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(54) SELF-AIR-DRYING CONTROL METHOD, FLOOR SCRUBBER AND STORAGE MEDIUM

(57) The application relates to the technical field of floor washers, and provides a self-air drying control method, a floor washer, and a storage medium. The floor washer includes a dust suction air duct, a fan and a cleaning member, the fan rotates to drive an airflow to flow through the dust suction air duct, the cleaning member is configured to clean a to-be-cleaned surface and is located at the dust suction air duct, the self-air drying control method includes the following operations. The fan is started according to an initially set rotational speed. The fan is reduced from the initially set rotational speed to a target set rotational speed through closed-loop control, to air-dry the cleaning member. The fan is reduced from the initially set rotational speed to the target set rotational speed through the closed-loop control, in this way, the fan may stably rotate at the target set rotational speed which is relatively low, achieving a function of self-air drying the cleaning member.

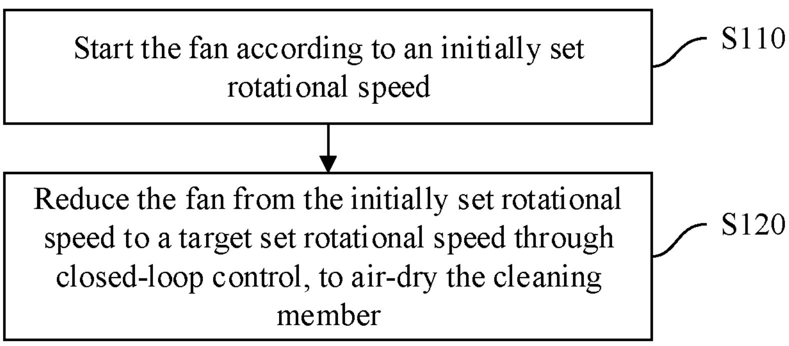

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is filed based on and claims priority to Chinese Patent application No. 202211253972.2 filed on October 13, 2022, the contents of which are hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The application relates to the technical field of floor washers, and in particular to a self-air drying control method, a floor washer, and a storage medium.

BACKGROUND

[0003] An existing floor washer includes a roller brush and a water tank, and water in the water tank is sprayed on the floor or the roller brush to clean the floor. After the floor washer is used, the roller brush is wet, and direct storage of the roller brush may lead to mildew, bacteria breeding, or other problems of the roller brush. Therefore, the roller brush needs to be dried in time.

[0004] In view of the problem that the roller brush needs to be air-dried, in the related art, an external air duct, a fan, a heating wire or other structures specially used to air-dry the roller brush are designed, to assist to air-dry the roller brush with heating, spin-drying or other means. The external air duct is independent of a dust suction air duct sucking water, liquid, garbage or other impurities on the floor. In this way, the external air duct, fan, drying or spin-drying component or other structures used to air-dry the roller brush may be additionally added, thereby increasing extra volume, weight and cost of the floor washer.

SUMMARY

[0005] In view of this, embodiments of the application provide a self-air drying control method, a floor washer, and a storage medium, so that the external air duct used to air-dry the roller brush may not be additionally added.

[0006] In order to achieve the above purpose, an aspect of the application provides a self-air drying control method, the self-air drying control method is applied to a floor washer which includes a dust suction air duct, a fan and a cleaning member, the fan rotates to drive an airflow to flow through the dust suction air duct, the cleaning member is configured to clean a to-be-cleaned surface and is located at the dust suction air duct, the self-air drying control method includes the following operations.

[0007] The fan is started according to an initially set rotational speed.

[0008] The fan is reduced from the initially set rotational speed to a target set rotational speed through closed-loop control, to air-dry the cleaning member.

[0009] In some embodiments, the operation of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control may include the following operations.

[0010] The fan is gradually reduced from the initially set rotational speed to the target set rotational speed according to a set value for a single rotational speed reduction.

[0011] In a process of reducing a rotational speed of the fan to a dynamically set rotational speed each time, the rotational speed of the fan reaches a steady state corresponding to the dynamically set rotational speed through the closed-loop control.

[0012] In some embodiments, the set value for the single rotational speed reduction may be reduction of 100rpm to 1000rpm per second.

[0013] In some embodiments, the steady state may include that the rotational speed of the fan is kept between 95% and 105% of the dynamically set rotational speed.

[0014] In some embodiments, the operation of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control may include the following operations.

[0015] A Pulse Width Modulation (PWM) wave is controlled through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

[0016] In some embodiments, the operation of controlling the PWM wave through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed may include the following operations.

[0017] A duty cycle of the PWM wave is reduced through the closed-loop control, so that a rotational speed of a motor of the fan reaches the target set rotational speed.

[0018] In some embodiments, the closed-loop control may adopt a Proportion Integral Differential (PID) control algorithm, an active disturbance rejection control algorithm or a sliding mode control algorithm.

[0019] In some embodiments, the operation of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control may include the following operations.

[0020] A current reference value or a driving voltage reference value is controlled through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

[0021] In some embodiments, the initially set rotational speed may be included between 0.2 times and 0.5 times of a rated rotational speed of the fan.

[0022] Another aspect of the embodiments of the application provides a floor washer, the floor washer includes a dust suction air duct, a fan, a cleaning member, a processor and a memory, the fan rotates to drive an airflow to flow through the dust suction air duct, the cleaning member is configured to clean a to-be-cleaned surface and is located at the dust suction air duct, and the memory is configured to store one or more programs. The one or more programs allow the processor to implement the self-drying control method in any one of the above paragraphs, when the one or more programs are executed by the processor.

[0023] An embodiment of the application also provides a storage medium, having stored thereon a computer program. The program implements the self-drying control method in any one of the above paragraphs, when the program is executed by a processor.

[0024] According to the self-air drying control method provided in the application, on one hand, rotation of the fan is used to drive the airflow to flow through the dust suction air duct. In this way, the airflow flows through the cleaning member, so that the fan for dust suction is used to air-dry the cleaning member, without additionally adding an external air duct, a fan, a heating wire or other structures, and without additionally increasing volume, weight and cost of the floor washer. On the other hand, the fan is started according to the initially set rotational speed, so that the fan may be stably started, and the fan is reduced from the initially set rotational speed to the target set rotational speed through the closed-loop control. In this way, the fan may stably rotate at the target set rotational speed which is relatively low, achieving a function of self-air drying the cleaning member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

FIG. 1 is a flowchart of a self-air drying control method according to an embodiment of the application.

FIG. 2 is a schematic diagram of a PWM wave according to an embodiment of the application.

FIG. 3 is a schematic diagram of a PWM wave after reducing ON time according to an embodiment of the application.

FIG. 4 is a schematic diagram of a three-phase half-bridge driver according to an embodiment of the application.

FIG. 5 is a schematic diagram of a PWM wave for driving the three-phase half-bridge driver shown in FIG. 4.

DETAILED DESCRIPTION

[0026] The application will be further described in detail below in combination with the drawings and embodiments. It should be understood that specific embodiments described here are only intended to explain the application, and are not intended to limit the application.

[0027] Unless defined otherwise, all technical and scientific terms used here have the same meaning as usually understood by technicians in the technical field to which the application belongs. In the description of the application, terms used here are only for the purpose of describing specific embodiments, and are not intended to limit the application. A term "and/or" as used here includes any and all combinations of one or more relevant listed items.

[0028] With reference to FIG. 1, an aspect of the embodiments of the application provides a self-air drying control method, the self-air drying control method is applied to a floor washer.

[0029] The floor washer includes a dust suction air duct, a fan and a cleaning member, the fan rotates to drive an airflow to flow through the dust suction air duct, the cleaning member is configured to clean a to-be-cleaned surface and is located at the dust suction air duct. The cleaning member may be contacted with the to-be-cleaned surface, to clean the to-be-cleaned surface by friction. Specifically, an end of the dust suction air duct close to the to-be-cleaned surface is provided with a dust opening, and at least a part of the cleaning member protrudes from the dust opening to contact with the to-be-cleaned surface.

[0030] The self-air drying control method includes the following operations S110 and S120.

[0031] At S110, the fan is started according to an initially set rotational speed.

[0032] At S120, the fan is reduced from the initially set rotational speed to a target set rotational speed through closed-loop control, to air-dry the cleaning member.

[0033] In the application, air-drying the cleaning member refers to drying the cleaning member by way of blowing air.

[0034] Specifically, the initially set rotational speed is higher than the target set rotational speed. In the application, the fan includes an impeller and a motor 10, a motor shaft of the motor 10 is connected to the impeller, and the motor 10 drives the impeller to rotate to make the airflow flow. It may be understood that a rotational speed of the fan may be a rotational speed of the motor 10.

[0035] Since the motor 10 of the fan for dust suction has a high rotational speed, that is, a rated rotational speed of the motor 10 is high, for example, between 40000rpm and 60000rpm, while air-drying the cleaning member requires the fan to operate at a relatively low rotational speed, for example, below 25000rpm, so that the fan may be used to air-dry the cleaning member and has low noise. However, when the motor 10 is far from a rated operation point, a phenomenon where the rotational speed thereof is unstable may occur, thus it is difficult to use the fan to air-dry the cleaning member.

[0036] According to the self-air drying control method provided in the application, on one hand, rotation of the fan is used to drive the airflow to flow through the dust suction air duct. In this way, the airflow flows through the cleaning member, so that the fan for dust suction is used to air-dry the cleaning member, without additionally adding an external air duct, a fan, a heating wire or other structures, and without additionally increasing volume, weight and cost of the floor washer. On the other hand, the fan is started according to the initially set rotational speed, so that the fan may be stably started, and the fan is reduced from the initially set rotational speed to the target set rotational speed through the closed-loop control. In this way, the fan may stably rotate at the target set rotational speed which is relatively low, achieving a function of self-air drying the cleaning member.

[0037] It should be noted that in the application, rpm refers to revolution per minute.

[0038] The fan is reduced from the initially set rotational speed to the target set rotational speed through the closed-loop control, to air-dry the cleaning member. Exemplarily, an operation time of the fan at the target set rotational speed may be controlled. In this way, a degree of air-drying the cleaning member by the fan is controlled.

[0039] It may be understood that a degree of dryness of the cleaning member may be set according to actual requirements, which is not elaborated here.

[0040] In an embodiment, the initially set rotational speed is included between 0.2 times and 0.5 times of a rated rotational speed of the fan. For example, the rated rotational speed of the fan is 60000rpm, and the initially set rotational speed may be included between 12000rpm and 30000rpm. That is, the initially set rotational speed may be 12000rpm, 20000rpm, or 30000rpm, etc. In this way, it may effectively ensure that the fan may be started at a relatively stable rotational speed, and it facilitates the fan to reduce to the target set rotational speed quickly.

[0041] The rated rotational speed refers to a rotational speed of the motor 10 of the fan at rated power.

[0042] The closed-loop control is a control mode in which an output end provides feedback to an input end to participate in re-control. Exemplarily, rotational speed control information is input to the fan, and real-time rotational speed information of the fan is fed back to the input to correct operation processes, so that a real-time rotational speed of the fan reach the target set rotational speed. The closed-loop control is a system control mode with feedback information.

[0043] In an embodiment, the closed-loop control adopts a PID control algorithm. PID refers to Proportion Integral Differential. Error value may be calculated by the PID control algorithm, to control the real-time rotational speed of fan to reach the target set rotational speed.

[0044] In some embodiments, the closed-loop control may also adopt an active disturbance rejection control algorithm or a sliding mode control algorithm. That is, an adaptive control algorithm may also be used to implement the closed-loop control.

[0045] In some embodiments, after starting the fan according to the initially set rotational speed and determining that it is stable at the initially set rotational speed, the fan is reduced from the initially set rotational speed to the target set rotational speed through the closed-loop control. In this way, fluctuation in a process of speed reduction of the fan is reduced.

[0046] Exemplarily, in some embodiments, after starting the fan according to the initially set rotational speed, the fan stably operates at the initially set rotational speed through the closed-loop control. In other words, after the fan is started according to the initially set rotational speed, the fan may stably operate at the initially set rotational speed. That is, the real-time rotational speed of the fan is kept between 95% of the initially set rotational speed and 105% of the target set rotational speed.

[0047] In an embodiment, the operation 5120 of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control includes the following operation S121.

[0048] At S121, the fan is gradually reduced from the initially set rotational speed to the target set rotational speed according to a set value for a single rotational speed reduction. In a process of reducing a rotational speed of the fan to a dynamically set rotational speed each time, the rotational speed of the fan reaches a steady state corresponding to the dynamically set rotational speed through the closed-loop control.

[0049] It may be understood that in some embodiments, the initially set rotational speed may be reduced to the target set rotational speed according to the set value for the single rotational speed reduction at a time. In some other embodiments, the initially set rotational speed may be reduced to the target set rotational speed according to the set value for the single rotational speed reduction at multiple times.

[0050] It may be understood that since the real-time rotational speed changes dynamically in a process of gradually reducing from the initially set rotational speed to the target set rotational speed according to the set value for the single rotational speed reduction, the dynamically set rotational speed is a dynamic value for single speed reduction in a process of slowly reducing from the initially set rotational speed to the target set rotational speed.

[0051] It should be noted that multiple times include two times and more than two times.

[0052] Exemplarily, reducing the fan from the initially set rotational speed to the target set rotational speed according to the set value for the single rotational speed reduction at three times is taken as an example: the fan is reduced from the initially set rotational speed to a first dynamically set rotational speed according to the set value for single rotational speed reduction at a first time, and the rotational speed of the fan reaches a steady state corresponding to the first dynamically set rotational speed through the closed-loop control; then, the fan is reduced from the first dynamically set rotational speed to a second dynamically set rotational speed according to the set value for the single rotational speed reduction at a second time, and the rotational speed of the fan reaches a steady state corresponding to the second dynamically set rotational speed through the closed-loop control; then, the fan is reduced from the second dynamically set rotational speed to the target set rotational speed according to the set value for the single rotational speed reduction at a third time.

[0053] Here, on one hand, since speed reduction of the fan is too fast, it is difficult for the fan to rotate stably. In the application, the fan is gradually reduced from the initially set rotational speed to the target set rotational speed according to the set value for the single rotational speed reduction, to achieve graded speed reduction and avoid a problem of unstable rotational speed of the fan caused by quick speed reduction. On the other hand, the rotational speed of the fan reaches the steady state corresponding to the dynamically set rotational speed through the closed-loop control, that is, the fan stably rotates at the dynamically set rotational speed after each speed reduction, and then enters a next speed reduction. In this way, after each speed reduction, it waits until the closed-loop control functions; after the rotational speed of the fan is stable, speed reduction is performed again, and it waits for the real-time rotational speed of the fan to be stable again, so that the rotational speed of the fan is gradually reduced to the target set rotational speed required by self-drying operation.

[0054] In an embodiment, the set value for the single rotational speed reduction is reduction of 100rpm to 1000rpm per second. For example, the set value for the single rotational speed reduction may be reduction of 100rpm per second, reduction of 300rpm per second, reduction of 500rpm per second, or reduction of 1000rpm per second, etc. In this way, it may facilitate the fan to reduce to the target set rotational speed quickly, and may ensure stable rotation of the fan.

[0055] In an embodiment, the steady state includes that the rotational speed of the fan is kept between 95% and 105% of the dynamically set rotational speed. That is, a fluctuation range of the real-time rotational speed of the fan is included between -5% and 5% of the dynamically set rotational speed. In this way, the real-time rotational speed of the fan is ensured to be stable.

[0056] It may be understood that after the fan reaches the target set rotational speed, the target set rotational speed is stabilized by the closed-loop control. In other words, after the fan reaches the target set rotational speed, the fan may stably rotate at the target set rotational speed. That is, the real-time rotational speed of the fan is kept between 95% and 105% of the target set rotational speed. In this way, in a process of air-drying the cleaning member by the fan, the fan keeps rotating at the target set rotational speed which is relatively low, giving consideration to low noise and air-drying functions.

[0057] In some embodiments, the operation 5120 of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control includes the following operation S122.

[0058] At S122, a PWM wave is controlled through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

[0059] The PWM wave refers to a Pulse Width Modulation wave.

[0060] A driving voltage generated by the PWM wave drives the motor 10 of the fan to rotate. The PWM wave is controlled through the closed-loop control, to generate a constant driving voltage, that is, the fan may be controlled to rotate stably through the constant driving voltage, thereby reducing the fan from the initially set rotational speed to the target set rotational speed.

[0061] Exemplarily, the closed-loop control may acquire a real-time rotational speed of the motor 10, compare the real-time rotational speed of the motor 10 with the target set rotational speed, adjust the PWM wave when the real-time rotational speed of the motor 10 is different from the target set rotational speed, and then adjust the rotational speed of the motor 10 according to the adjusted PWM wave, to achieve that the rotational speed of the motor 10 is stable at the target set rotational speed and achieve a purpose of the fan rotating at a constant speed.

[0062] Exemplarily, the PID control algorithm may be used to perform an operation, and the PWM wave may be adjusted according to the operation result, to drive the motor 10 to rotate, thereby achieving that the speed of the motor 10 is stable at the target set rotational speed and achieving a purpose of the motor 10 rotating at a constant speed.

[0063] In an embodiment, the operation S122 of controlling the PWM wave through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed includes the following operation S1221.

[0064] At S1221, duty cycle of the PWM wave is reduced through the closed-loop control, so that a rotational speed of the motor 10 of the fan reaches the target set rotational speed.

[0065] The driving voltage is equal to a bus voltage multiplied by ON time and then divided by a period. The duty cycle is adjusted and converted into a driving voltage signal to be input into a driver of the fan, to achieve adjustment of the rotational speed of the fan.

[0066] Exemplarily, reference is made to FIG. 2 and FIG. 3 where the ordinate is voltage and the abscissa is time. The bus voltage and period are kept unchanged, the duty cycle of the PWM wave is reduced, that is, ON time is reduced, for example, the ON time in FIG. 2 is reduced to the ON time in FIG. 3, the driving voltage may be reduced, so that the motor 10 rotates at the target set rotational speed, and the motor 10 may operate at a low speed state, to achieve the self-air drying function by using the fan.

[0067] The motor 10 of the fan may be a Direct Current (DC) brushless motor or a DC brush motor.

[0068] Exemplarily, with reference to FIG. 4 and FIG. 5, a DC brushless motor used as the motor 10 is taken as an example, the DC brushless motor is driven by fixed rotational speed and frequency; the DC brushless motor adopting a three-phase half-bridge driver (with reference to FIG. 4) is taken as an example, signals of three switch transistors of an upper bridge are V1, V2 and V3 respectively, and signals of three switch transistors of a lower bridge are V4, V5 and V6 respectively. V1 and V4 form a pair, and there is a difference of 180 electrical angles between switch models of V1 and V4. V2 and V5 form a pair, and there is a difference of 180 electrical angles between switch models of V2 and V5. V3 and V6 form a pair, and there is a difference of 180 electrical angles between switch models of V3 and V6. In this example, rotor position of the DC brushless motor is not considered, and switch transistors of V1, V2, V3, V4, V5 and V6 are supplied with PWM waves with fixed frequency respectively.

[0069] In this example, with reference to FIG. 5, one switch transistor of each of the upper and lower bridges is turned on in pairs at the same time, that is, one of V1, V2 and V3 and one of V4, V5 and V6 are turned on at the same time. For example, in an electrical period, V1 and V5 are turned on in pairs, V1 and V6 are turned on in pairs, V2 and V6 are turned on in pairs, V2 and V4 are turned on in pairs, V3 and V4 are turned on in pairs, V3 and V5 are turned on in pairs, V1 and V5 are turned on in pairs, and such turn-on continues circularly in such sequence.

[0070] During operation with a pair of poles of the rotor and the target set rotational speed of 10000rpm, the electrical period = 1s/(10000rpm/60s)/(number of pole pairs, i.e., 1) may be obtained, that is, the electrical period is 6 milliseconds. Reference is made to FIG. 5 where the ordinate is voltage and the abscissa is time. FIG. 5 shows PWM wave of V1, PWM wave of V2, PWM wave of V3, PWM wave of V4, PWM wave of V5 and PWM wave of V6 respectively. When the electrical period is set to be 6 milliseconds, the DC brushless motor may be driven according to the given 10000rpm, so that the DC brushless motor rotates according to the target set rotational speed. The DC brushless motor may operate at a low speed state, to achieve the self-air drying function by using the fan.

[0071] In an embodiment, the operation S120 of reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control includes the following operation S123.

[0072] At S123, a current reference value or a driving voltage reference value is controlled through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

[0073] Here, the current reference value of the control algorithm or the driving voltage reference value of the control algorithm is controlled through the closed-loop control, to achieve dynamic adjustment, which is simple and efficient.

[0074] Another aspect of the application provides a floor washer, the floor washer includes a dust suction air duct, a fan, a cleaning member, a processor and a memory, the fan rotates to drive an airflow to flow through the dust suction air duct, the cleaning member is configured to clean a to-be-cleaned surface and is located at the dust suction air duct. and the memory is configured to store one or more programs. The one or more programs allow the processor to implement the self-drying control method in any one of the above paragraphs, when the one or more programs are executed by the processor. When the fan rotates at the rated rotational speed, the dust suction air duct is configured to suck water, liquid, garbage or other impurities on the to-be-cleaned surface. When the fan rotates at the target set rotational speed, the dust suction air duct is configured to circulate the airflow for air-drying.

[0075] The cleaning member is configured to be contacted with the to-be-cleaned surface such as the floor, to clean the to-be-cleaned surface. The cleaning member may roll, rotate, slide, or the like relative to the floor, so that the cleaning member rubs against the to-be-cleaned surface, and in this way, cleaning purpose is achieved by the cleaning member rubbing against the to-be-cleaned surface. In a process of cleaning the floor by the floor washer, the fan rotates at the rated rotational speed to suck water, liquid, garbage or other impurities on the to-be-cleaned surface into a container through the dust suction air duct. The container includes, but is not limited to a sewage tank, etc. In this way, the floor may be cleaned by the dust suction air duct, the fan and the cleaning member. In a process of air-drying the cleaning member of the floor washer, the fan rotates at the target set rotational speed to air-dry the cleaning member.

[0076] Exemplarily, the cleaning member includes, but is not limited to a roller brush, and/or a mop, etc.

[0077] The memory is configured to store one or more programs. The one or more programs allow the processor to implement the self-drying control method in any one of the embodiments of the application, when the one or more programs are executed by the processor.

[0078] An embodiment of the application also provides a storage medium, having stored thereon a computer program. The program implements the self-drying control method in any one of the embodiments of the application, when the program is executed by a processor. Specifically, the storage medium is a computer-readable storage medium.

[0079] The above descriptions of embodiments of the floor washer and the storage medium are similar to descriptions of any one of the above embodiments of the self-drying control method, and have the same advantageous effect as the embodiments of the self-drying control method. Technical details of the floor washer and the storage medium undisclosed in the embodiments of the application may be understood with reference to descriptions of the embodiments of the air-drying control method in the embodiments of the application.

[0080] It should be noted that in the embodiments of the application, when the above self-drying control method is implemented in form of a software function module and sold or used as an independent product, the above self-air drying control method may also be stored in a computer-readable storage medium. Based on such understanding, the technical solutions of the embodiments of the application substantially or parts making contributions to the related art may be embodied in form of a software product, and the computer software product is stored in a storage medium, includes several instructions to enable a floor washer to execute all or part of the method described in each embodiment of the application. The foregoing storage medium includes various media capable of storing program codes such as a U disk, a mobile hard disk, a Read Only Memory (ROM), a magnetic disk, or an optical disk, etc. In this way, the embodiments of the application are not limited to any specific combination of hardware and software.

[0081] The above descriptions are only specific implementations of the application, however, the scope of protection of the application is not limited thereto. Any variation or replacement easily conceived by those skilled in the art within the technical scope disclosed by the application should be included in the scope of protection of the application. Therefore, the scope of protection of the application should be subjected to the scope of protection of claims.

Claims

1. A self-air drying control method for a floor washer, wherein the floor washer comprises a dust suction air duct, a fan for rotating and driving an airflow to flow through the dust suction air duct, and a cleaning member configured to clean a to-be-cleaned surface and located at the dust suction air duct, the self-air drying control method comprising:

   starting the fan according to an initially set rotational speed; and
   reducing the fan from the initially set rotational speed to a target set rotational speed through closed-loop control, to air-dry the cleaning member.

2. The self-air drying control method of claim 1, wherein reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control comprises:

   gradually reducing the fan from the initially set rotational speed to the target set rotational speed according to a set value for a single rotational speed reduction,
   wherein in a process of reducing a rotational speed of the fan to a dynamically set rotational speed each time, the rotational speed of the fan reaches a steady state corresponding to the dynamically set rotational speed through the closed-loop control.

3. The self-air drying control method of claim 2, wherein the set value for the single rotational speed reduction is a reduction of 100 rpm to 1000 rpm per second.

4. The self-drying control method of claim 2, wherein the steady state comprises that the rotational speed of the fan is kept between 95% and 105% of the dynamically set rotational speed.

5. The self-air drying control method of claim 1, wherein reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control comprises:
   controlling a Pulse Width Modulation (PWM) wave through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

6. The self-drying control method of claim 5, wherein controlling the PWM wave through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed comprises:
   reducing a duty cycle of the PWM wave through the closed-loop control, so that a rotational speed of a motor of the fan reaches the target set rotational speed.

7. The self-drying control method of claim 1, wherein the closed-loop control adopts a Proportion Integral Differential (PID) control algorithm, an active disturbance rejection control algorithm or a sliding mode control algorithm.

8. The self-drying control method of claim 1, wherein reducing the fan from the initially set rotational speed to the target set rotational speed through the closed-loop control comprises:
   controlling a current reference value or a driving voltage reference value through the closed-loop control, to reduce the fan from the initially set rotational speed to the target set rotational speed.

9. The self-air drying control method of any one of claims 1 to 8, wherein the initially set rotational speed is between 0.2 times and 0.5 times of a rated rotational speed of the fan.

10. A floor washer, comprising a dust suction air duct, a fan for rotating and driving an airflow to flow through the dust suction air duct, a cleaning member configured to clean a to-be-cleaned surface and located at the dust suction air duct, a processor, and a memory configured to store one or more programs,
   the one or more programs allowing the processor to implement a self-drying control method of any one of claims 1 to 9, when the one or more programs are executed by the processor.

11. A storage medium, having stored thereon a computer program,
the program implementing a self-drying control method of any one of claims 1 to 9, when the program is executed by a processor.

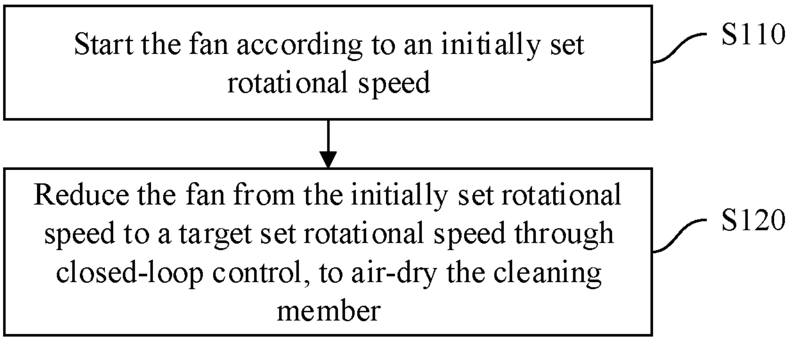
Start the fan according to an initially set rotational speed
S110
Reduce the fan from the initially set rotational speed to a target set rotational speed through closed-loop control, to air-dry the cleaning member
S120

FIG. 1

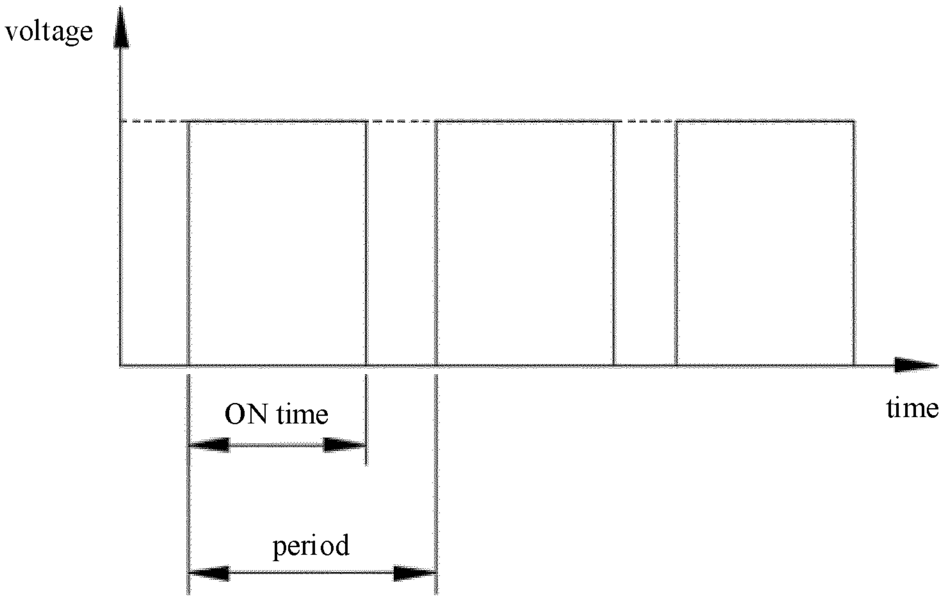
voltage
time
ON time
period

FIG. 2

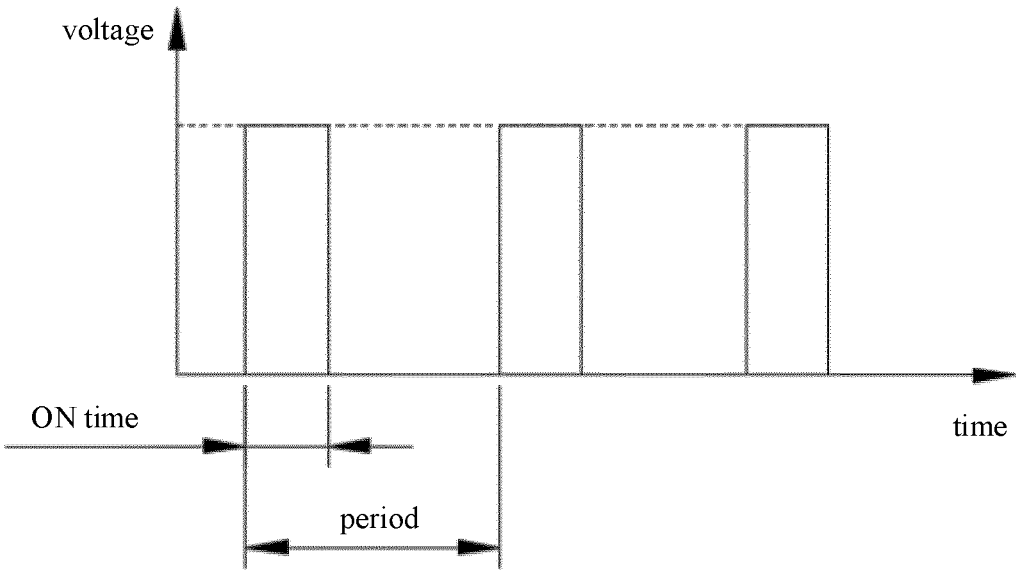

FIG. 3

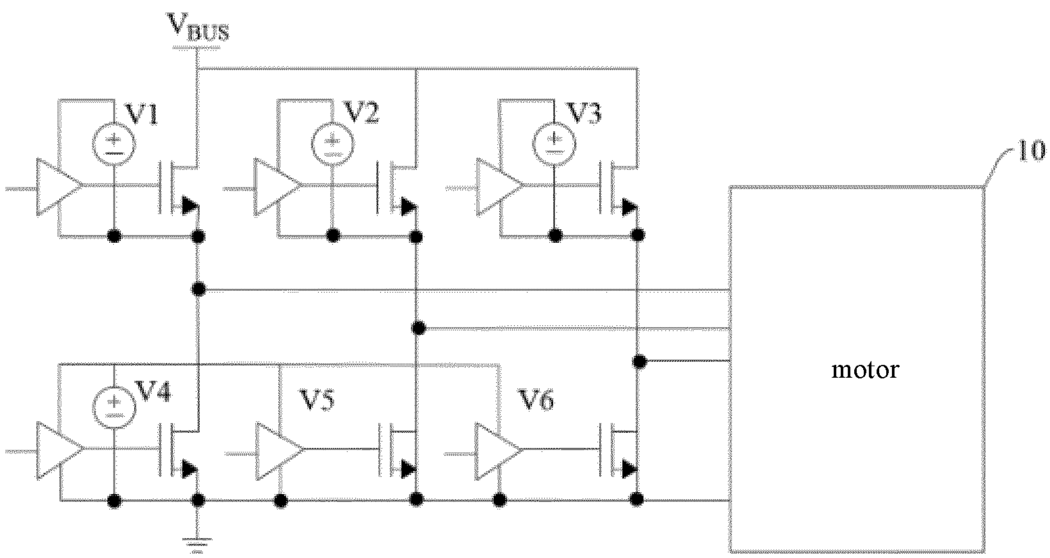

FIG. 4

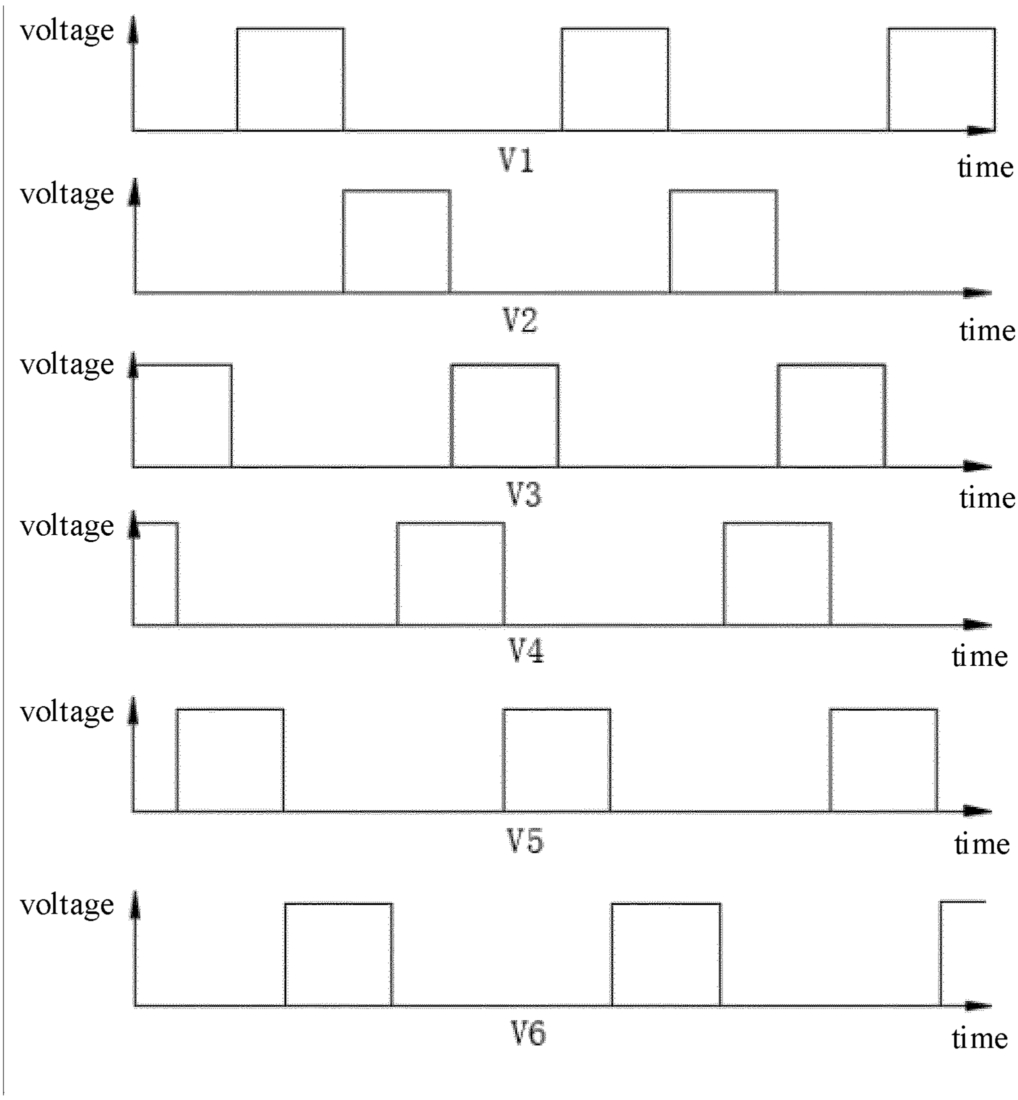
voltage
V1
time
voltage
V2
time
voltage
V3
time
voltage
V4
time
voltage
V5
time
voltage
V6
time

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/134954

A. CLASSIFICATION OF SUBJECT MATTER

A47L11/28(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, ENTXTC, WPABSC, VEN: 风干, 烘干, 吹干, 吹风, 干燥, 刷, 清洁件, 清扫件, 噪音, 低, 小, 风机, 电机, 电动机, 转速, 速度, 速率, 降低, 减小, 减少, 降速, 闭环, 反馈, 自抗扰, 滑模, PID, PMW

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 112515577 A (SHENZHEN SILVER STAR INTELLIGENT TECHNOLOGY CO., LTD.) 19 March 2021 (2021-03-19) description, paragraphs [0046]-[0112], and figures 1-6	1-11
A	CN 114869181 A (GUANGDONG LIZI TECHNOLOGY CO., LTD.) 09 August 2022 (2022-08-09) entire document	1-11
A	CN 113171031 A (MEIZHI ZONGHENG TECHNOLOGY CO., LTD.) 27 July 2021 (2021-07-27) entire document	1-11
A	CN 217408692 U (SHENZHEN SILVER STAR INTELLIGENT GROUP CO., LTD.) 13 September 2022 (2022-09-13) entire document	1-11
A	CN 114951077 A (SUZHOU WEIMOER INTELLIGENT TECHNOLOGY CO., LTD.) 30 August 2022 (2022-08-30) entire document	1-11

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

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 July 2023	**06 July 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/134954

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 206228293 U (JOYOUNG CO., LTD.) 09 June 2017 (2017-06-09) entire document	1-11
A	JP 2022143026 A (MITSUBISHI ELECTRIC CORP. et al.) 03 October 2022 (2022-10-03) entire document	1-11

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/134954

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	112515577	A	19 March 2021	None	
CN	114869181	A	09 August 2022	None	
CN	113171031	A	27 July 2021	None	
CN	217408692	U	13 September 2022	None	
CN	114951077	A	30 August 2022	None	
CN	206228293	U	09 June 2017	None	
JP	2022143026	A	03 October 2022	None	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202211253972 **[0001]**