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(54) **ROLLER BRUSH ASSEMBLY, CLEANING DEVICE, DETECTION METHOD, AND STORAGE MEDIUM**

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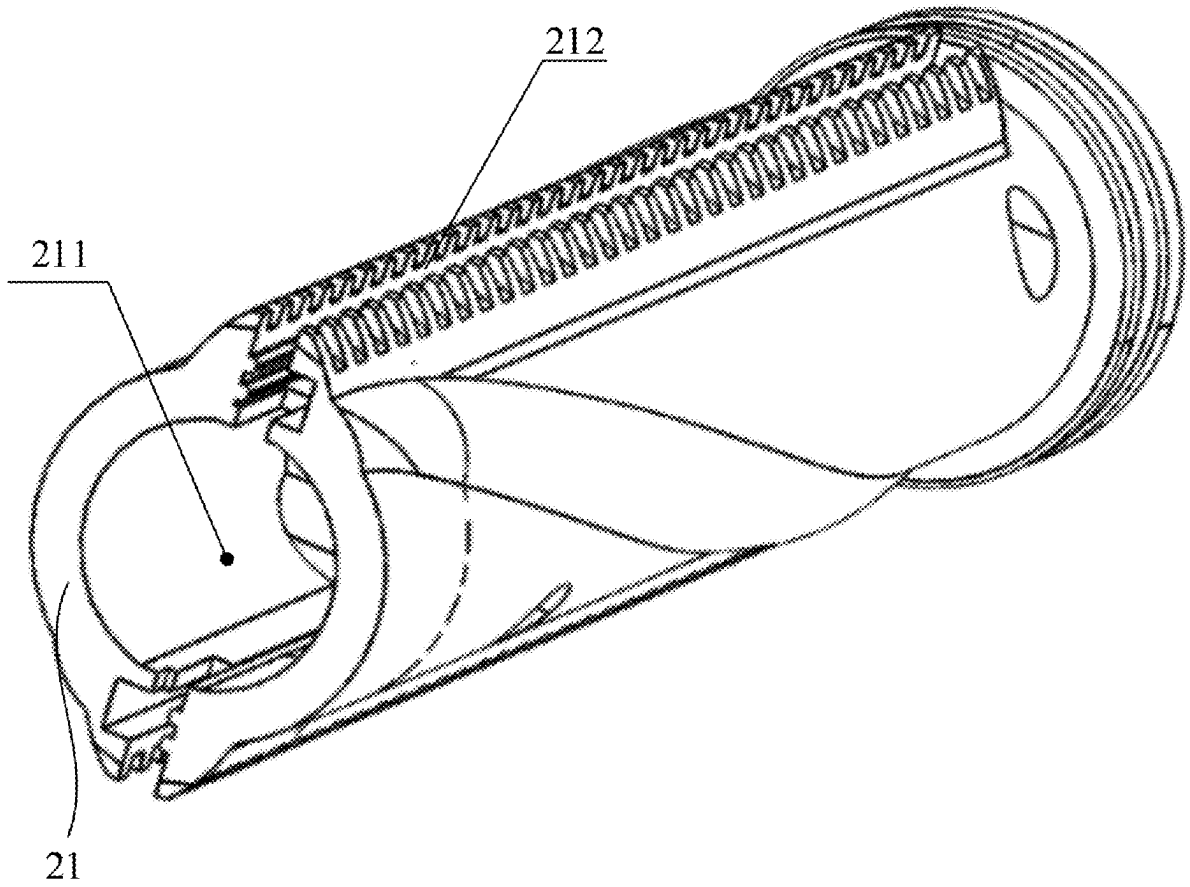
(57) **ABSTRACT**

A roller brush assembly, a cleaning device, a detection method, a storage medium, and a computer program product are provided. The roller brush assembly includes: a roller brush housing; a roller brush, located inside the roller brush housing; and a magnetic detector, located on an outer surface of the roller brush housing and configured to detect a magnetic signal, wherein the magnetic signal is configured to determine a type of the roller brush.



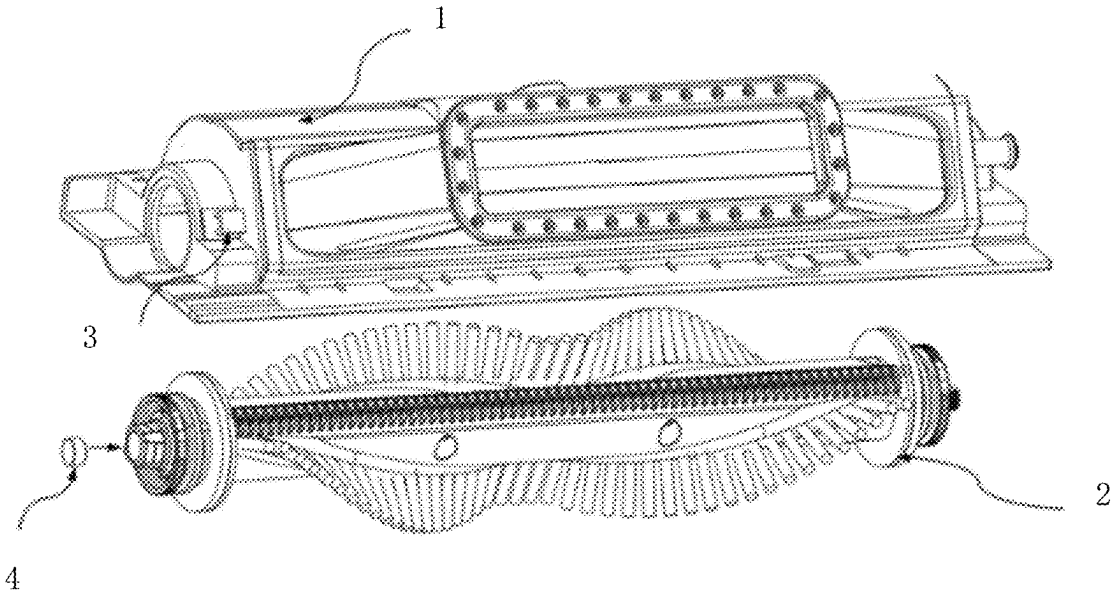


Figure 1

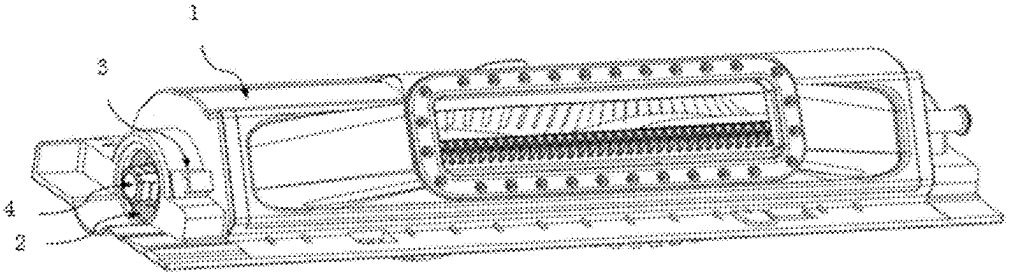


Figure 2

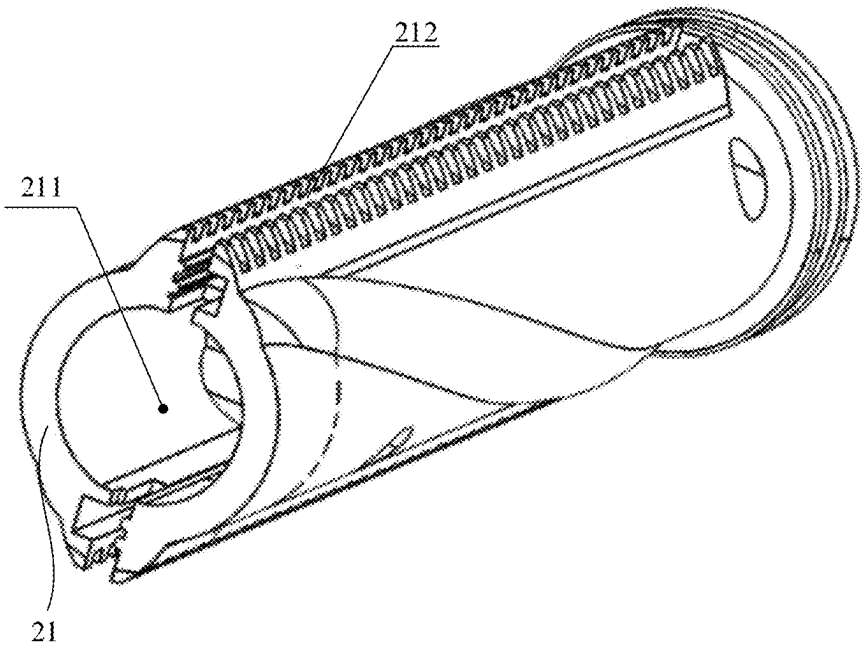


Figure 3

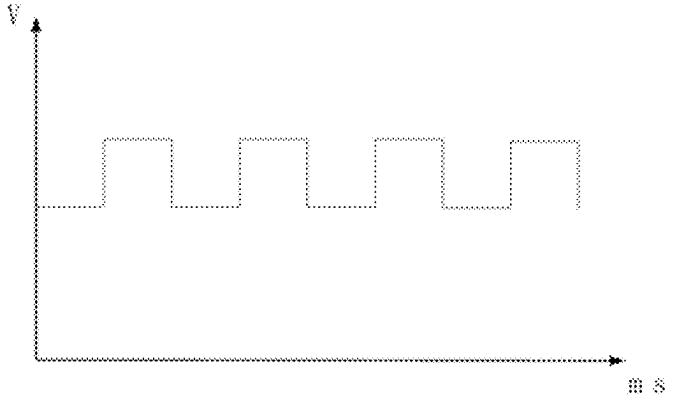


Figure 4

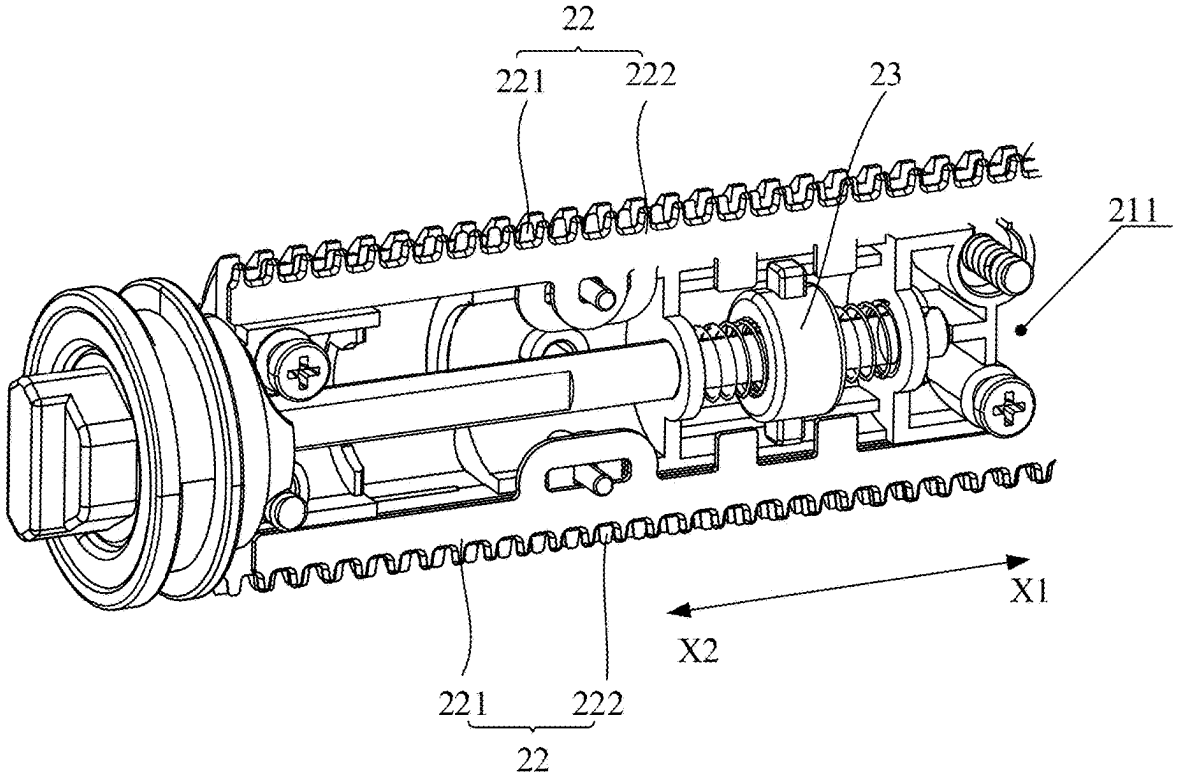


Figure 5

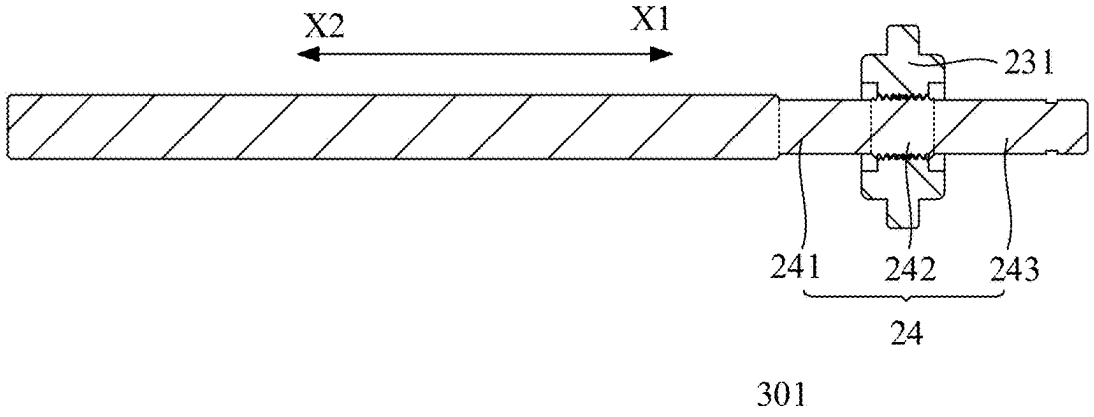


Figure 6

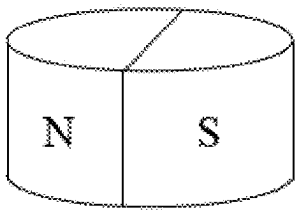


Figure 7

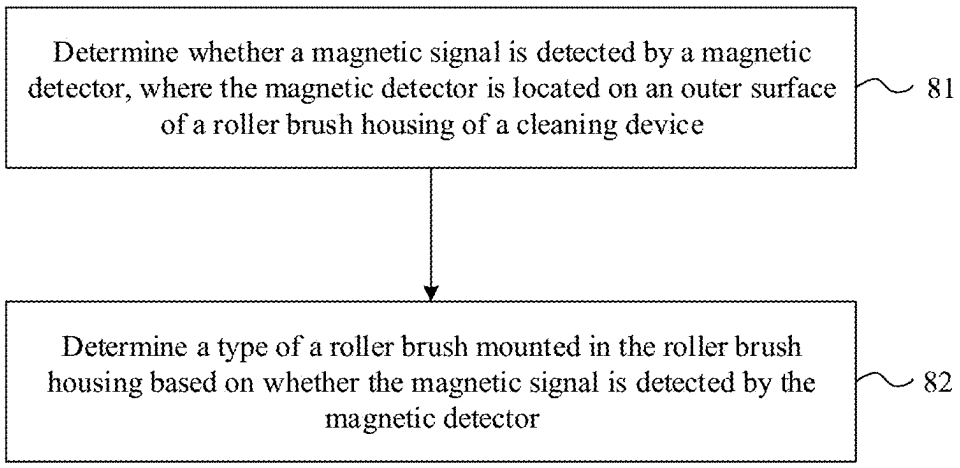


Figure 8

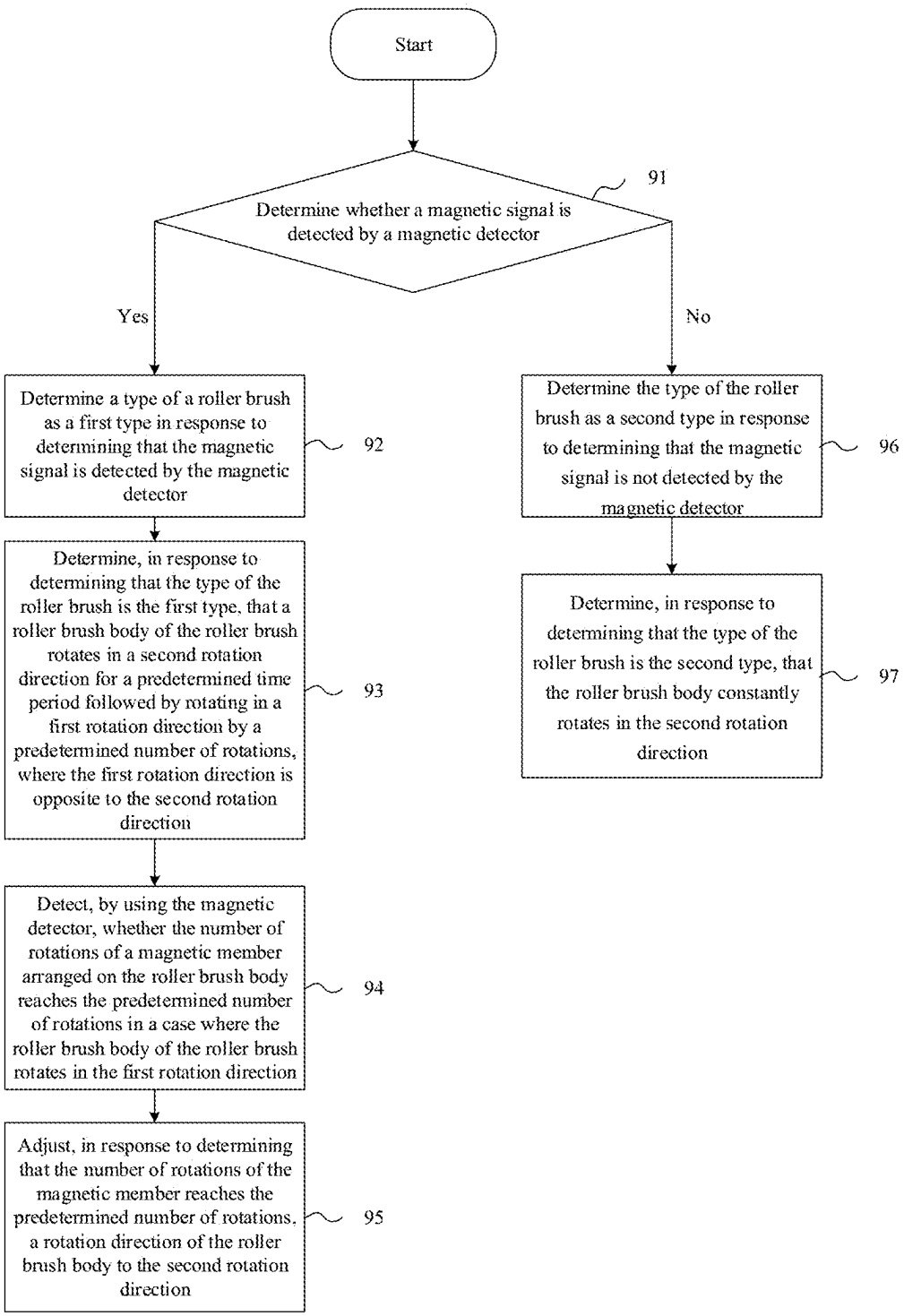

Start
Determine whether a magnetic signal is detected by a magnetic detector
91
Yes
No
Determine a type of a roller brush as a first type in response to determining that the magnetic signal is detected by the magnetic detector
92
Determine, in response to determining that the type of the roller brush is the first type, that a roller brush body of the roller brush rotates in a second rotation direction for a predetermined time period followed by rotating in a first rotation direction by a predetermined number of rotations, where the first rotation direction is opposite to the second rotation direction
93
Detect, by using the magnetic detector, whether the number of rotations of a magnetic member arranged on the roller brush body reaches the predetermined number of rotations in a case where the roller brush body of the roller brush rotates in the first rotation direction
94
Adjust, in response to determining that the number of rotations of the magnetic member reaches the predetermined number of rotations, a rotation direction of the roller brush body to the second rotation direction
95
Determine the type of the roller brush as a second type in response to determining that the magnetic signal is not detected by the magnetic detector
96
Determine, in response to determining that the type of the roller brush is the second type, that the roller brush body constantly rotates in the second rotation direction
97

Figure 9

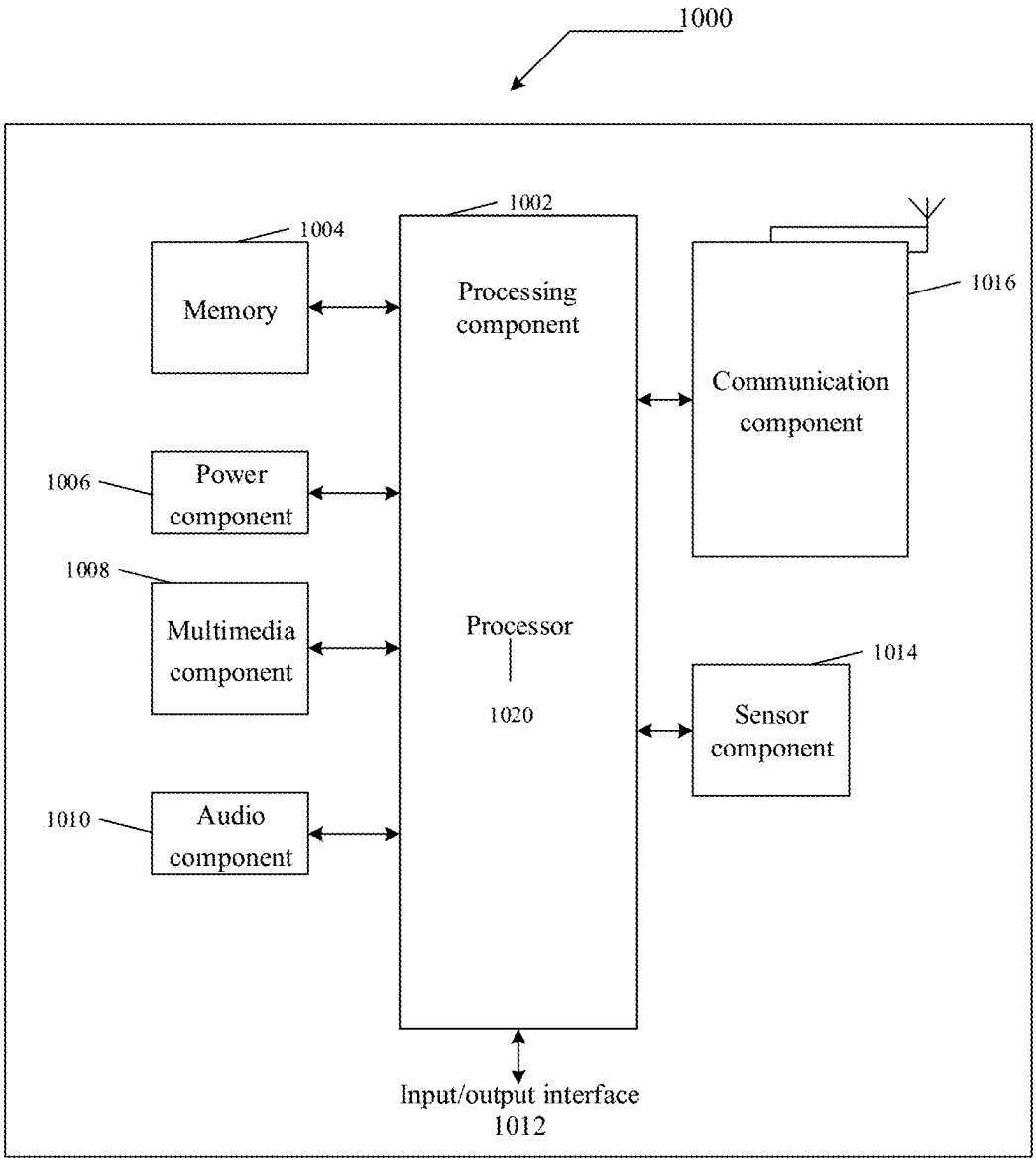

1000
1002
1004
Memory
Processing component
1016
Communication component
1006
Power component
1008
Multimedia component
Processor
1020
1014
Sensor component
1010
Audio component
Input/output interface
1012

Figure 10

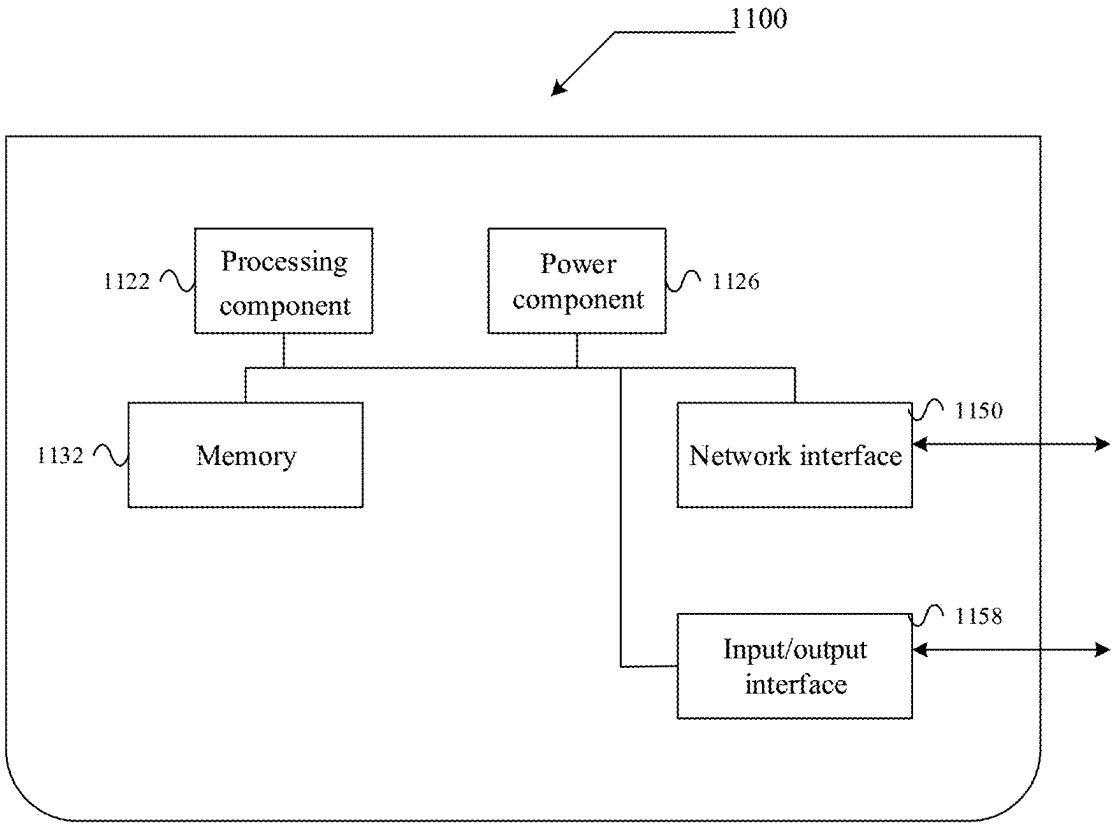

1100
1122
Processing component
Power component
1126
1132
Memory
Network interface
1150
Input/output interface
1158

Figure 11

ROLLER BRUSH ASSEMBLY, CLEANING DEVICE, DETECTION METHOD, AND STORAGE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of priority to Chinese Application No. 202410178133.1, filed on Feb. 8, 2024, the contents of which are incorporated herein by reference in their entirety for all purposes.

BACKGROUND OF THE INVENTION

[0002] In the related art, cleaning devices can be equipped with roller brushes, which are used by the cleaning devices to perform cleaning functions.

SUMMARY OF THE INVENTION

[0003] The present disclosure relates to, but is not limited to, the field of roller brush assemblies, and particularly relates to a roller brush assembly, a cleaning device, a detection method, a storage medium, and a computer program product. In order to solve the problem in the related art, a roller brush assembly, a cleaning device, a detection method, a storage medium, and a computer program product are provided according to embodiments of the present disclosure, to accurately and rapidly identify a type of a roller brush mounted in the roller brush assembly.

[0004] According to a first aspect of an embodiment of the present disclosure, a roller brush assembly is provided. The roller brush assembly includes:

[0005] a roller brush housing;

[0006] a roller brush, located inside the roller brush housing; and

[0007] a magnetic detector, located on an outer surface of the roller brush housing and configured to detect a magnetic signal, where the magnetic signal is configured to determine a type of the roller brush.

[0008] According to a second aspect of an embodiment of the present disclosure, a cleaning device is provided. The cleaning device includes: the roller brush assembly according to any aspect of the present disclosure; and a processor, connected to the magnetic detector of the roller brush assembly and configured to determine the type of the roller brush in the roller brush assembly based on whether the magnetic signal is detected by the magnetic detector.

[0009] According to a third aspect of an embodiment of the present disclosure, a detection method is provided. The detection method is applied to the cleaning device according to any aspect of the present disclosure and includes:

[0010] determining whether the magnetic signal is detected by the magnetic detector, where the magnetic detector is located on an outer surface of the roller brush housing of the cleaning device; and

[0011] determining the type of the roller brush mounted inside the roller brush housing based on whether the magnetic signal is detected by the magnetic detector.

[0012] According to a fourth aspect of an embodiment of the present disclosure, a terminal device is provided. The terminal device includes:

[0013] one or more processors; and

[0014] a memory that store a computer program or instructions, where the one or more processors, when executing the computer program or instructions, cause the terminal device to perform the detection method according to any aspect of the present disclosure.

[0015] According to a fifth aspect of an embodiment of the present disclosure, a non-transitory computer-readable storage medium is provided. The non-transitory computer-readable storage medium stores a computer program or instructions, where a processor, when executing the computer program or instructions in the storage medium, executes the detection method according to any aspect of the present disclosure.

[0016] According to a sixth aspect of an embodiment of the present disclosure, a computer program product is provided, which includes a computer program or instructions, where a processor, when executing the computer program or instructions, executes the detection method according to any aspect of the present disclosure.

[0017] It is to be understood that the above general description and the following detailed description are merely illustrative and explanatory, which does not limit the present disclosure.

BRIEF DESCRIPTION OF DRAWINGS

[0018] Accompanying drawings here, which are incorporated in and constitute a part of this specification, illustrate embodiments consistent with the present disclosure and explain the principles of the present disclosure together with the specification.

[0019] FIG. **1** is a schematic structural diagram of a roller brush assembly according to an example;

[0020] FIG. **2** is a schematic structural diagram of a roller brush assembly according to an example;

[0021] FIG. **3** is a schematic structural diagram of a roller brush assembly according to an example;

[0022] FIG. **4** is a schematic diagram of a waveform of a pulse signal according to an example;

[0023] FIG. **5** is a schematic structural diagram of a roller brush assembly according to an example;

[0024] FIG. **6** is a schematic structural diagram of a roller brush assembly according to an example;

[0025] FIG. **7** is a schematic structural diagram of a magnet according to an example;

[0026] FIG. **8** is a schematic flowchart of a detection method according to an example;

[0027] FIG. **9** is a schematic flowchart of a detection method according to an example;

[0028] FIG. **10** is a block diagram of a device according to an example; and

[0029] FIG. **11** is a block diagram of a device according to an example.

REFERENCE NUMERALS

[0030] roller brush housing **1**; roller brush **2**; roller brush body **21**; accommodation cavity **211**; slot **212**; cutting assembly **22**; first blade **221**; second blade **222**; linkage module **23**; clamping part **231**; supporting rod **24**; first polished rod **241**; threaded rod **242**; second polished rod **243**; magnetic detector **3**; and magnetic member **4**.

DETAILED DESCRIPTION OF THE INVENTION

[0031] In order to clarify an objective, a technical solution and advantages of the present disclosure, the present dis-

closure will be further described in detail with the accompanying drawings. The described embodiments do not limit the present disclosure. All other embodiments obtained by those of ordinary skill in the art without creative efforts fall within the protection scope of the present disclosure.

[0032] In the following description, "some embodiments" denote a subset of all possible embodiments. However, it may be understood that "some embodiments" may be a same subset or different subsets of all possible embodiments and may be combined with each other without conflict.

[0033] In the following description, the terms "first", "second", and "third" are used to distinguish similar objects, which do not indicate a specific order for the objects. It may be understood that a specific order or sequence indicated by "first", "second", and "third" may be interchanged if allowed, such that the embodiments of the present disclosure described here may be implemented in other orders than an order illustrated or described here.

[0034] Unless otherwise defined, all technical and scientific terms used here have the same meanings as those commonly understood by those skilled in the art to which the present disclosure belongs. The terms used here are merely for the purpose of describing the embodiments of the present disclosure, which are not intended to limit the present disclosure.

[0035] FIG. **1** and FIG. **2** are schematic structural diagrams of a roller brush assembly according to an example. As shown in FIG. **1** and FIG. **2**, the roller brush assembly includes:

[0036] a roller brush housing **1**;

[0037] a roller brush **2**, located in the roller brush housing **1**; and

[0038] a magnetic detector **3**, located on an outer surface of the roller brush housing **1** and configured to detect a magnetic signal;

[0039] where the magnetic signal is configured to determine a type of the roller brush **2**.

[0040] In some embodiments, the roller brush housing **1** may be understood as a roller brush enclosure The roller brush enclosure is capable of protecting the roller brush **2** arranged inside the roller brush enclosure.

[0041] In some embodiments, the roller brush **2** is detachably arranged in the roller brush housing **1**. In this way, different types of roller brushes **2** may be replaced in the roller brush assembly as required.

[0042] In some embodiments, the specific type of the magnetic detector **3** may not be limited. For instance, the magnetic detector **3** may be an electromagnetic sensor. In this case, the magnetic detector **3** can detect the magnetic signals through electromagnetic induction. Alternatively, the magnetic detector **3** may be a Hall sensor. In this case, the magnetic detector **3** can detect the magnetic signals through a hall effect between a magnetic field and the Hall sensor.

[0043] In some embodiments, the type of roller brush **2** may be a first type. The first type of roller brush **2** may be provided with a magnetic member **4**. The magnetic detector **3** may be configured to detect the magnetic signals for the first type of roller brush **2**. The type of roller brush **2** may be a second type, where the second type of roller brush **2** may not be provided with the magnetic member **4**. The magnetic detector **3** may be configured to detect no magnetic signal for the second type of roller brush **2**. Here, the type of the roller brush **2** may be accurately identified as either the first type or the second type based on whether the magnetic signal is detected by the magnetic detector **3**.

[0044] In the related art, different roller brushes installed in the cleaning device are generally not distinguished from each other. This makes it difficult for the cleaning device to provide corresponding product functions for different roller brushes, leading to a reduction in the diversity of product functions.

[0045] In the present disclosure, whether the magnetic signal may be generated by the roller brush **2** may be determined based on whether the magnetic signal is detected by the magnetic detector **3**, such that a roller brush **2** capable of generating a magnetic signal can be distinguished from a roller brush **2** incapable of generating a magnetic signal.

[0046] Compared with the related art where the type of roller brush **2** installed in the roller brush assembly is not identified, in the present disclosure, the type of roller brush **2** arranged in the roller brush assembly can be precisely identified by detecting whether the arranged roller brush **2** can generate a magnetic signal. In this way, corresponding product functions can be provided for different types of roller brushes, thereby increasing the diversity of product functions.

[0047] In some embodiments, FIG. **3** is a schematic diagram of a partial structure of a roller brush assembly according to an example. With reference to FIG. **3**, a roller brush **2** includes:

[0048] a roller brush body **21**, assembled in a roller brush housing **1**;

[0049] a magnetic member **4**, arranged at an end of the roller brush body **21**; and

[0050] a magnetic detector **3**, arranged at an end of the roller brush housing **1**;

[0051] where the end of the roller brush body **21** where the magnetic member **4** is arranged and the end of the roller brush housing **1** where the magnetic detector **3** is arranged are located at a same side.

[0052] In some embodiments, the roller brush **2** includes: bristles. The bristles may be located on an outer surface of the roller brush body **21**. The roller brush **2** may achieve a cleaning function by means of the bristles on the roller brush body **21**. Here, the shape of the bristles may not be limited.

[0053] In some embodiments, the roller brush body **21** may include a first end and a second end, and the roller brush housing I may include a first end and a second end. The first end of the roller brush body **21** and the first end of the roller brush housing **1** are located at the same side, and the second end of the roller brush body **21** and the second end of the roller brush housing **1** are located at the same side.

[0054] In some embodiments, the number of the magnetic member **4** may be one. In this case, the magnetic member **4** is arranged at the first end of the roller brush body **21**, and the magnetic detector **3** may be arranged at the first end of the roller brush housing **1**. Alternatively, the magnetic member **4** may be arranged at the second end of the roller brush body **21**, and the magnetic detector **3** may be arranged at the second end of the roller brush housing **1**.

[0055] In some other examples, the number of magnetic members **4** may be two. For instance, the magnetic members **4** may include a first magnetic member **41** and a second magnetic member **42**. The magnetic detectors **3** may include a first magnetic detector **31** and a second magnetic detector **32**. The first magnetic member **41** may be arranged at the first end of the roller brush body **21**, and the second magnetic

member **42** may be arranged at the second end of the roller brush body **21**. The first magnetic detector **31** may be arranged at the first end of the roller brush housing **1**, and the second magnetic detector **32** may be arranged at the second end of the roller brush housing **1**.

[0056] In some embodiments, the magnetic member **4** may be any object capable of generating a magnetic signal. For instance, the magnetic member **4** may be any magnet capable of generating a magnetic field.

[0057] In some embodiments, any first type of roller brush **2** in the present disclosure includes: a roller brush body **21**, assembled in a roller brush housing **1**; and a magnetic member **4**, arranged at an end of the roller brush body **21**. In other words, only the first type of the roller brush **2** is provided with the magnetic member **4**. In some other examples, the second type of roller brush **2** includes: a roller brush body **21**, assembled in a roller brush housing **1**. The roller brush body **21** is not provided with a magnetic member **4**. In other words, there is no magnetic member **4** provided for the second type of roller brush **2**.

[0058] In the present disclosure, since the end of the roller brush body **21** where the magnetic member **4** is arranged and the end of the roller brush housing **1** where the magnetic detector **3** is arranged are located at the same side, a distance between the magnetic member **4** and the magnetic detector **3** is short. In a case where the roller brush **2** is provided with the magnetic member **4**, the magnetic detector **3** can reliably detect the magnetic signal from the magnetic member **4** at a close distance.

[0059] In some embodiments, the roller brush assembly includes:

[0060] a driver, connected to the roller brush body **21** and configured to drive the roller brush body **21**, along with the magnetic member **4**, to rotate.

[0061] In some embodiments, the magnetic detector **3** is configured to generate a pulse signal in response to a magnetic pole of the magnetic member **4** approaching the magnetic detector **3** (as shown in FIG. **4**). It should be noted that, the overall relative position of the magnetic member **4** and the magnetic detector **3** remains unchanged when the roller brush body **21** of the roller brush **2** along with the magnetic member **4** rotate. However, the positions of the magnetic poles of the magnetic member **4** relative to the magnetic detector **3** are changed.

[0062] In some embodiments, during one complete rotation of the magnetic member **4**, the magnetic detector **3** generates a pulse signal when the south pole of the magnetic member **4** approaches the magnetic detector **3**. Similarly, the magnetic detector **3** generates a pulse signal when the north pole of the magnetic member **4** approaches the magnetic detector **3**. In other words, during one complete rotation of the magnetic member **4**, the magnetic detector **3** generates two pulse signals. FIG. **4** illustrates a waveform of a pulse signal according to an example. Referring to FIG. **4**, the number of pulse signals generated by the magnetic detector **3** is four, indicating that the magnetic member **4** has rotated twice. It can be understood that, in some application scenarios, the magnetic detector **3** is configured to generate a pulse signal upon detecting a magnetic signal.

[0063] In the present disclosure, a roller brush body **21** may be driven to rotate, which in turn causes the magnetic member **4** to rotate. In this case, in a rotation process of the magnetic member **4**, the magnetic detector **3** may indicate whether the magnetic signal is detected by generating the pulse signal or not. In this way, a type of a roller brush **2** may be accurately identified even during the rotation process of the roller brush **2**.

[0064] In some embodiments, FIG. **3**, FIG. **5**, and FIG. **6** are a schematic diagram of a partial structure of a roller brush assembly according to an example. Referring to FIG. **3**, FIG. **5**, and FIG. **6**, a roller brush body **21** is provided with an accommodation cavity **211** and a slot **212** in communication with the accommodation cavity **211**. A roller brush **2** further includes:

[0065] a cutting assembly **22**, which includes: a first blade **221** and a second blade **222** that are stacked, where the first blade **221** is fixedly connected to the roller brush body **21** at the slot **212**, and the second blade **222** is slidably connected to the roller brush body **21** at the slot **212**, and portions of the first blade **221** and the second blade **222** extend from the slot **212** to the accommodation cavity **211**; and

[0066] a linkage module **23**, located in the accommodation cavity **211**, where the linkage module **23** is configured to: drive the second blade **222** to slide relative to the first blade **221** in a first direction (with reference to an X1 direction in FIG. **5** and FIG. **6**) while the roller brush body **21** rotates in a second rotation direction; and drive the second blade **222** to slide relative to the first blade **221** in the slot **212** in a second direction (with reference to an X2 direction in FIG. **5** and FIG. **6**) opposite to the first direction while the roller brush body **21** rotates in a first rotation direction.

[0067] In some embodiments, the first rotation direction may be one of a clockwise direction and a counterclockwise direction, and the second rotation direction may be the other of the clockwise direction and the counterclockwise direction.

[0068] In the present disclosure, after the roller brush assembly is integrated into a cleaning device and the cleaning device performs cleaning work for a fixed time period, a certain amount of hair may tangle around the continuously rotating roller brush body **21**, the cleaning device may control the roller brush **2** to cut the hair periodically. In a hair cutting period, the cleaning device may firstly control the roller brush body **21** to rotate in the second rotation direction, such that the linkage module **23** may drive the second blade **222** in the cutting assembly **22** to slide in the first direction relative to the first blade **221**. The cleaning device may then control the roller brush body **21** to rotate in the first rotation direction, such that the linkage module **23** may drive the second blade **222** in the cutting assembly **22** to slide in the second direction relative to the first blade **221**. Thus, while the cleaning device controls the roller brush **2** to cut the hair periodically, the second blade **222** in the cutting assembly **22** may slide back and forth relative to the first blade **221** in a length direction of the roller brush body **21**, such that the cutting assembly **22** may better cut off the hair tangled around the roller brush body **21** and the cut hair may fall off from the roller brush body **21**. Consequently, the cleaning device may clear the cut hair. This not only prevents issues with the driver in the cleaning device being blocked due to excessive hair tangling on the roller brush **2** but also eliminates the need for users to manually clean the hair from the roller brush **2**. As a result, the service life of the cleaning device integrating such a roller brush **2** can be effectively extended and the cleaning performance of the cleaning device can be improved.

[0069] In some embodiments, FIG. **3**, FIG. **5**, and FIG. **6** are a schematic diagram of a partial structure of a roller brush assembly according to an example. With reference to FIG. **3**, FIG. **5**, and FIG. **6**, a roller brush **2** includes a supporting rod **24**, located in the accommodation cavity **211** and rotatably connected to the roller brush body **21**. The supporting rod **24** includes: a threaded rod **242** provided with an external thread, a first polished rod **241** located in a first direction of the threaded rod **242**, and a second polished rod **243** located in a second direction of the threaded rod **242**.

[0070] A linkage module **23** includes: a clamping part **231** and an internal threaded hole. The linkage module **23** is clamped to the roller brush body **21** via the clamping part **231**. The internal threaded hole is matched with the external thread. The linkage module **23** sleeves the supporting rod **24** via the internal threaded hole.

[0071] The linkage module **23** is configured to: move in the first direction when the roller brush body **21** rotates in a second rotation direction; and move in the second direction when the roller brush body **21** rotates in a first rotation direction.

[0072] In the present disclosure, by only arranging the linkage module **23** that can achieve axial movement through the rotation of the threaded rod **242**, either by screwing in or unscrewing it, the second blade **222** can be driven to slide back and forth relative to the first blade **221**. There is no need to additionally install a dedicated axial drive motor in the cleaning device to drive the second blade **222** to slide back and forth relative to the first blade **221**. This approach effectively reduces the manufacturing cost of the cleaning device and saves space within the cleaning device that would otherwise be used for an axial drive motor and its associated transmission, resulting in a smaller overall volume and weight of the cleaning device.

[0073] In some embodiments, a magnetic member includes: a radially magnetized magnet;

[0074] a magnetic detector includes: a Hall sensor, where the Hall sensor is arranged in a magnetization direction of the magnet.

[0075] It should be understood that the magnet on the roller brush body **21** and the Hall sensor on the roller brush housing I may be arranged in a same cross-section here, and the Hall sensor is located in the magnetization direction of the magnet in the cross-section. The cross-section may be a plane perpendicular to the rotation axis of the magnet. In this case, for each full rotation of the roller brush body **21**, the Hall sensor may detect two square waves. By identifying the waveform, the type of roller brush **2** and the number of rotations can be detected.

[0076] In some embodiments, the magnetization direction of the magnet may differ from the rotation axis of the magnet.

[0077] In some embodiments, the shape of the magnet may not be limited. For instance, the shape of the magnet may be circular (as shown in FIG. **7**), annular, rectangular, or irregular.

[0078] In the embodiment of the present disclosure, since the Hall sensor is arranged in the magnetization direction of the magnet, the Hall sensor can sensitively detect the number of times the magnetic poles of the magnet approach the Hall sensor during the rotation of the magnet, thereby determining the number of rotations of the magnet. This allows for precise identification of the number of rotations of the magnet.

[0079] In some embodiments, a cleaning device is provided according to the present disclosure. The cleaning device includes:

[0080] the roller brush assembly according to any aspect of the present disclosure; and

[0081] a processor, connected to the magnetic detector **3** and configured to determine a type of a roller brush **2** in the roller brush assembly based on whether a magnetic signal is detected by the magnetic detector **3** of the roller brush assembly.

[0082] In some embodiments, the cleaning device may be any intelligent device that can achieve a cleaning function by the roller brush **2**. For instance, the cleaning device may be a robot vacuum cleaner/sweeping robot, which may achieve the cleaning function by the roller brush **2**.

[0083] In some embodiments, the processor is configured to: determine the type of the roller brush **2** as a first type in response to determining that the magnetic signal is detected by the magnetic detector **3**, and determine the type of the roller brush **2** as a second type in response to determining that the magnetic signal is not detected by the magnetic detector **3**. The first type is different from the second type. The first type of roller brush **2** may be provided with a magnetic member **4**. The second type of roller brush **2** may not be provided with the magnetic member **4**. Here, the type of the roller brush **2** may be accurately identified as the first type or the second type based on whether the magnetic signal is detected by the magnetic detector **3**.

[0084] In some embodiments, the first type of the roller brush **2** may be provided with the magnetic member **4**, and the second type of the roller brush **2** may not be provided with the magnetic member **4**. The processor may be configured to: determine that the roller brush **2** is provided with the magnetic member **4** and the type of the roller brush **2** is the first type in response to determining that the magnetic signal is detected by the magnetic detector **3**; and determine that the roller brush **2** is not provided with the magnetic member **4** and the type of the roller brush **2** is the second type in response to determining that the magnetic signal is not detected by the magnetic detector **3**.

[0085] In some embodiments, the magnetic detector **3** is configured to generate a pulse signal in response to detecting the magnetic signal, and the processor may be configured to determine the type of the roller brush **2** based on whether the pulse signal is received. The pulse signal may be a square wave signal (as shown in FIG. **4**).

[0086] In the present disclosure, the processor connected to the magnetic detector **3** may determine whether the roller brush **2** can generate the magnetic signal based on the result of whether the magnetic signal is detected by the magnetic detector **3**. In this way, the roller brush **2** capable of generating a magnetic signal can be distinguished from the roller brush **2** incapable of generating a magnetic signal. As a result, the type of the roller brush **2** mounted in the cleaning device can be accurately identified.

[0087] In some embodiments, the processor is configured to instruct the roller brush **2** to perform a cleaning function corresponding to the type of the roller brush **2**;

[0088] where, different types of roller brushes **2** correspond to different cleaning functions.

[0089] In some embodiments, different cleaning functions correspond to different cleaning parameters. The cleaning parameters may include at least one of a cleaning duration, a cleaning area, or a cleaning intensity. It is to be noted that different types of roller brushes **2** have different cleaning functions, which may be understood as follows: different types of roller brushes **2** have at least one different cleaning parameters of the cleaning duration, the cleaning area or the cleaning intensity.

[0090] In some embodiments, the roller brush **2** is provided with bristles, and different types of roller brushes **2** may correspond to different bristles. For instance, different types of roller brushes **2** may correspond to different bristle hardness. Different bristle hardness may correspond to different cleaning duration. For instance, the bristle hardness may be inversely related to the cleaning duration. Different bristle hardness may correspond to different cleaning areas. For instance, soft bristles may correspond to a wooden cleaning area, and hard bristles may correspond to a porcelain cleaning area. Different bristle hardness may correspond to different cleaning intensities. For instance, the bristle hardness may be inversely related to the cleaning intensity.

[0091] In some embodiments, the cleaning parameters may further include: a rotation direction and/or rotation time period of the roller brush **2**. It can be understood that different types of roller brushes **2** have different cleaning functions, which may be understood as follows: different types of roller brushes **2** have different rotation directions and/or different rotation time periods. Here, the rotation time period may refer to total rotation time of the roller brush **2** in all rotation directions in a case where the cleaning function is performed by rotating the roller brush **2**. In this case, any cleaning duration of the present disclosure may also be understood as the rotation time period here. Alternatively, the rotation time period may include independent rotation time of the roller brush **2** for rotating in each rotation direction. For instance, the rotation time period may include: a first rotation time period of the roller brush **2** for rotating in a first rotation direction and/or a second rotation time period of the roller brush **2** for rotating in a second rotation direction. The first rotation direction may be opposite to the second rotation direction. For instance, the rotation directions corresponding to any first type of roller brush **2** in the present disclosure may include the first rotation direction and the second rotation direction, and the rotation direction corresponding to any second type of roller brush in the present disclosure may include the first rotation direction.

[0092] In some embodiments, different types of roller brushes **2** may correspond to different bristle shapes. For instance, the bristle shape may be wavy, straight, or U-shaped. In this case, bristles of different shapes may correspond to different rotation directions and/or rotation time periods of the roller brush **2**. For instance, the rotation direction corresponding to U-shaped bristles having an opening facing the second rotation direction may be the second rotation direction, and the rotation direction corresponding to wavy bristles may include the second rotation direction and/or the first rotation direction.

[0093] In the present disclosure, the corresponding cleaning function can be accurately performed by rapidly and accurately identifying the type of the roller brush **2**.

[0094] In some embodiments, the processor is connected to a driver in the roller brush assembly, and is configured to determine a rotation direction and/or rotation time period of a roller brush body **21** based on the type of the roller brush **2** and generate a corresponding first driving signal;

[0095] the driver is connected to the roller brush body **21** and the processor, and is configured to drive the roller brush body **21** along with a magnetic member **4** on the roller brush body **21** to rotate according to the rotation direction and/or the rotation time period based on the first driving signal.

[0096] In some embodiments, the processor is configured to determine, in response to determining that the type of the roller brush **2** is the first type, that the roller brush body **21** of the roller brush **2** rotates in the second rotation direction for predetermined time, followed by rotating in the first rotation direction by a predetermined number of rotations, and generate the corresponding first driving signal. The driver is connected to the roller brush body **21** and the processor, and is configured to drive, in a case where the type of the roller brush **2** is the first type, the roller brush body **21** along with the magnetic member **4** to rotate in the second rotation direction for the predetermined time based on the first driving signal and then rotate in the first rotation direction by the predetermined number of rotations. The roller brush **2** of the first type is provided with the magnetic member **4**.

[0097] In some other examples, the processor is configured to determine, in response to determining that the type of the roller brush **2** is the second type, that the roller brush body **21** of the roller brush **2** constantly rotates in the first rotation direction for the predetermined time and generate the corresponding first driving signal. The driver is connected to the roller brush body **21** and the processor, and is configured to drive, in a case where the type of the roller brush **2** is the second type, the roller brush body **21** to constantly rotate in the second rotation direction based on the first driving signal. The roller brush **2** of the second type is not provided with the magnetic member **4**. The driver may include an electric motor.

[0098] In the present disclosure, the corresponding first driving signal may be flexibly generated according to the type of the roller brush **2**, and further the driver may be controlled to drive the roller brush body **21** to rotate according to an appropriate rotation direction and/or rotation time period based on the first driving signal corresponding to the type of the roller brush **2**, thereby ensuring that a rotation state of the roller brush body **21** is suited to the type of the roller brush **2**.

[0099] In some embodiments, the magnetic detector **3** is configured to generate a pulse signal in response to determining that a magnetic pole of the magnetic member **4** on the roller brush body **21** approaches the magnetic detector **3**;

[0100] the processor is configured to determine the number of rotations of the magnetic member **4** based on the pulse signal and generate a second driving signal based on the number of rotations;

[0101] where the second driving signal is configured to adjust the rotation direction and/or the rotation time period of the roller brush body **21**.

[0102] In some embodiments, the processor is configured to determine the number of rotations of the magnetic member **4** based on the number of pulse signals.

[0103] In some embodiments, in the first type of roller brush **2**, the magnetic member **4** and the roller brush body **21** may be coaxially arranged. In other words, when the

roller brush body **21** of the first type of roller brush **2** rotates, the magnetic member **4** may rotate synchronously with the roller brush body **21**. In this case, the number of rotations of the magnetic member **4** is the number of rotations of the roller brush body **21**. That is, the number of rotations, determined by the processor based on the number of pulse signals, of the magnetic member **4** may indicate the number of rotations of the roller brush body **21**.

[0104] In some embodiments, the driver drives the roller brush body **21** to rotate according to the adjusted rotation direction and/or rotation time period based on the second driving signal.

[0105] In the present disclosure, the processor may accurately determine an actual number of rotations of the magnetic member **4** through the pulse signal generated by the magnetic detector **3**. In other words, the processor may accurately determine an actual number of rotations of the roller brush body **21**. In this way, after the actual number of rotations of the roller brush body **21** is determined, the rotation time period and/or the rotation direction of the roller brush body **21** may be adjusted in time according to the actual number of rotations of the roller brush body **21** in a case where the rotation state of the roller brush body **21** is required to be adjusted.

[0106] In some embodiments, the processor is configured to generate, in response to determining that the number of rotations during which the roller brush body **21** drives the magnetic member **4** to rotate in the first rotation direction reaches a predetermined number of rotations, the corresponding second driving signal to adjust the rotation direction of the roller brush body **21** to the second rotation direction. In some embodiments, in a case where the linkage module **23** in the roller brush assembly moves in a second direction, an internal threaded hole of the linkage module **23** may be clamped to an external thread on the threaded rod **242**. The processor is configured to generate the corresponding second driving signal in response to determining that the number of rotations during which the roller brush body **21** drives the magnetic member **4** to rotate in the first rotation direction reaches the predetermined number of rotations, such that the rotation direction of the roller brush body **21** is adjusted to the second rotation direction, to drive the linkage module **23** to move in the first direction.

[0107] In some embodiments, in a case where the linkage module **23** moves in the first direction, the threaded rod **242** may be screwed out of the internal threaded hole of the linkage module **23** until the internal threaded hole moves to the first polished rod **241** for idling.

[0108] In the present disclosure, when the number of rotations during which the roller brush body **21** drives the magnetic member **4** to rotate in the first rotation direction reaches the predetermined number of rotations, i.e., when the linkage module **23** moves in the second direction, the corresponding second driving signal may be generated in time to adjust the rotation direction of the roller brush body **21** to the second rotation direction, causing the linkage module **23** moves in the first direction. In this way, the risk of the internal threaded hole of the linkage module **23** and the external threads on the threaded rod **242** becoming jammed due to excessive movement of the linkage module **23** in the second direction can be reduced. Further, it minimizes the situation where the linkage module **23** cannot continue moving, preventing it from driving the second blade **222** to move back and forth and achieve the cutting function, thereby ensuring the reliable implementation of the cutting function in the cleaning device.

[0109] It is to be noted that any detection method in the present disclosure may be applied to any cleaning device in the present disclosure.

[0110] FIG. **8** is a flow diagram of a detection method according to an example. As shown in FIG. **8**, the method includes steps **81** and **82** as follows.

[0111] In step **81**, whether a magnetic signal is detected by a magnetic detector is determined, where the magnetic detector is located on an outer surface of a roller brush housing of a cleaning device.

[0112] In some embodiments, whether the magnetic signal is detected by the magnetic detector may be determined according to a first predetermined period. Alternatively, whether the magnetic signal is detected by the magnetic detector may be determined in real-time. The first predetermined period may be determined based on a replacement frequency of replacing a roller brush in a cleaning device. The first predetermined period may be inversely related to the replacement frequency.

[0113] In some embodiments, the magnetic detector may be configured to detect the magnetic signal according to a second predetermined period. Alternatively, the magnetic detector may be configured to detect the magnetic signal. The second predetermined period may be determined based on a replacement frequency of replacing a roller brush in a cleaning device. The second predetermined period may be inversely related to the replacement frequency.

[0114] In some embodiments, the first predetermined period may be the same as the second predetermined period. Alternatively, the first predetermined period may be longer than the second predetermined period.

[0115] In some embodiments, in response to a triggering instruction, the magnetic signal may be detected by the magnetic detector, and/or whether the magnetic signal is detected by the magnetic detector may be determined. The triggering instruction may be an instruction generated in response to detecting a touch operation for a predetermined control. Alternatively, the triggering instruction may be an instruction generated in response to detecting predetermined voice information. The predetermined voice information may be configured to instruct that the magnetic signal is detected.

[0116] In step **82**, a type of a roller brush mounted in the roller brush housing is determined based on whether the magnetic signal is detected by the magnetic detector.

[0117] In some embodiments, in response to determining the type of the roller brush, detection of the magnetic signal by the magnetic detector may be stopped. Here, after the type of the roller brush is determined, continuous detection of the magnetic signal by the magnetic detector may be stopped in time. In this way, power consumption of the magnetic detector can be reduced.

[0118] In the example of the present disclosure, types of different roller brushes may be accurately identified based on whether the magnetic signal is detected by the magnetic detector. As a result, operations can be performed corresponding to different types of roller brushes.

[0119] In some embodiments, the type of the roller brush mounted in the roller brush housing is determined based on whether the magnetic signal is detected by the magnetic detector, which includes:

[0120] the type of the roller brush is determined as a first type in response to determining that the magnetic signal is detected by the magnetic detector; or

[0121] the type of the roller brush is determined as a second type in response to determining that the magnetic signal is not detected by the magnetic detector, where the first type is different from the second type.

[0122] In the present disclosure, whether the type of the roller brush is the first type or the second type may be accurately determined based on whether the magnetic signal is detected by the magnetic detector, such that an accurate type of roller brush can be suitable for performing the appropriate related operation.

[0123] In some embodiments, the method further includes:

[0124] controlling the roller brush to perform a cleaning function corresponding to the type of the roller brush,

[0125] where different types of roller brushes correspond to different cleaning functions.

[0126] In some embodiments, different cleaning functions correspond to different cleaning parameters. The cleaning parameters may indicate at least one of the following: cleaning duration, a cleaning area, or a cleaning intensity. It may be understood that different types of roller brushes have different cleaning functions, which may be understood as follows: different types of roller brushes have at least one of the different cleaning duration, different cleaning area or different cleaning intensity.

[0127] In some embodiments, the roller brush is provided with bristles, and different types of roller brushes may correspond to different bristles. For instance, different types of roller brushes may correspond to different bristle hardness. Different bristle hardness may correspond to different cleaning duration. For instance, the bristle hardness may be inversely related to the cleaning duration. Different bristle hardness may correspond to different cleaning areas. For instance, soft bristles may correspond to a wooden cleaning area, and hard bristles may correspond to a porcelain cleaning area. Different bristle hardness may correspond to different cleaning intensities. For instance, the bristle hardness may be inversely related to the cleaning intensity.

[0128] In some embodiments, the cleaning parameters may further indicate: a rotation direction and/or rotation time period of the roller brush. It can be understood that different types of roller brushes have different cleaning functions, which may be understood as follows: different types of roller brushes have different rotation directions and/or different rotation time periods. Here, the rotation time period may refer to total rotation time of the roller brush in all rotation directions in a case where the cleaning function is performed by rotating the roller brush. In this case, any cleaning duration of the present disclosure may also be understood as the rotation time period here. Alternatively, the rotation time period may include independent rotation time of the roller brush for rotating in each rotation direction. For instance, the rotation time period may include: a second rotation time period of the roller brush for rotating in a second rotation direction and/or a first rotation time period of the roller brush for rotating in a first rotation direction. The second rotation direction may be opposite to the first rotation direction.

[0129] In some embodiments, different types of roller brushes may correspond to different bristle shapes. For instance, the bristle shape may be wavy, straight, or U-shaped. In this case, bristles of different shapes may correspond to different rotation directions and/or rotation time periods of the roller brush. For instance, the rotation direction corresponding to U-shaped bristles having an opening facing the second rotation direction may be the second rotation direction, and the rotation direction corresponding to wavy bristles may include the second rotation direction and/or the first rotation direction.

[0130] In the present disclosure, the corresponding cleaning function can be accurately performed by rapidly and accurately identifying the type of the roller brush, to ensure a desirable cleaning performance of the cleaning device.

[0131] In some embodiments, controlling the roller brush to perform a cleaning function corresponding to the type of the roller brush includes:

[0132] determining a rotation direction and/or a rotation time period of a roller brush body of the roller brush based on the type of the roller brush, where the roller brush body is assembled in the roller brush housing of the cleaning device;

[0133] generating a first driving signal based on the rotation direction and/or the rotation time period; and

[0134] driving the roller brush body along with a magnetic member to rotate according to the rotation direction and/or the rotation time period based on the first driving signal.

[0135] In some embodiments, a mapping relationship table among a type of the roller brush, a rotation direction and a rotation time period may be established in advance.

[0136] In some embodiments, after the type of the roller brush is determined, the rotation direction and/or the rotation time period corresponding to the type of the roller brush may be determined from the mapping relationship table based on the type of the roller brush.

[0137] In the present disclosure, the corresponding first driving signal may be flexibly generated according to the type of the roller brush, and further the roller brush body may be driven to rotate according to an appropriate rotation direction and/or rotation time period based on the first driving signal corresponding to the type of the roller brush. This ensure that the rotation state of the roller brush body can be suitable to the type of the roller brush.

[0138] In some embodiments, the method further includes: generating, in a case where the roller brush body of the roller brush rotates and the roller brush body is provided with a magnetic member, a pulse signal in response to determining that a magnetic pole of the magnetic member approaches the magnetic detector;

[0139] determining a number of rotations of the magnetic member based on the pulse signal;

[0140] generating a second driving signal based on the number of rotations; and

[0141] adjusting a rotation direction and/or a rotation time period based on the second driving signal.

[0142] It should be understood that the magnetic detector generates a pulse signal only when the roller brush body rotates and the roller brush is provided with the magnetic member, i.e., the roller brush is of the first type with a magnetic member. In this case, the cleaning device can determine the number of rotations of the magnetic member based on the pulse signal. In a case where the roller brush is of the second type without a magnetic member, there is no need to determine the number of rotations of the magnetic member.

[0143] In some embodiments, determining the number of rotations of the magnetic member based on the pulse signal, includes: determining the number of rotations of the magnetic member based on the number of pulse signals. It is to be noted that the overall relative position of the magnetic member and the magnetic detector remains unchanged when the roller brush body of the roller brush along with the magnetic member rotate. Rather, the positions of the magnetic poles of the magnetic member relative to the magnetic detector are changed. During one complete rotation of the magnetic member, the magnetic detector generates a pulse signal when the south pole of the magnetic member approaches the magnetic detector. Similarly, the magnetic detector generates a pulse signal when the north pole of the magnetic member approaches the magnetic detector. In other words, during one complete rotation of the magnetic member, the magnetic detector generates two pulse signals. In this case, the number of rotations of the magnetic member may be accurately determined based on the number of pulse signals.

[0144] In some embodiments, the second driving signal includes at least one of the following:

[0145] a first driving sub-signal, configured to adjust the rotation direction to the first rotation direction and/or adjust the rotation time period from the second rotation time period to the first rotation time period, where the second rotation time period is a preset rotation time period for driving the roller brush body to rotate in the second rotation direction; and

[0146] a second driving sub-signal, configured to adjust the rotation direction to the second rotation direction and/or adjust the rotation time period from the first rotation time period to the second rotation time period, where the first rotation time period is a preset rotation time period for driving the roller brush body to rotate in the first rotation direction.

[0147] In some embodiments, determining the rotation direction and/or the rotation time period based on the type of the roller brush includes:

[0148] determining, in a case where the type of the roller brush is the first type, that the roller brush body of the roller brush rotates cyclically according to the second rotation direction and the first rotation direction, to cut entanglements on the roller brush body by driving a second blade arranged in a slot of the roller brush body to slide back and forth relative to a first blade.

[0149] Here, in a case where the roller brush arranged in the cleaning device is the first type of roller brush, the roller brush body may be controlled to rotate cyclically according to the second rotation direction and the first rotation direction, to drive the second blade arranged in the slot of the roller brush body to slide back and forth relative to the first blade to cut the entanglements on the roller brush body. In this way, the hair tangled around the roller brush body can be cut off, and the cut hair can fall off from the roller brush body. Consequently, the cleaning device can clear the cut hair. This not only prevents issues with the driver in the cleaning device being blocked due to excessive hair tangling on the roller brush but also eliminates the need for users to manually clean the hair from the roller brush. As a result, the service life of the cleaning device integrating such a roller brush can be effectively extended and the cleaning performance of the cleaning device can be improved.

[0150] In some embodiments, generating the second driving signal based on the number of rotations includes at least one of the following steps:

[0151] generating a first driving sub-signal in response to determining that the number of rotations, during which the roller brush body rotates in the second rotation direction, reaches a first number of rotations; or

[0152] generating a second driving sub-signal in response to determining that the number of rotations, during which the roller brush body rotates in the first rotation direction, reaches a second number of rotations. Here, the first number of rotations and the second number of rotations may be set according to actual rotation requirements in each rotation direction. The first number of rotations and the second number of rotations may be the same or not.

[0153] In the present disclosure, the processor may accurately determine an actual number of rotations of the magnetic member through the pulse signal generated by the magnetic detector. In other words, the processor may accurately determine an actual number of rotations of the roller brush body. In this way, after the actual number of rotations of the roller brush body is determined, the rotation time period and/or the rotation direction of the roller brush body may be adjusted in time according to the actual number of rotations of the roller brush body in a case where the rotation state of the roller brush body is required to be adjusted.

[0154] In some embodiments, determining the rotation direction and/or the rotation time period based on the type of the roller brush includes:

[0155] determining, in response to determining that the type of the roller brush is the first type, that the roller brush body of the roller brush rotates in the second rotation direction for a predetermined time period, followed by rotating in the first rotation direction by a predetermined number of rotations; or

[0156] determining, in response to determining that the type of the roller brush is the second type, that the roller brush body constantly rotates in the second rotation direction.

[0157] In some embodiments, the first type of roller brush in the present disclosure may be a roller brush provided with a cutting assembly. The first type of roller brush may cut the entanglements on the roller brush body through sliding of the second blade in the cutting assembly relative to the first blade. In other words, the first type of roller brush may be a hair-cutting roller brush with a hair-cutting function. The second type of roller brush may be an ordinary roller brush without a cutting assembly.

[0158] In some embodiments, in response to determining that the type of the roller brush is the first type, it is determined that the roller brush body of the roller brush rotates in the second rotation direction for the predetermined time and then rotates in the first rotation direction by the predetermined number of rotations, to drive the second blade arranged in the slot of the roller brush body to slide in a second direction relative to the first blade, to cut the entanglements on the roller brush body.

[0159] In some embodiments, determining the number of rotations of the magnetic member based on the pulse signal includes: determining the number of rotations of the magnetic member based on the pulse signal, in response to determining that the roller brush body of the roller brush

rotates in the second rotation direction for the predetermined time period followed by rotating in the first rotation direction by the predetermined number of rotations. The second driving signal is generated based on the number of rotations, which includes: generating a second driving sub-signal in response to determining that the number of rotations, during which the roller brush body rotates in the first rotation direction, reaches the second number of rotations, where the second driving sub-signal is configured to adjust the rotation direction from the first rotation direction to the second rotation direction.

[0160] In some other examples, in response to determining the roller brush body constantly rotates in the second rotation direction, the number of rotations of the magnetic member is not determined based on the pulse signal.

[0161] In the present disclosure, in a case where the roller brush arranged in the cleaning device is the first type of roller brush, the roller brush body may be controlled to rotate cyclically according to the second rotation direction and the first rotation direction, to drive the second blade arranged in the slot of the roller brush body to slide back and forth relative to the first blade in the second direction to cut the entanglements on the roller brush body. In this way, the hair tangled around the roller brush body can be cut off, and the cut hair can fall off from the roller brush body. Consequently, the cleaning device can clear the cut hair. This not only prevents issues with the driver in the cleaning device being blocked due to excessive hair tangling on the roller brush but also eliminates the need for users to manually clean the tangled hair from the roller brush. As a result, the service life of the cleaning device integrating such a roller brush can be effectively extended and the cleaning performance of the cleaning device can be improved.

[0162] In some embodiments, determining the number of rotations of the magnetic member based on the pulse signal includes:

[0163] determining, in a case where the roller brush body of the roller brush rotates in the first rotation direction, the number of rotations, during which the magnetic member rotates in the first rotation direction, based on the pulse signal; and

[0164] generating the second driving signal based on the number of rotations includes:

[0165] generating the second driving signal in response to determining that the number of rotations reaches the predetermined number of rotations, where the second driving signal is configured to adjust the rotation direction to the second rotation direction.

[0166] In some embodiments, in a case where the roller brush body of the roller brush rotates in the first rotation direction, any linkage module of the present disclosure may move in the second direction, and the internal threaded hole of the linkage module may be clamped to the external thread on any threaded rod of the present disclosure. Here, in a case where the roller brush body of the roller brush rotates in the first rotation direction, i.e., while the linkage module moves in the second direction, the corresponding second driving signal may be generated in time to adjust the rotation direction of the roller brush body to the second rotation direction, enabling the linkage module to move in the first direction. In this way, the risk of the internal threaded hole of the linkage module and the external threads on the threaded rod becoming jammed due to excessive movement of the linkage module in the second direction can be reduced. Further, it minimizes the situation where the linkage module cannot continue moving, preventing it from driving the second blade to move back and forth and achieve the cutting function, thereby ensuring the reliable implementation of the cutting function in the cleaning device.

[0167] In some embodiments, in a case where the roller brush body rotates in the second rotation direction, detection of the magnetic signal by the magnetic detector and/or generation of the pulse signal by the magnetic detector may be stopped. Here, on the premise of ensuring that the internal threaded hole of the linkage module and the external threads on the threaded rod are not stuck, resource consumption caused by continuous long-term detection of the magnetic signal and/or generation of the pulse signal by the magnetic detector can be reduced.

[0168] For better understanding of the technical solution of the present disclosure, reference is made to FIG. **9**. FIG. **9** is a schematic flowchart of a detection method according to an example. The method includes steps **91** to **97** as follows.

[0169] In step **91**, whether a magnetic signal is detected by a magnetic detector is determined.

[0170] In step **92**, a type of a roller brush is determined as a first type in response to determining that the magnetic signal is detected by the magnetic detector;

[0171] where the first type of the roller brush may be understood as a hair-cutting roller brush.

[0172] In step **93**, in response to determining that the type of the roller brush is the first type, it is determined that a roller brush body of the roller brush rotates in a second rotation direction for predetermined time followed by rotating in a first rotation direction by a predetermined number of rotations, where the second rotation direction is opposite to the first rotation direction.

[0173] In step **94**, in a case where the roller brush body of the roller brush rotates in the first rotation direction, the magnetic detector is used to detect whether the number of rotations of a magnetic member arranged on the roller brush body reaches the predetermined number of rotations.

[0174] In step **95**, in response to determining that the number of rotations of the magnetic member reaches the predetermined number of rotations, a rotation direction of the roller brush body is adjusted to the second rotation direction.

[0175] In step **96**, the type of the roller brush is determined as a second type in response to determining that the magnetic signal is not detected by the magnetic detector;

[0176] where the second type of the roller brush may be understood as an ordinary roller brush without a hair-cutting function.

[0177] In step **97**, in response to determining that the type of the roller brush is the second type, it is determined that the roller brush body constantly rotates in the second rotation direction.

[0178] The technical solution according to the embodiments of the present disclosure can have the beneficial effects below.

[0179] In the present disclosure, since whether the magnetic signal may be generated by the roller brush can be determined based on whether the magnetic signal is detected by the magnetic detector, a roller brush capable of generating a magnetic signal can be distinguished from a roller brush incapable of generating a magnetic signal, and further the type of the roller brush can be determined.

[0180] Compared with the related art where the type of a roller brush mounted in a roller brush assembly is not identified, in the present disclosure, the type of the roller brush mounted in the roller brush assembly can be accurately identified by detecting whether the magnetic signal is generated by the roller brush mounted in the roller brush assembly. In this way, product functions can be provided corresponding to different roller brushes, thereby improving the diversity of the product functions.

[0181] FIG. **10** is a structural block diagram of a terminal device **1000** according to an example. For instance, the terminal device **1000** may be a mobile phone, a computer, a digital broadcast terminal, a messaging device, a game console, a tablet device, a medical device, a fitness device, a personal digital assistant, etc.

[0182] With reference to FIG. **10**, the terminal device **1000** may include one or more the following components: a processing component **1002**, a memory **1004**, a power component **1006**, a multimedia component **1008**, an audio component **1010**, an input/output (I/O) interface **1012**, a sensor component **1014**, and a communication component **1016**.

[0183] The processing component **1002** generally controls all operations of the terminal device **1000**, such as operations associated with at least one of display, telephone call, data communication, a camera operation or a recording operation. The processing component **1002** may include one or more processors **1020** configured to execute instructions, so as to complete all or some steps of the above method. In addition, the processing component **1002** may include one or more modules to facilitate interaction between the processing component **1002** and other components. For instance, the processing component **1002** may include a multimedia module to facilitate interaction between the multimedia component **1008** and the processing component **1002**.

[0184] The memory **1004** is configured to store various types of data, so as to support the operations on the terminal device **1000**. Instances of the data include at least one of the following: instructions for any application or method operating on the terminal device **1000**, contact data, phone book data, messages, pictures, videos, etc. The memory **1004** may be implemented by any type of volatile or nonvolatile storage device or a combination of them, such as a static random access memory (SRAM), an electrically erasable programmable read only memory (EEPROM), an erasable programmable read-only memory (EPROM), a programmable read only memory (PROM), a read-only memory (ROM), a magnetic memory, a flash memory, a magnetic disk, or an optical disk.

[0185] The power component **1006** supplies power to various components of the terminal device **1000**. The power component **1006** may include at least one of the following: a power management system, one or more power supplies, or other components associated with generating, managing and distributing electric power for the terminal device **1000**.

[0186] The multimedia component **1008** includes a screen that provides an output interface between the terminal device **1000** and a user. In some embodiments, the screen may include a liquid crystal display (LCD) and a touch panel (TP). If the screen includes the touch panel, the screen may be implemented as a touch screen to receive an input signal from the user. The touch panel includes one or more touch sensors to sense the touch, slide and gestures on the touch panel. The touch sensor may sense a boundary of a touching or sliding operation, and further measure duration and pressure related to the touching or sliding operation. In some embodiments, the multimedia component **1008** includes a front-facing camera and/or a rear-facing camera. When the terminal device **1000** is in an operation mode, such as a photographing mode or a video mode, the front-facing camera and/or the rear-facing camera are/is capable of receiving external multimedia data. Each of the front-facing camera and the rear-facing camera may be a fixed optical lens system or have a focal length and optical zoom capability.

[0187] The audio component **1010** is configured to output and/or input an audio signal. For instance, the audio component **1010** includes a microphone (MIC). The microphone is configured to receive an external audio signal when the terminal device **1000** is in operation modes such as a call mode, a recording mode and a voice identification mode. The received audio signal may be further stored in the memory **1004** or transmitted via the communication component **1016**. In some embodiments, the audio component **1010** further includes a speaker configured to output an audio signal.

[0188] The I/O interface **1012** provides an interface between the processing component **1002** and a peripheral interface module. The peripheral interface module may be a keyboard, a click wheel, a button, etc. The buttons may include, but are not limited to, a home button, a volume button, a start button, and a lock button.

[0189] The sensor component **1014** includes one or more sensors configured to provide various aspects of state assessment for the terminal device **1000**. For instance, the sensor component **1014** may detect an on/off state of the terminal device **1000** and relative positioning of the components, such as a display and a keypad of the terminal device **1000**, and the sensor component **1014** may further detect position change of the terminal device **1000** or a component of the terminal device **1000**, presence or absence of contact between the user and the terminal device **1000**, an orientation or acceleration/deceleration of the terminal device **1000**, and temperature change of the terminal device **1000**. The sensor component **1014** may include a proximity sensor configured to detect presence of a nearby object without any physical contact. The sensor component **1014** may further include an optical sensor, such as a complementary metal-oxide-semiconductor (CMOS) or charge-coupled device (CCD) image sensor, which is used in imaging application. In some embodiments, the sensor component **1014** may further include, but is not limited to, at least one of the following: an acceleration sensor, a gyroscope sensor, a magnetic sensor, a pressure sensor, or a temperature sensor.

[0190] The communication component **1016** is configured to facilitate wired or wireless communication between the terminal device **1000** and other devices. The terminal device **1000** may access a wireless network based on a communication standard, such as Wi-Fi, the 4th generation mobile communication technology (4G), the 5th generation mobile communication technology (5G), or a combination of them. In one example, the communication component **1016** receives a broadcast signal or broadcast related information from an external broadcast management system via a broadcast channel. In one example, the communication component **1016** further includes a near field communication (NFC) module to facilitate short-range communication. For

instance, the NFC module may be implemented based on a radio frequency identification (RFID) technology, an infrared data association (IrDA) technology, an ultra wide band (UWB) technology, a Bluetooth (BT) technology, and other technologies.

[0191] In one example, the terminal device **1000** may be implemented by one or more of an application specific integrated circuit (ASIC), a digital signal processing (DSP) device, a digital signal processing device (DSPD), a programmable logic device (PLD), a field programmable gate array (FPGA), a controller, a microcontroller, a microprocessor, or other electronic elements.

[0192] In one example, there is further provided a non-transitory computer-readable storage medium including instructions, such as the memory **1004** including executable instructions or a computer program. The instructions or computer program may be executed by the processor **1020** of the terminal device **1000** to complete the above method. For instance, the non-transitory computer-readable storage medium may be ROM, a random access memory (RAM), a compact disc read-only memory (CD-ROM), a magnetic tape, a floppy disk, an optical data storage device, etc.

[0193] A non-transitory computer-readable storage medium, when instructions in the non-transitory computer-readable storage medium executed by a processor of a terminal device, the terminal device is caused to perform any detection method according to the embodiments of the present disclosure. For instance, the detection method includes:

[0194] determining whether a magnetic signal is detected by a magnetic detector, where the magnetic detector is located on an outer surface of a roller brush housing of a cleaning device; and

[0195] determining a type of a roller brush mounted in the roller brush housing based on whether the magnetic signal is detected by the magnetic detector.

[0196] A computer program product is provided according to an embodiment of the present disclosure. The computer program product includes: a computer program or executable instructions. The computer program or the executable instructions is/are stored in the computer-readable storage medium. A processor of a computer device reads the computer program or the executable instructions from the computer-readable storage medium. The processor executes the computer program or the executable instructions, causing the computer device to perform any detection method according to the embodiments of the present disclosure.

[0197] FIG. **11** is a block diagram of a device for executing a detection method according to an example. For instance, the apparatus **1100** may be provided as a server. With reference to FIG. **11**, the device **1100** includes a processing component **1122**, which further includes one or more processors, and a memory resource represented by a memory **1132**, which is configured to store executable instructions by the processing component **1122**, such as an application. The application stored in the memory **1132** may include one or more modules that each correspond to a group of instructions. In addition, the processing component **1122** is configured to execute the instructions, so as to perform the above method.

[0198] The device **1100** may further include a power component **1126** configured to execute power management of the device **1100**, a wired or wireless network interface **1150** configured to connect the device **1100** to a network, and an input/output (I/O) interface **1158**. The device **1100** may operate on an operating system stored in the memory **1132**, such as Windows Server™, Mac OS X™, Unix™, Linux™, FreeBSD™, or similar operating systems.

[0199] Those skilled in the art would readily conceive other embodiments of the present disclosure upon consideration of the specification and practice of the present disclosure here. The present disclosure is intended to cover any variations, uses, or adaptations of the embodiments of the present disclosure. These variations, uses, or adaptations comply with the general principles of the embodiments of the present disclosure, and include common knowledge or customary technical means in the art which are not disclosed herein. The specification and embodiments are to be considered as illustrative merely, the scope and spirit of the embodiments of the present disclosure are defined by the following claims.

[0200] It is to be understood that the embodiments of the present disclosure are not limited to the precise structures that have been described above and illustrated in the accompanying drawings, and that various modifications and changes can be made without departing from the scope thereof. The scope of the embodiments of the present disclosure is merely limited by the appended claims.

1. A roller brush assembly, comprising:
a roller brush housing;
a roller brush, located inside the roller brush housing; and
a magnetic detector, located on an outer surface of the roller brush housing and configured to detect a magnetic signal, wherein the magnetic signal is configured to determine a type of the roller brush.

2. The roller brush assembly according to claim **1**, wherein the roller brush comprises:
a roller brush body, assembled in the roller brush housing; and
a magnetic member, arranged at an end of the roller brush body; and
the magnetic detector, arranged at an end of the roller brush housing,
wherein the end of the roller brush body where the magnetic member is arranged and the end of the roller brush housing where the magnetic detector is arranged are located at a same side.

3. The roller brush assembly according to claim **2**, comprising:
a driver, connected to the roller brush body and configured to drive the roller brush body, along with the magnetic member, to rotate.

4. The roller brush assembly according to claim **2**, wherein
the magnetic member comprises: a radially magnetized magnet; and
the magnetic detector comprises: a Hall sensor, arranged in a magnetization direction of the radially magnetized magnet.

5. A cleaning device, comprising:
a roller brush assembly, comprising: a roller brush housing; a roller brush, located inside the roller brush housing; and a magnetic detector, located on an outer surface of the roller brush housing and configured to detect a magnetic signal, wherein the magnetic signal is configured to determine a type of the roller brush; and
a processor, connected to the magnetic detector of the roller brush assembly and configured to determine the

type of the roller brush in the roller brush assembly based on whether the magnetic signal is detected by the magnetic detector.

6. The cleaning device according to claim **5**, wherein the processor is configured to instruct the roller brush to perform a cleaning function corresponding to the type of the roller brush, wherein different types of roller brushes correspond to different cleaning functions.

7. The cleaning device according to claim **5**, wherein

the processor is connected to a driver in the roller brush assembly and configured to determine a rotation direction and/or a rotation time period of a roller brush body based on the type of the roller brush, and generate a first driving signal; and

the driver is configured to drive the roller brush body, along with a magnetic member on the roller brush body, to rotate according to the rotation direction and/or the rotation time period based on the first driving signal.

8. The cleaning device according to claim **5**, wherein

the magnetic detector is configured to generate a pulse signal in response to determining that a magnetic pole of a magnetic member on a roller brush body approaches the magnetic detector; and

the processor is configured to determine a number of rotations of the magnetic member based on the pulse signal, and generate a second driving signal based on the number of rotations, wherein the second driving signal is configured to adjust a rotation direction and/or a rotation time period of the roller brush body.

9. The cleaning device according to claim **5**, wherein the roller brush comprises:

a roller brush body, assembled in the roller brush housing; and

a magnetic member, arranged at an end of the roller brush body; and

the magnetic detector, arranged at an end of the roller brush housing,

wherein the end of the roller brush body where the magnetic member is arranged and the end of the roller brush housing where the magnetic detector is arranged are located at a same side.

10. The cleaning device according to claim **8**, wherein the processor is configured to generate, in response to determining that a number of rotations during which the roller brush body along with the magnetic member rotates in a first rotation direction reaches a predetermined number of rotations, the second driving signal, to adjust the rotation direction of the roller brush body to a second rotation direction opposite to the first rotation direction.

11. A detection method, applied to a cleaning device, wherein

the cleaning device comprises:

a roller brush assembly, comprising: a roller brush housing; a roller brush, located inside the roller brush housing; and a magnetic detector, located on an outer surface of the roller brush housing and configured to detect a magnetic signal, wherein the magnetic signal is configured to determine a type of the roller brush; and

a processor, connected to the magnetic detector of the roller brush assembly and configured to determine the type of the roller brush in the roller brush assembly based on whether the magnetic signal is detected by the magnetic detector; and

the detection method comprises:

determining whether the magnetic signal is detected by the magnetic detector; and

determining the type of the roller brush mounted inside the roller brush housing based on whether the magnetic signal is detected by the magnetic detector.

12. The detection method according to claim **11**, wherein determining the type of the roller brush mounted inside the roller brush housing based on whether the magnetic signal is detected by the magnetic detector comprises:

determining the type of the roller brush as a first type in response to determining that the magnetic signal is detected by the magnetic detector; or

determining the type of the roller brush as a second type in response to determining that the magnetic signal is not detected by the magnetic detector, wherein the first type is different from the second type.

13. The detection method according to claim **11**, further comprising:

controlling the roller brush to perform a cleaning function corresponding to the type of the roller brush, wherein different types of roller brushes correspond to different cleaning functions.

14. The detection method according to claim **13**, wherein controlling the roller brush to perform a cleaning function corresponding to the type of the roller brush comprises:

determining a rotation direction and/or a rotation time period of a roller brush body of the roller brush based on the type of the roller brush, wherein the roller brush body is assembled in the roller brush housing of the cleaning device;

generating a first driving signal based on the rotation direction and/or the rotation time period; and

driving the roller brush body along with a magnetic member to rotate according to the rotation direction and/or the rotation time period based on the first driving signal.

15. The detection method according to claim **11**, further comprising:

generating, in a case where a roller brush body of the roller brush rotates and the roller brush body is provided with a magnetic member, a pulse signal in response to determining that a magnetic pole of the magnetic member approaches the magnetic detector;

determining a number of rotations of the magnetic member based on the pulse signal;

generating a second driving signal based on the number of rotations; and

adjusting a rotation direction and/or a rotation time period based on the second driving signal.

16. The detection method according to claim **14**, wherein determining the rotation direction and/or the rotation time period based on the type of the roller brush comprises:

determining, in response to determining that the type of the roller brush is a first type, that the roller brush body of the roller brush rotates in a second rotation direction for a predetermined time period, followed by rotating in a first rotation direction by a predetermined number of rotations; or

determining, in response to determining that the type of the roller brush is a second type, that the roller brush body constantly rotates in the second rotation direction.

17. The detection method according to claim **15**, wherein determining the number of rotations of the magnetic member based on the pulse signal comprises:

determining, in a case where the roller brush body of the roller brush rotates in a first rotation direction, the number of rotations, during which the magnetic member rotates in the first rotation direction, based on the pulse signal; and

generating the second driving signal based on the number of rotations comprises:

generating the second driving signal in response to determining that the number of rotations reaches a predetermined number of rotations, where the second driving signal is configured to adjust the rotation direction to a second rotation direction.

18. A terminal device, comprising:

one or more processors; and

a memory that store a computer program or instructions, wherein

the one or more processors, when executing the computer program or instructions, cause the terminal device to perform the detection method according to claim **11**.

19. A non-transitory computer-readable storage medium, storing a computer program or instructions, wherein the processor, when executing the computer program or instructions in the non-transitory computer-readable storage medium, executes the detection method according to claim **11**.

20. A computer program product, comprising a computer program or instructions, wherein the processor, when executing the computer program or instructions, executes the detection method according to claim **11**.

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