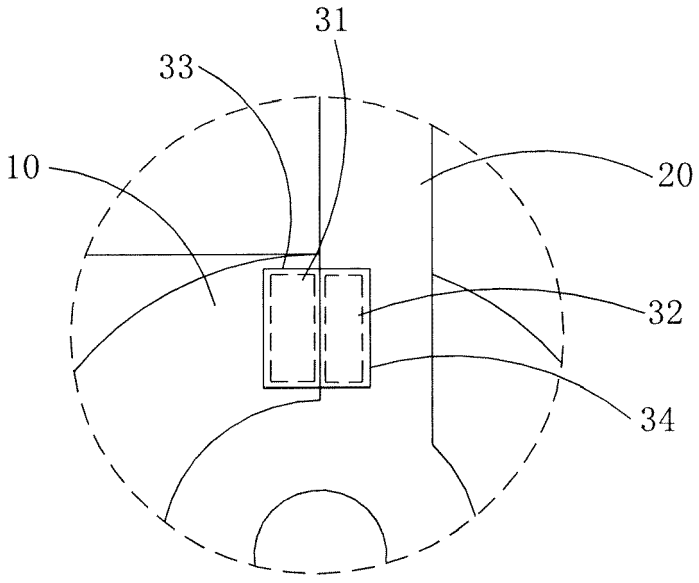

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 25 0023

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	WO 2016/141953 A1 (ALFRED KÄRCHER GMBH & CO KG [DE]) 15 September 2016 (2016-09-15) * page 31, line 26 - page 32, line 12; claim 6; figure 6 *	1-15	INV. A47L11/40
X	US 9 999 333 B2 (SHARKNINJA OPERATING LLC [US]) 2 July 2015 (2015-07-02) * columns 5,6; figures 6,7 *	1-15	
X	WO 2016/141960 A1 (ALFRED KÄRCHER GMBH & CO KG [DE]) 15 September 2016 (2016-09-15) * page 31 - page 32; claim 6; figure 6 *	1-15	
X	US 8 752 241 B2 (WOERWAG PETER [CH]; DUEPRO AG [CH]) 17 June 2014 (2014-06-17) * columns 4-5; claims; figures 1-5 *	1-15	
X	CN 201 052 128 Y (CHANGXIE XU [CN]) 30 April 2008 (2008-04-30) * claims; figures *	1-15	
X	WO 2007/092508 A2 (ONTEL PRODUCTS CORP [US]; KHUBANI ASHOK [US]) 16 August 2007 (2007-08-16) * page 8; claims; figure 4 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) A47L B08B H01L E01H
A	US 7 581 284 B2 (DYSON TECHNOLOGY LTD [GB]) 1 September 2009 (2009-09-01) * column 4, line 12 - line 20; figures 1,2 *	3	
A	CH 267 910 A (ERNST WERNER [CH]) 30 April 1950 (1950-04-30) * page 2, lines 59-66 *	12,13	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 March 2019	Lopez Vega, Javier

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)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 25 0023

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.

28-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016141953 A1	15-09-2016	CN 107427174 A	01-12-2017
		EP 3264959 A1	10-01-2018
		WO 2016141953 A1	15-09-2016
US 9999333 B2	02-07-2015	CN 203935144 U	12-11-2014
		US 2014245555 A1	04-09-2014
		US 2015183108 A1	02-07-2015
WO 2016141960 A1	15-09-2016	CN 107405032 A	28-11-2017
		EP 3264962 A1	10-01-2018
		WO 2016141960 A1	15-09-2016
US 8752241 B2	17-06-2014	DE 102010038026 A1	12-04-2012
		US 2012090131 A1	19-04-2012
CN 201052128 Y	30-04-2008	NONE	
WO 2007092508 A2	16-08-2007	NONE	
US 7581284 B2	01-09-2009	AT 407615 T	15-09-2008
		AT 410110 T	15-10-2008
		AT 418903 T	15-01-2009
		AT 460872 T	15-04-2010
		AU 2003283157 A1	25-02-2004
		AU 2003283159 A1	25-02-2004
		AU 2003283161 A1	25-02-2004
		BR 0312979 A	14-06-2005
		BR 0313040 A	14-06-2005
		BR 0313223 A	12-07-2005
		CA 2495053 A1	19-02-2004
		CA 2495066 A1	19-02-2004
		CA 2495073 A1	19-02-2004
		CA 2697025 A1	19-02-2004
		CA 2804831 A1	19-02-2004
		CN 1674818 A	28-09-2005
		CN 1674819 A	28-09-2005
		CN 1674820 A	28-09-2005
		CN 101219037 A	16-07-2008
		EP 1526796 A1	04-05-2005
		EP 1526797 A1	04-05-2005
		EP 1526798 A1	04-05-2005
		EP 1915937 A1	30-04-2008
		ES 2312796 T3	01-03-2009
		ES 2314220 T3	16-03-2009
		ES 2318144 T3	01-05-2009
		GB 2391459 A	11-02-2004

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 25 0023

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.

28-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 4077822 B2	23-04-2008
		JP 4077823 B2	23-04-2008
		JP 4718176 B2	06-07-2011
		JP 4913238 B2	11-04-2012
		JP 5112887 B2	09-01-2013
		JP 5618972 B2	05-11-2014
		JP 2005534442 A	17-11-2005
		JP 2006503607 A	02-02-2006
		JP 2006503608 A	02-02-2006
		JP 2008093476 A	24-04-2008
		JP 2011045741 A	10-03-2011
		JP 2012040440 A	01-03-2012
		KR 20050056196 A	14-06-2005
		KR 20050060066 A	21-06-2005
		KR 20060004647 A	12-01-2006
		KR 20070116131 A	06-12-2007
		MX PA05001610 A	19-08-2005
		MX PA05001611 A	25-04-2005
		MX PA05001612 A	25-04-2005
		MY 135045 A	31-01-2008
		MY 135421 A	30-04-2008
		MY 141889 A	16-07-2010
		MY 142498 A	30-11-2010
		NZ 537905 A	29-09-2006
		NZ 537906 A	27-10-2006
		NZ 537907 A	29-09-2006
		RU 2316245 C2	10-02-2008
		RU 2316992 C2	20-02-2008
		RU 2329757 C2	27-07-2008
		TW I295164 B	01-04-2008
		TW 200409610 A	16-06-2004
		TW 200410655 A	01-07-2004
		TW 200835460 A	01-09-2008
		US 2005223516 A1	13-10-2005
		US 2005223517 A1	13-10-2005
		US 2005235454 A1	27-10-2005
		US 2008022482 A1	31-01-2008
		US 2009288268 A1	26-11-2009
		WO 2004014209 A1	19-02-2004
		WO 2004014210 A1	19-02-2004
		WO 2004014211 A1	19-02-2004
		ZA 200500578 B	19-10-2005
		ZA 200500579 B	22-02-2006
		ZA 200500580 B	22-02-2006
CH 267910 A	30-04-1950	NONE	

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 25 0023

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.

28-03-2019

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

EPO FORM P0459

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

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

- CN 2018076678 W **[0001]**