



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.03.2020 Bulletin 2020/12

(51) Int Cl.:
A47L 5/36 (2006.01)
A47L 9/28 (2006.01)
A47L 9/02 (2006.01)

(21) Application number: **18193993.5**

(22) Date of filing: **12.09.2018**

(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

(71) Applicant: **Vestel Elektronik Sanayi ve Ticaret A.S.**
45030 Manisa (TR)

(72) Inventors:
• **TURGUT, Hüseyin Ilker**
45030 Manisa (TR)
• **ILHAN, Tugce**
45030 Manisa (TR)

(74) Representative: **Ascherl, Andreas et al**
KEHL, ASCHERL, LIEBHOFF & ETTMAYR
Patentanwälte - Partnerschaft
Emil-Riedel-Strasse 18
80538 München (DE)

(54) **DEVICE FOR DETERMINING THE FRICTION LEVEL BETWEEN A BROOMSTICK OF A VACUUM CLEANER AND THE SURFACE TO BE CLEANED**

(57) An arrangement (1) for a vacuum cleaner (19) comprising a broomstick (20), the arrangement (1) comprising a friction detection unit (2) adapted to sense at least one of a friction force (3) between the broomstick (20) and a cleaning surface (21) to be cleaned using broomstick (20), or a pressure value (4) to detect pressure applied due to at least one contact between the cleaning surface (21) and the broomstick (20), or due to a movement of the broomstick (20) onto the cleaning surface (21), or a combination thereof, or a heat value (5) representative of heat generated while the broomstick

(20) is in contact with the cleaning surface (21), or a temperature value (6) representative of temperature around an environment of the broomstick (20) and the cleaning surface (21) to be cleaned using broomstick (20), or a combination thereof. The arrangement (1) further comprising a primary processing unit (7) adapted to receive and process the friction force (3) or the heat value (5), or the temperature value (6), or the pressure value (4), or a combination thereof, and to identify a friction level (8) of the cleaning surface (21).

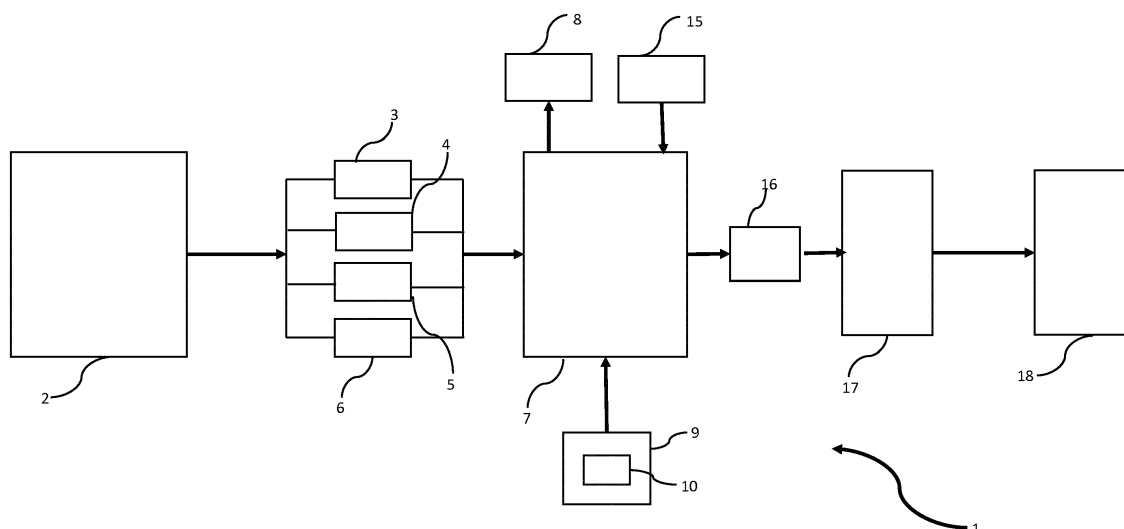


Fig 2

Description

[0001] This invention refers to an arrangement for a vacuum cleaner according to claim 1, a vacuum cleaner according to claim 11, and a method for providing an arrangement within a vacuum cleaner according to claim 12.

Background of the Invention

[0002] A vacuum cleaner, one of the household appliances, is a common tool in every household. This electrical household appliance is used to sweep places requires movement with human force. However, different surfaces have different friction coefficients so that a different traction power level is needed. Adjusting the traction power to the surface is a troublesome task for users. For example, while low-strength traction is sufficient on the laminate surface, higher traction settings are required on surfaces such as carpets. It is an old system which is problematic for users to change the power setting manually on each surface. Some users operate the vacuum cleaner at high power throughout the entire sweeping process, unless the traction power is changed. As a result, the energy loss is increasing as the vacuum cleaner runs for a long time.

[0003] Japanese Patent Publication Number JP2015188490 discloses a self-propelled vacuum cleaner which includes a body having a pair of driving wheels, driving wheel driving means for driving the pair of driving wheels individually, a rotary brush provided at a bottom surface of the body; an azimuth detection sensor for detecting the direction of the body, floor surface detection means for detecting a friction resistance value of the floor surface with which the rotary brush comes into contact, and a control unit for controlling individual rotational frequency of the driving wheels with respect to the driving wheel driving means. The control unit performs control based on the detection value of the azimuth detection sensor, and performs control of the driving wheel driving means on the basis of the friction resistance value of the floor surface detected by the floor surface detection means.

[0004] Japanese Patent Publication Number JPH06169872 discloses a vacuum cleaner having a floor brush fitted with a vibration detecting means which detects a vibration due to friction with the irregularities of the surface of a cleaning object or the surface of the body, and a mounting and demounting state detecting means to detect whether the brush is lifted. The vibration detection means is constituted of a piezoelectric element, a vibration actuator and a vibration spring. Also, the demounting state detecting means is constituted of a micro switch and an actuator for causing a mounting and demounting motion.

[0005] Japanese Patent Publication Number JPS648941 discloses an electric cleaner which automatically control a suction flow quantity by detecting friction

by a suction part of a floor surface in a suction range, and further determines a condition of the floor surface based on the size of the detected friction, and performs control of suction.

Object of the Invention

[0006] It is therefore an object of the present invention is to efficiently detect a friction level of a cleaning surface currently being cleaned by a vacuum cleaner.

Description of the Invention

[0007] The before mentioned object is solved by an arrangement if the vacuum cleaner according to claim 1.

[0008] An arrangement for a vacuum cleaner is described which comprises a broomstick, the arrangement comprising a friction detection unit adapted to sense at least one of a friction force between the broomstick and a cleaning surface to be cleaned using broomstick, or a pressure value to detect pressure applied due to at least one contact between the cleaning surface and the broomstick, or due to a movement of the broomstick onto the cleaning surface, or a combination thereof, or a heat value representative of heat generated while the broomstick is in contact with the cleaning surface, or, a temperature value representative of temperature around an environment of the broomstick and the cleaning surface to be cleaned using broomstick, or a combination thereof. The arrangement further comprising a primary processing unit adapted to receive and process the friction force or the heat, or the temperature, or the pressure value, or a combination thereof, and to identify a friction level of the cleaning surface.

[0009] This embodiment is helpful, as it provides a mechanism for identifying friction level based on parameters like temperature, heat generated while the surfaces are in contact, pressure, friction force. The friction coefficient or friction level have a correlation with these parameters, and can be used for more efficiently determining the friction level of the cleaning surface. Once the friction level is identified, a user can manually change the traction level of vacuum cleaner, or the friction level can be further used to automatically change the traction power of the vacuum cleaner.

[0010] Further preferred embodiments are subject-matter of dependent claims and/or of the following specification parts.

[0011] According to a preferred embodiment of the invention, the arrangement further comprises a memory storing a lookup table having a mapping of temperature value, or heat value or friction force, or the pressure value, or a combination thereof with respect to the friction levels of the cleaning surface, wherein the primary processing unit is adapted to fetch the friction level of the cleaning surface based on the temperature value, or heat value, or friction force, or pressure value, or a combination thereof.

[0012] This embodiment is beneficial as it provides an efficient mechanism to identify the friction level by using predefined relation between the parameters detected by friction detection unit, i.e., temperature value, heat, friction force, pressure value, and the friction level.

[0013] According to a further preferred embodiment of the invention, the friction detection sensor is placed in proximity to the broomstick of the vacuum cleaner and/or on the outer surface of the head of the vacuum cleaner.

[0014] This embodiment is helpful, as it provides for further sensing of accurate values sensed by the friction detection unit are accurate due to proximity of the detection unit and the source of generation of the heat, temperature, pressure and friction force. The source here is the surface of broom stick and the cleaning surface.

[0015] According to another preferred embodiment of the invention, the friction detection unit comprises a temperature sensor adapted to sense the temperature value.

[0016] This embodiment is helpful, as it provides an easy mechanism to sense the temperature values.

[0017] According to a further embodiment of the invention, the arrangement comprises a heat processing module adapted to receive and process the temperature value, and to determine the heat generated while the broomstick is in contact with the cleaning surface.

[0018] This embodiment is helpful, as it provides a mechanism to sense amount of heat generated while the broomstick is in contact with the cleaning surface.

[0019] According to another preferred embodiment of the invention, the friction detection unit comprises a pressure sensor adapted to detect the pressure value applied due to at least one contact between the cleaning surface and the broomstick, or due to the movement of the broomstick onto the cleaning surface, or a combination thereof.

[0020] This embodiment is helpful, as it provides an easy mechanism to sense the pressure values.

[0021] According to a further embodiment of the invention, the arrangement comprises a force processing module adapted to receive and process the pressure value, and to determine the friction force between the broomstick and the cleaning surface being cleaned using broomstick.

[0022] This embodiment is helpful, as it provides a mechanism to sense amount of friction force generated while the broomstick is in contact with the cleaning surface.

[0023] According to a further preferred embodiment of the invention, the primary processing unit is further adapted to receive a traction power value representative of the vacuum cleaner, and to process the traction power value along with the temperature value to identify a friction level of the cleaning surface.

[0024] This embodiment is beneficial, as it provides for a mechanism to keep a consideration for traction power is being applied while tracking the temperature values generated. If a traction power value remains substantially unchanged over a period of time, while temperature value changes substantially, it shall pertain to a situation for

change of the cleaning surface, hence change in friction level.

[0025] According to another preferred embodiment of the invention, the primary processing unit is adapted to generate a trigger based on the identification of the friction level. The arrangement further comprising a control unit adapted to receive the trigger, and to change a traction power level of a traction motor of the vacuum cleaner.

[0026] This embodiment is beneficial, as it automates the process of changing traction power based on the change in friction level of the cleaning surface.

[0027] According to a further embodiment of the invention, the friction detection unit is adapted to sense the friction force or the heat, or the temperature, or the pressure value, or a combination thereof, at regular intervals.

[0028] This embodiment is beneficial, as sensing the parameters by the friction detection unit periodically helps in identifying any sudden change in the friction level due to changes in the type of surfaces while the vacuum cleaner is functioning.

[0029] The before mentioned object is also solved by a vacuum cleaner comprising the arrangement according to according to claim 11.

[0030] The before mentioned object is also solved by a method for providing an arrangement within a vacuum cleaner according to according to claim 12.

[0031] A method for providing an arrangement within a vacuum cleaner comprising placing a friction detection unit in proximity of a broomstick of the vacuum cleaner.

The friction detection unit adapted to sense at least one of a friction force between the broomstick and a cleaning surface to be cleaned using broomstick, or a pressure value to detect pressure applied due to at least one of a contact between the cleaning surface and the broomstick, or due to a movement of the broomstick onto the cleaning surface, or a combination thereof, or a heat generated while the broomstick is in contact with the cleaning surface, or, a temperature around an environment of the broomstick and the cleaning surface to be cleaned using broomstick, or a combination thereof. The method further includes coupling a primary processing unit to the friction detection unit. The primary processing unit is adapted to receive and process the friction force or the heat, or the temperature, or the pressure value, or a combination thereof, and to identify a friction level of the cleaning surface.

[0032] According to a further preferred embodiment of the invention, the method comprises coupling the primary processing unit to a memory. The memory stores a lookup table having a mapping of temperature value, or heat or friction force, or the pressure value, or a combination thereof with respect to the friction levels of the cleaning surface. The primary processing unit is adapted to fetch the friction level of the cleaning surface based on the temperature value, or heat or friction force, or a combination thereof.

[0033] According to a further embodiment of the invention, the method comprises triggering the movement

means by using a motor to extend the separator to be in the extended position from the collapsed position, or to collapse the separator be in collapsed position from the extended position.

[0034] According to another preferred embodiment of the invention, the primary processing unit is adapted to generate a trigger based on the identification of the friction level. The method further comprising coupling the primary processing unit to a control unit, such that the control unit is adapted to receive the trigger, and to change a traction power level of a traction motor of the vacuum cleaner.

[0035] Further benefits, goals and features of the present invention will be described by the following specification of the attached figures, in which components of the invention are exemplarily illustrated. Components of the devices and method according to the inventions, which match at least essentially with respect to their function, can be marked with the same reference sign, wherein such components do not have to be marked or described in all figures.

[0036] The invention is just exemplarily described with respect to the attached figure in the following.

Brief Description of the Drawings

[0037]

Fig. 1 illustrates a vacuum cleaner having a friction detection unit, according to an embodiment of the invention.

Fig. 2 illustrates a schematic diagram of the arrangement for a vacuum cleaner for determining and managing friction level of a cleaning surface being cleaned, according to an embodiment of the invention.

Fig. 3 illustrates a schematic diagram of a friction detection unit, according to an embodiment of the invention.

[0038] The present invention focuses on determining friction levels of a cleaning surface being cleaned by a vacuum cleaner. In order to detect the friction level, frictional force and heat level are utilized which will come out from the surface area of the vacuum cleaner. Since the friction coefficient will depend on the surface type, surfaces such as laminate parquet, carpet and tile will be detected by the vacuum cleaner. After the surface type is determined, the traction force will be increased for rough surfaces and will be reduced on a smooth surface where low power is sufficient. The traction force can be changed either manually, or through a automated mechanism.

[0039] Fig. 1 shows a vacuum cleaner 19 having a friction detection unit 2. The vacuum cleaner 19 includes a broomstick 20 which comes into contact to a cleaning

surface 21 to clean the cleaning surface 21. The friction detection unit 2 is placed in proximity to head of the broomstick 20. The friction detection unit 2 is responsible for detection of one or more of

- a friction force between the broomstick 20 and a cleaning surface 21 to be cleaned or being cleaned using broomstick 20,
- a pressure value to detect pressure applied due to at least one contact between the cleaning surface 21 and the broomstick 20, or due to a movement of the broomstick 20 onto the cleaning surface 21,
- a heat value representative of heat generated while the broomstick 20 is in contact with the cleaning surface 21,
- a temperature value representative of temperature around an environment of the broomstick 20 and the cleaning surface 21 to be cleaned using the broomstick 20.

[0040] Based on the above parameters identified by the friction detection unit, a processor determines friction level of the surface being cleaned or about to be cleaned. And, once the friction level of the cleaning surface 21 is identified, the traction power level of traction motor can be changed automatically or manually.

[0041] In an alternate embodiment, the friction detection unit need not be placed in proximity of the head of the broomstick, rather it can be placed at any other location, however in proximity to the contact of the cleaning surface 21 and the broomstick 20.

[0042] Fig. 2 shows a schematic diagram of the arrangement 1 for a vacuum cleaner for determining and managing friction level 8 of a cleaning surface being cleaned. The arrangement includes a friction detection unit 2, a primary processing unit 7, and a control unit 17.

[0043] The friction detection unit 2 is capable of identifying four parameters, i.e., temperature value 6, heat value 5, pressure value 4, and friction force 3. In an alternate embodiment, the friction detection unit 2 is capable only to identify any one or more of the four parameters, temperature value 6, heat value 5, pressure value 4, and friction force 3.

[0044] These parameters, temperature value 6, heat value 5, pressure value 4, and friction force 3 are used as input to the primary processing unit 7. The primary processing unit 7 also receives a traction power value 15 representative of traction power of the vacuum cleaner at a particular timeframe, and process the parameters 3, 4, 5, 6, and identifies the friction level 8 of the cleaning surface currently being cleaned or about to be cleaned.

[0045] In one embodiment, the primary processing unit 7 receives temperature values 6 at regular time intervals, and also receives traction power value 15, and if the traction power value 15 remain unchanged in that particular period of time, however the temperature values 6 changes, the primary processing unit 7 identifies that the friction level has changed, and further processes the parameters

3, 4, 5, 6 to determine the friction level 8.

[0046] In an alternate embodiment, the primary processing unit 7 do not receive the traction power value 15, and processes one or more parameters, temperature value 6, heat value 5, pressure value 4, and friction force 3, to determine the friction level 8.

[0047] The arrangement 1 also includes a memory 9 which stores a lookup table 10 which maps friction levels 8 to temperature value 6, heat value 5, pressure value 4, and friction force 3. In one embodiment, the lookup table 10 includes mapping of friction levels 8 to any one or more of temperature value 6, heat value 5, pressure value 4, and friction force 3. The primary processing unit 7 while processing the parameters 3, 4, 5, 6, fetches the relevant friction level 8 from the lookup table 10 and determines it to be the friction level 8 of the cleaning surface being cleaned or about to be cleaned. In an alternate embodiment, the arrangement need not include the memory 9, rather the primary processing unit 7 processes the parameters, temperature value 6, heat value 5, pressure value 4, and friction force 3 based on certain rules to determine the friction level 8 of the cleaning surface.

[0048] Based on the friction level 8 of the cleaning surface, the primary processing unit 7 generates a trigger 16 for controlling traction power level of the vacuum cleaner. The trigger 16 is further sent to a control unit 17, which processes the trigger 16 to control a traction motor 18 to change the traction power level of the vacuum cleaner. In one embodiment, the arrangement only determines the friction level 8 of the cleaning surface, while the traction power level of the traction motor 18 is adjusted manually.

[0049] Fig. 3 shows a schematic diagram of a friction detection unit 2. The friction detection unit 2 includes a temperature sensor 11, a pressure sensor 13, a heat processing module 12, and a force processing module 14. The temperature sensor 11 senses the temperature values 6, while the pressure sensor 13 senses the pressure values 4. The temperature values 11 are fed into the heat processing module 12, which processes the temperature value 6 to determine the heat value 5 regarding heat generated while the broomstick is in contact with the cleaning surface. The pressure values 4 are fed into the force detection module 14, which process the pressure value 4, and determines the friction force 3 between the broomstick and the cleaning surface being cleaned using broomstick. The temperature sensor 11, and the pressure sensor 13 are provided in the friction detection unit 2 in such a way, so that they are in proximity to the head of the broomstick, or in proximity to a contact between the broomstick and the cleaning surface about to be cleaned or being cleaned. In one embodiment, the friction detection unit only has either the temperature sensor 11 or the pressure sensor 13, and hence is capable of generating only the heat value 5 or the friction force 3, as the case may be. In an alternate embodiment, the heat processing module 12 and the force processing

module 14 are not present or only either of them present. Accordingly, in alternate embodiment, based on the presence of sensors and processing modules, the friction detection unit 2 is adapted to generate one or more of the following parameters, temperature value 6, heat value 5, pressure value 4, and friction force 3.

[0050] Thus, the present invention provides for an arrangement 1 for a vacuum cleaner 19 which have a broomstick 20. The arrangement 1 includes a friction detection unit 2 which senses at least one friction force 3 between the broomstick 20 and a cleaning surface 21 to be cleaned using broomstick 20, or a pressure value 4 to detect pressure applied due to at least one contact between the cleaning surface 21 and the broomstick 20, or due to a movement of the broomstick 20 onto the cleaning surface 21, or combination thereof, or a heat value 5 representative of heat generated while the broomstick 20 is in contact with the cleaning surface 21, or, a temperature value 6 representative of temperature around an environment of the broomstick 20 and the cleaning surface 21 to be cleaned using broomstick, or a combination thereof. The arrangement 1 also includes a primary processing unit 7 which receives and processes the friction force 3 or the heat value 5, or the temperature value 6, or the pressure value 4, or a combination thereof, and to identify a friction level 8 of the cleaning surface.

List of reference numbers

[0051]

1	arrangement
2	friction detection unit
3	friction force
4	pressure value
5	heat value
6	temperature value
7	primary processing unit
8	friction level
9	memory
10	lookup table
11	temperature sensor
12	heat processing module
13	pressure sensor
14	force processing module
15	traction power value
16	trigger
17	control unit
18	traction motor
19	vacuum cleaner
20	broomstick
21	cleaning surface

Claims

1. An arrangement (1) for a vacuum cleaner (19) comprising a broomstick (20), the arrangement (1) com-

prising:

- a friction detection unit (2) adapted to sense at least one friction force (3) between the broomstick (20) and a cleaning surface (21) to be cleaned using the broomstick (20), or a pressure value (4) to detect pressure applied due to at least one contact between the cleaning surface (21) and the broomstick (20), or due to a movement of the broomstick (20) onto the cleaning surface (21), or a combination thereof, or a heat value (5) representative of heat generated while the broomstick (20) is in contact with the cleaning surface (21), or a temperature value (6) representative of temperature around an environment of the broomstick (20) and the cleaning surface (21) to be cleaned using broomstick (20), or a combination thereof;
 - a primary processing unit (7) adapted to receive and process the friction force (3) or the heat value (5), or the temperature value (6), or the pressure value (4), or a combination thereof, and to identify a friction level (8) of the cleaning surface (21).
2. The arrangement (1) according to claim 1 comprising:
- a memory (9) storing a lookup table (10) having a mapping of temperature value (6), or heat value (5) or friction force (3), or the pressure value (4), or a combination thereof with respect to the friction levels (8) of the cleaning surface (21), wherein the primary processing unit (7) is adapted to fetch the friction level (8) of the cleaning surface (21) based on the temperature value (6), or heat value (5) or friction force (3), or, pressure value (4), or a combination thereof.
3. The arrangement (1) according to any of the claims 1 or 2, wherein the friction detection unit (2) is placed in proximity to the broomstick (20) of the vacuum cleaner (19).
4. The arrangement (1) according to any of the claims 1 to 3, wherein the friction detection unit (2) comprises a temperature sensor (11) adapted to sense the temperature value (6).
5. The arrangement (1) according to the claim 4 comprising a heat processing module (12) adapted to receive and process the temperature value (6), and to determine the heat value (5) regarding heat generated while the broomstick (20) is in contact with the cleaning surface (21).
6. The arrangement (1) according to any of the claims 1 to 5, wherein the friction detection unit (2) comprises a pressure sensor (13) adapted to detect the pressure value (4) applied due to at least one contact between the cleaning surface (21) and the broomstick (20), or due to the movement of the broomstick (20) onto the cleaning surface (21), or a combination thereof.
7. The arrangement (1) according to the claim 7 comprising a force processing module (14) adapted to receive and process the pressure value (4), and to determine the friction force (3) between the broomstick (20) and the cleaning surface (21) being cleaned using broomstick (20).
8. The arrangement (1) according to any of the claims 1 to 7, wherein the primary processing unit (7) is further adapted to receive a traction power value (15) representative of traction power of the vacuum cleaner (19), and to process the traction power value (15) along with the temperature value (6) to identify the friction level (8) of the cleaning surface (21).
9. The arrangement (1) according to any of the claims 1 to 8, wherein the primary processing unit (7) is adapted to generate a trigger (16) based on the identification of the friction level (8), the arrangement (1) further comprising:
- a control unit (17) adapted to receive the trigger (16), and to change a traction power level of a traction motor (18) of the vacuum cleaner (19).
10. The arrangement according to any of the claims 1 to 10, wherein the friction detection unit (2) is adapted to sense the friction force (3) or the heat value (5), or the temperature value (6), or the pressure value (4), or a combination thereof, at regular intervals.
11. A vacuum cleaner (19) comprising the arrangement (1) according to any of the claims 1 to 10.
12. A method for providing an arrangement within a vacuum cleaner (19) comprising:
- placing a friction detection unit (2) in proximity of a broomstick (20) of the vacuum cleaner (19), the friction detection unit (2) adapted to sense at least one of a friction force (3) between the broomstick (20) and a cleaning surface (21) to be cleaned using broomstick (20), or a pressure value (4) to detect pressure applied due to at least one contact between the cleaning surface (21) and the broomstick (20), or due to a movement of the broomstick (20) onto the cleaning surface (21), or a combination thereof, or a heat value (5) representative of heat generated while the broomstick (20) is in contact with the cleaning surface (21), or a temperature value (6) representative of temperature around an environment of the broomstick (20) and the cleaning surface (21) to be cleaned using broomstick (20), or a combination thereof;

representative of temperature around an environment of the broomstick (20) and the cleaning surface (21) to be cleaned using broomstick (20), or a combination thereof; and

- coupling a primary processing unit (7) to the friction detection unit (2), such that the primary processing unit (7) is adapted to receive and process the friction force (3) or the heat value (5), or the temperature value (6), or the pressure value (4), or a combination thereof, and to identify a friction level (8) of the cleaning surface (21).

13. The method according to claim 12 comprising:

- coupling the primary processing unit (7) to a memory (9), wherein the memory (9) stores a lookup table (10) having a mapping of temperature value (6), or heat value (5) or friction force (3), or the pressure value (4), or a combination thereof with respect to the friction levels (8) of the cleaning surface (21), wherein the primary processing unit (7) is adapted to fetch the friction level (8) of the cleaning surface (21) based on the temperature value (6), or heat value (5) or friction force (3), or pressure value (4), or a combination thereof.

14. The method according to any of the claims 12 or 13, wherein the primary processing unit (7) is adapted to generate a trigger (16) based on the identification of the friction level (8), the method further comprising:

- coupling the primary processing unit (7) to a control unit (17) such that the control unit (17) is adapted to receive the trigger (16), and to change a traction power level of a traction motor (18) of the vacuum cleaner (19).

40

45

50

55

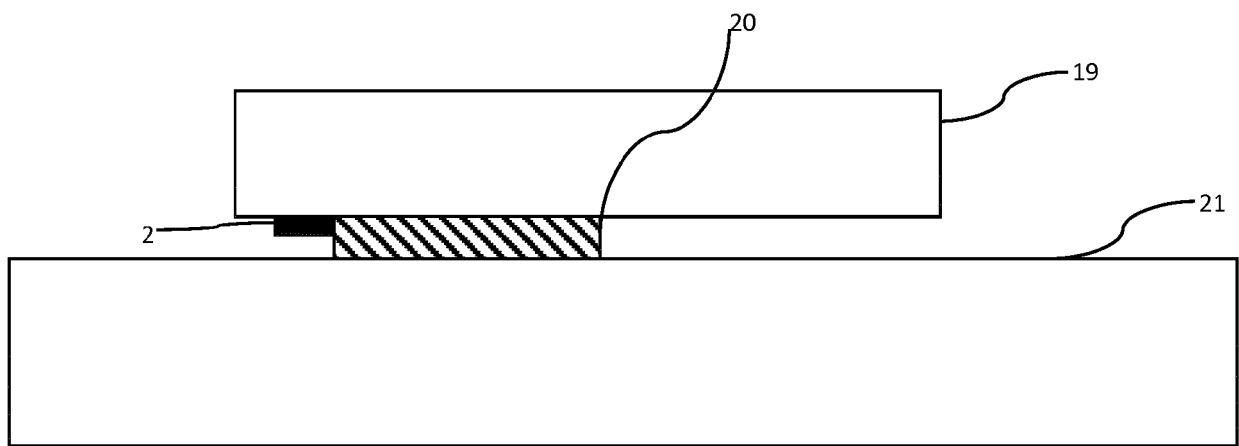


Fig 1

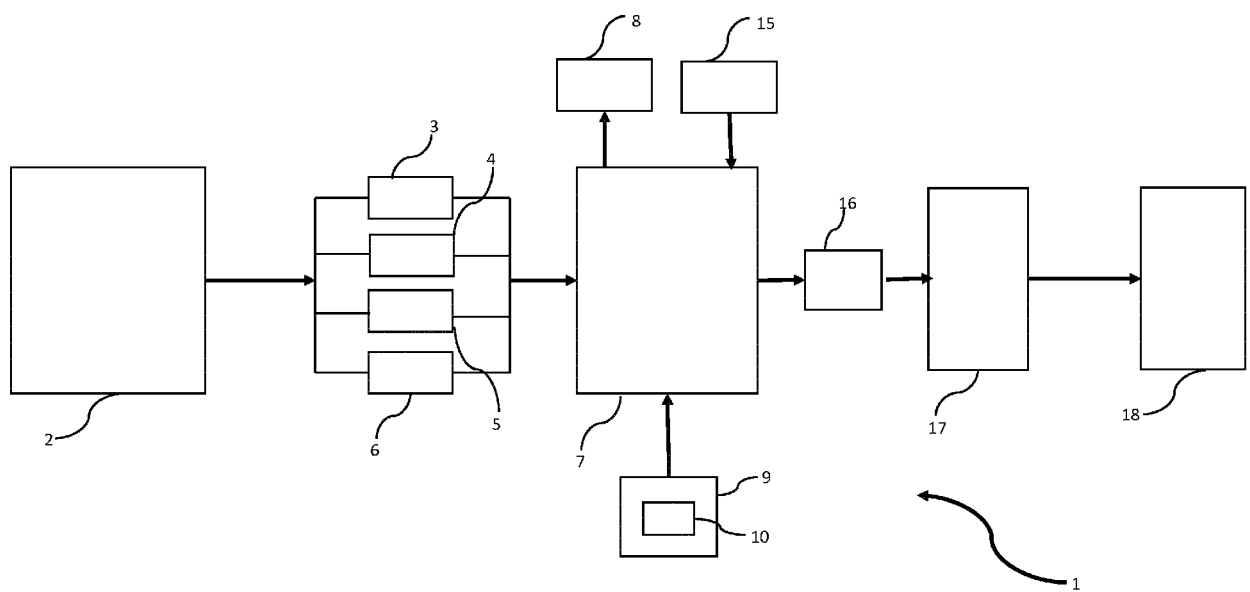


Fig 2

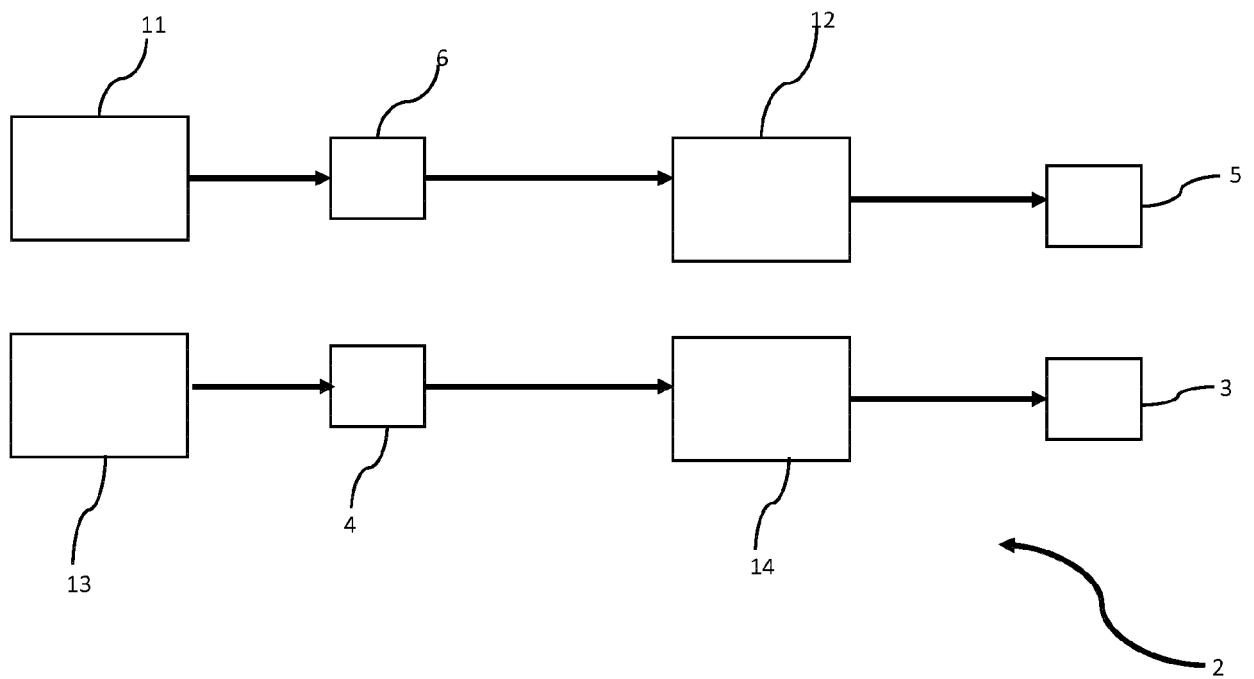


Fig 3



EUROPEAN SEARCH REPORT

Application Number
EP 18 19 3993

5

10

15

20

25

30

35

40

45

1

50

55

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	DE 10 2004 014252 A1 (VORWERK CO INTERHOLDING [DE]) 30 June 2005 (2005-06-30) * page 2, paragraph 1 * * page 5, left-hand column, line 45 - line 60 * * page 6, paragraph 18 - page 7, paragraph 32 * * figures 1-4 *	1-14	INV. A47L5/36 A47L9/02 A47L9/28
X	DE 10 2007 057589 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; KURZ GERHARD [DE]) 4 June 2009 (2009-06-04) * page 2, left-hand column, paragraph 1 * * page 2, right-hand column, paragraph 9 - paragraph 12 * * page 3, left-hand column, paragraph 14 * * page 4, right-hand column, paragraph 39 - page 5, left-hand column, paragraph 51 * * figures 1,2 *	1-14	
X	DE 10 2014 116978 A1 (VORWERK & CO INTERHOLDING GES MIT BESCHRÄNKTER HAFTUNG [DE]) 25 May 2016 (2016-05-25) * left-hand column, paragraph 1 * * page 1, right-hand column, paragraph 8 - page 2, right-hand column, paragraph 9 * * page 6, left-hand column, paragraph 39 - right-hand column, paragraph 41 * * figure 4 *	1-14	TECHNICAL FIELDS SEARCHED (IPC) A47L
X	DE 10 2016 118248 A1 (VORWERK CO INTERHOLDING [DE]) 4 May 2017 (2017-05-04) * page 2, left-hand column, paragraph 1 * * page 2, right-hand column, paragraph 9 * * page 5, right-hand column, paragraph 30 - page 6, right-hand column, paragraph 36 * * figure 2 *	1-14	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 March 2019	Examiner Redelsperger, C
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 19 3993

5

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

15-03-2019

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102004014252 A1	30-06-2005	AT 474492 T	15-08-2010
		CN 1889880 A	03-01-2007
		DE 102004014252 A1	30-06-2005
		ES 2345891 T3	05-10-2010
		JP 4887156 B2	29-02-2012
		JP 2007512884 A	24-05-2007

DE 102007057589 A1	04-06-2009	CN 101877986 A	03-11-2010
		DE 102007057589 A1	04-06-2009
		EP 2219505 A1	25-08-2010
		ES 2390529 T3	13-11-2012
		JP 2011504775 A	17-02-2011
		US 2010300489 A1	02-12-2010
		WO 2009068299 A1	04-06-2009

DE 102014116978 A1	25-05-2016	DE 102014116978 A1	25-05-2016
		TW 201625170 A	16-07-2016

DE 102016118248 A1	04-05-2017	CN 108135417 A	08-06-2018
		DE 102016118248 A1	04-05-2017
		EP 3367868 A1	05-09-2018
		JP 2018531689 A	01-11-2018
		PH 12018500451 A1	10-09-2018
		SG 11201801835T A	27-04-2018
		TW 201720360 A	16-06-2017
		WO 2017071942 A1	04-05-2017

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- JP 2015188490 B [0003]
- JP H06169872 B [0004]
- JP S648941 B [0005]