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(54) **MUSIC WASHING MACHINE AND CONTROL METHOD THEREOF**

MUSIK-WASCHMASCHINE UND STEUERUNGSVERFAHREN DAFÜR

MACHINE À LAVER MUSICALE ET SON PROCÉDÉ DE COMMANDE

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(73) Proprietors:

- **Haier Group Corporation**  
**Shandong 266101 (CN)**
- **Qingdao Haier Washing Machine Co., Ltd.**  
**Shandong 266101 (CN)**

(72) Inventors:

- **SHU, Hai**  
**Qingdao**  
**Shandong 266101 (CN)**

• **GAO, Qiuying**

**Qingdao**  
**Shandong 266101 (CN)**

• **ZENG, Jingfeng**

**Qingdao**  
**Shandong 266101 (CN)**

• **XUE, Kai**

**Qingdao**  
**Shandong 266101 (CN)**

(74) Representative: **Ziebig, Marlene et al**

**Ziebig & Hengelhaupt**  
**Patentanwälte PartG mbB**  
**Leipziger Straße 49**  
**10117 Berlin (DE)**

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**Description****BACKGROUND****Technical Field**

**[0001]** The present invention relates to the field of washing machines, and in particular, to a music washing machine and a control method thereof.

**Related Art**

**[0002]** During a washing process of a conventional washing machine, clockwise and anticlockwise rotations of a motor generate water flows in an inner barrel, and clothes therein are washed by the water flows. In the washing process, generally a user selects a corresponding washing program of the washing machine according to information such as materials, weight, and cleanness of the clothes. The control process depends on the user, and does not have any independent determination. Therefore, a novel washing control method for a washing machine is provided, so that a user has more interactive and sensual pleasures during washing.

**[0003]** Meanwhile, music is everywhere in daily life, and in various fields of life, there are methods using music to control actions of devices. For example, in Chinese Patent No. CN02133317.3, a method of feeling music by touch is provided, and the invention is implemented as follows: a weak audio-frequency electric signal output when a player plays music or a weak audio-frequency electric signal obtained by a microphone is first amplified into a strong audio-frequency electric signal by using an amplifier, and the strong audio-frequency electric signal is divided into two paths: one path of signal passes through a signal delayer to a loudspeaker and is converted into a sound signal, so as to transmit into an auditory and tactile music hall from the upper portion of the hall; the other path of strong audio-frequency electric signal is input to a frequency converter, and the frequency converter is controlled to change the frequency and voltage of a power supply of a motor of a music fan, thereby controlling the rotation speed of the motor of the music fan, and making the change of the rotation speed to be the same as the change of rhythm of the sound signal output by the loudspeaker; therefore, the wind power output by the music fan has the same rhythm change with the music, and the wind power output by the music fan enters the auditory and tactile music hall directly in a short distance. In this way, people in the auditory and tactile music hall can hear and feel the rhythm of the same music simultaneously by the ears and the skin.

**[0004]** Therefore, it is completely feasible to convert a music signal by a converting device into a rotation and stopping ratio and/or rotation speed of a motor of a washing machine, so as to implement controlling of a washing program of the washing machine by using music; therefore, during a washing process of the user, selection of a washing program is implemented together by music and a self determination of the user.

**[0005]** Therefore, the present invention is proposed.

**[0006]** US2005/086979A1 discloses a control method of a washing machine that enables the output of a plurality of melodies to indicate any one of a plurality of operational states of the washing machine. The method of controlling the washing machine includes the steps of assigning at least one audio signal according to a specific operational state of the washing machine among a plurality of operational states, monitoring the specific operational state of the washing machine, and outputting the at least one audio signal according to the specific operational state.

**SUMMARY**

**[0007]** An objective of the present invention is to provide a music washing machine and a control method of the music washing machine, so that the washing machine performs washing according to a music selected by a user and according to corresponding water flows, so as to achieve the effect of increasing interaction with the user; meanwhile, the water flows during the washing process is converted into music, thereby achieving the effect of improving pleasures of the user during washing. Further improvements and embodiments are provided in the dependent claims. To implement the objective of the present invention, the following technical solutions are used:

A music washing machine includes: a motor for introducing washing water flows, where the motor is connected to a control device for performing mutual conversion between a rotation and stopping ratio and/or rotation speed of the motor and a musical characteristic signal, so that during a washing process of the washing machine, music emitted by an output device synchronizes with the rotation and stopping ratio and/or rotation speed of the motor.

**[0008]** Further, the motor is connected to a control device for collecting a motor rotation and stopping ratio and/or rotation speed signal, the control device is provided with a converting module for converting the motor rotation and

stopping ratio and/or rotation speed signal into a corresponding music signal, and the converting module is connected to the output device for emitting the music.

**[0009]** According to the invention, the motor is connected to a control device for controlling the rotation and stopping ratio and/or rotation speed of the motor, the control device is provided with a storage device for storing music, the storage device is connected to an analyzing device for extracting, analyzing and processing a music feature, the analyzing device is connected to a converting device for converting the music signal into a rotation and stopping ratio and/or rotation speed signal of the motor, and the converting device is connected to an executing device for controlling the rotation speed of the motor.

**[0010]** A control method of the music washing machine of the invention, where, a rotation and stopping ratio and/or rotation speed of a motor of the washing machine and a musical characteristic signal are mutually converted by a converting device of the washing machine, so that in the washing process of the washing machine, an output device emits corresponding music obtained through conversion of the rotation and stopping ratio and/or rotation speed of the motor.

**[0011]** Further, the rotation and stopping ratio and/or rotation speed of the motor of the washing machine is analyzed and processed by the control device, and then converted into a corresponding sound feature signal, and the output device emits corresponding music to the user.

**[0012]** Further, the rotation and stopping ratio and/or rotation speed of the motor of the washing machine is extracted by the converting device to generate a corresponding electric signal, and then converted into corresponding musical characteristic signals such as frequency, tune, and tone, and the output device outputs corresponding music to the user.

**[0013]** Further, the user transmits music into the control device of the washing machine, the control device extracts features of the music such as frequency, volume and tone, analyzes and processes the features, and then converts the features into a corresponding motor rotation and stopping ratio and/or rotation speed signal, and the motor of the washing machine performs the washing process according to the corresponding signal.

**[0014]** Further, features such as frequency, tone and volume of the music at different time nodes are stored, analyzed and processed, different time nodes are matched with corresponding motor rotation and stopping ratios and/or rotation speeds, and they are stored in the control device, so that the washing machine works according to the motor rotation and stopping ratio and/or rotation speed matching the music during washing.

**[0015]** Further, the rotation and stopping ratio and/or rotation speed of the motor of the washing machine is analyzed and processed by the control device, then converted into a corresponding sound feature signal, and the output device emits corresponding music to the user.

**[0016]** Further, the user transmits music into the control device of the washing machine, the control device extracts features of the music such as frequency, volume and tone, analyzes and processes the features, and then converts the features into a corresponding motor rotation and stopping ratio and/or rotation speed signal, and the motor of the washing machine performs the washing process according to the corresponding signal.

**[0017]** Further, features such as frequency, tone and volume of the music at different time nodes are stored, analyzed and processed, different time nodes are matched with corresponding motor rotation speeds, and they are stored in the control device, so that the washing machine works according to the motor rotation and stopping ratio and/or rotation speed matching the music during washing.

**[0018]** Further, the user transmits a song into the storage device of the control device, an analyzing device of the control device extracts and analyzes a feature signal of the song such as frequency, tone and volume, so as to generate a processable and convertible musical characteristic signal, the converting device disposed on the control device converts the generated musical characteristic signal to generate a corresponding converted rotation and stopping ratio and rotation speed signal of the motor of the washing machine, and stores the signal. The control device determines, by means of a determining device, the generated motor rotation and stopping ratio and rotation speed signal as a corresponding washing program, and stores music into a music library of a corresponding washing program. Therefore, when the user selects the corresponding washing program, corresponding music may be selected from the corresponding music library, so that the motor of the washing machine performs washing according to the set program, and at the same time, an audio device plays the selected music.

**[0019]** Further, the motor of the washing machine is connected to the control device for collecting the motor rotation and stopping ratio and/or rotation speed, the control device is connected to an analysis and conversion device for converting the motor rotation speed and/or rotation and stopping ratio into a music signal, and the analysis and conversion device is connected to an output sound device for playing the converted music.

**[0020]** Further, the storage device stores the music selected by the user, and is connected to the analysis and conversion device for converting the motor rotation speed and/or rotation and stopping ratio into a music signal, and the analysis and conversion device is connected, by means of the control device, respectively to the motor of the washing machine and the output sound device, so that the music is played and the motor of the washing machine works synchronously according to the set rotation speed and rotation and stopping ratio.

**[0021]** Further, the storage device stores the music selected by the user, and is connected to the control device, and

the control device is connected to the sound device for outputting the music. The control device is further connected to the analysis and conversion device for converting a music signal into a motor rotation speed and/or rotation and stopping ratio, and the analysis and conversion device is connected to the motor of the washing machine, so that the music is played and the motor of the washing machine works synchronously according to the set rotation speed and rotation and stopping ratio.

**[0022]** Further, the motor of the washing machine is connected to the control device for collecting a motor rotation and stopping ratio and/or rotation speed, the control device is connected to the analysis and conversion device for converting the motor rotation speed and/or rotation and stopping ratio into a music signal, the analysis and conversion device is connected to the storage device for storing the corresponding music and the motor rotation and stopping ratio and/or rotation speed, and the storage device is connected to the output sound device for playing the converted music.

**[0023]** Further, methods such as mode recognition, digital signal process, artificial intelligence, and computer multimedia technologies are added, and music elements are recognized, analyzed and extracted by using computer software. The music signal of the computer is divided into two channels A and B, the music signal A is subjected to feature recognition and extraction of music elements by means of a digital audio signal processing software packet of the computer, so as to form various control signals, that is, bass, median, treble and beat; then, based on a "professional music arrangement knowledge base", manifestation forms of "sound, light, and water flow" are selected, and by means of a computer parallel port, discrete control signals from a controller are input to a digital isolated output card to output a simulation signal, the signal is transmitted by a protection device and a driving device to execution mechanisms of the motor: the motor and a light device, so as to control changes of rotation and stopping ratio and/or rotation speed of motors of various washing machines; at the same time, a response time of the music signal B lags behind that of the music signal A due to mechanical inertia of the motor and the control device, and therefore, the signal B is transmitted to the control device and a sound system after a period of delay time, so as to ensure that changes of the water flow and the light are synchronous to and harmonious with the music.

**[0024]** The music arrangement method of the present invention includes the following steps: a musical composition file is selected, and the musical composition is operated by using a "play, pause, confirm, reset" menu; when the musical composition file is opened, an interface displays an actual physical waveform of the file, and an operator clicks the waveform by using a mouse while the music is playing, so as to mark segments of the musical composition, and information such as segmentation time is filled automatically to a table above the waveform file; after segmentation of a musical composition is completed, the operator modifies and adjusts the divided segments according to content of the segments of the musical composition, and the operator may add one segment, delete one segment, or adjust the time of a segment; the operator fills controls signals, such as bass, median, treble, drumbeat, rhythm, melody, program control and blank, into the table according to the divided music segments and content and feeling presented by the music; rows of the table indicate divided music segments, and in "02-09'110-00'25'160", 02 indicates that the musical composition segment is the second segment, 09'110 indicates that the segment time of this segment is 9 seconds and 110 milliseconds, and 00'25'160 indicates that a current playing position of the music is 25 seconds and 160 milliseconds; columns of the table indicate specific control paths and numbers of the music fountain execution mechanism, and in "28-valve-phoenix tail", it indicates that a water pattern name controlled by the 28<sup>th</sup> path is "phoenix tail" and the control type is a "solenoid valve"; an intersection of a row and a column is a specific fountain control signal, and when table content at an intersection of the row "02-09'110-00'25'160" and the column "28-valve-phoenix tail" is "bass", it indicates that the phoenix tail at the 28<sup>th</sup> path of the control paths of the second segment of music is bass control, that is, when the music is played to this segment, the phoenix tail of the 28<sup>th</sup> path starts to work when there is a bass; the operator fills the table according to the previous step, and stores the music arrangement file for future use.

**[0025]** The system controls and outputs the music segments one by one according to the music arrangement file of music performance, until the music ends. First, the control system needs to perform some initialization processes, and when the music is played, from the first segment, effective components of the music are extracted by means of digital audio signal processing to form control signals, and the signals are output to the execution mechanism according to the music arrangement solution specified by the music arrangement file stored in the music arrangement stage, so as to determine whether the musical composition ends or not, if not, the next segment is performed, and the digital audio signal processing is performed to the execution mechanism, the process is repeated until the musical composition ends.

**[0026]** In addition, to enrich the operation interface, a multimedia animation effect is added, there are various simulation pictures of water flows in actual washing machines, and in an audio control state, the water flows act along with control signals sampled in real time, so that the system is more novel and unique, and at the same time, it is conducive to music arrangement of the operator, and enriching the imagination thereof.

**[0027]** Another characteristic of this system lies in that, the professional music arrangement knowledge base is used to assist the operator to arrange the music, and according to the experiential knowledges and some presentation methods, when the music is soft, it is suitable to select various swing water patterns, and when the rhythm is lively, it is suitable to select water patterns such as jade pillar and beam. The computer complements the music arrangement function in advance according to the knowledge base, and the operator performs appropriate adjustment according to specific

conditions, thereby increasing the difficulty in music arrangement.

**[0028]** Further, a frequency electric signal of the music stored in the control device of the washing machine is first amplified, by using an amplifier, into a strong audio-frequency electric signal, and the strong audio-frequency electric signal is divided into two paths: one path of signal passes through a signal delayer to an output device and is converted into a sound signal, so as to transmit to the user acoustically and tactilely; the other path of signal is input to a frequency converter, and the frequency converter is controlled to change the frequency and voltage of a power supply of a motor of the washing machine, so as to control the rotation and stopping ratio and/or rotation speed of the motor, and enable the change of the rotation speed to be the same as the change of rhythm of the sound signal output by the loudspeaker, so that the water flow generated in the washing machine has the same rhythm change with the music. Therefore, a user may feel the rhythm of the music acoustically and tactilely by ears, and can also feel the change of water flows in the washing machine intuitively.

**[0029]** Further, when the washing machine starts a washing program, a weak audio-frequency electric signal output when a control system plays music is first amplified into a strong audio-frequency electric signal by using an amplifier, and the strong audio-frequency electric signal is divided into two paths: one path of signal passes through a signal delayer to a loudspeaker and is converted into a sound signal, so as to transmit into an auditory and tactile music hall from the upper portion of the hall; the other path of strong audio-frequency electric signal is input to a frequency converter, and the frequency converter is controlled to change the frequency and voltage of a power supply of a motor of the washing machine, so as to change the rotation and stopping ratio and/or rotation speed of the motor of the washing machine, and enable the change of the rotation speed to be the same as the change of rhythm of the sound signal output by the control system, so that the water flow output by the motor of the washing machine has the same rhythm change with the music; therefore, the user may hear the music and feel the change of the water flow by ears.

**[0030]** Further, the user transmits a song into the storage device of the control device, the analyzing device of the control device extracts and analyzes a feature signal of the song such as frequency, tone and volume, so as to generate a processable and convertible musical characteristic signal, the converting device disposed on the control device converts the generated musical characteristic signal to generate a corresponding converted rotation and stopping ratio and rotation speed signal of the motor of the washing machine, and stores the signal. The control device determines, by means of the determining device, the generated motor rotation and stopping ratio and rotation speed signal as a corresponding washing program, and stores music into a music library of a corresponding washing program. Therefore, when the user selects the corresponding washing program, corresponding music may be selected from the corresponding music library, so that the motor of the washing machine performs washing according to the set program, and at the same time, an audio device plays the selected music.

**[0031]** Further, in this embodiment, when the washing machine starts a washing program, a weak audio-frequency electric signal output when a control system plays music is first amplified into a strong audio-frequency electric signal by using an amplifier, and the strong audio-frequency electric signal is divided into two paths: one path of signal passes through a signal delayer to a loudspeaker and is converted into a sound signal, so as to transmit into an auditory and tactile music hall from the upper portion of the hall; the other path of strong audio-frequency electric signal is input to a frequency converter, and the frequency converter is controlled to change the frequency and voltage of a power supply of a motor of the washing machine, so as to change the rotation and stopping ratio and/or rotation speed of the motor of the washing machine, and enable the change of the rotation speed to be the same as the change of rhythm of the sound signal output by the control system, so that the water flow output by the motor of the washing machine has the same rhythm change with the music; therefore, the user may hear the music and feel the change of the water flow by ears.

**[0032]** By means of the above technical solutions, compared with the prior art, the present invention has the following advantages: a washing machine is made to generate water flows in different forms according to music set by a user, so as to wash clothes in the washing machine. In this way, not only the user can clearly know the conditions of the water flows in the washing machine, but also the sensitivity of the motor can be intuitively presented to the user, thereby achieving the effect of presenting the performance of the motor. More particularly, by converting the water flows of the washing machine into a form of music transmitted to the user, the washing machine can automatically generate music, thereby improving the interaction with the user, and achieving the effect of improving pleasures of the user during washing.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0033]** The disclosure will become more fully understood from the detailed description given herein below for illustration only, and thus are not limitative of the disclosure, and wherein:

FIG. 1 is a structural block diagram of a washing machine generating music according to the present invention;

FIG. 2 is a structural block diagram of a preferred washing machine generating music according to the present invention;

FIG. 3 is a structural block diagram of a washing machine controlling water flows of the washing machine by music according to the present invention;

FIG. 4 is a structural block diagram of a preferred washing machine controlling water flows of the washing machine by music according to the present invention;

FIG. 5 is a flow chart of synchronizing washing machine music and a washing machine according to the present invention;

FIG. 6 is a flow chart of generating corresponding music and light in a washing machine according to the present invention;

FIG. 7 is a flow chart of generating water flows by using a preferred music control washing machine according to the present invention; and

FIG. 8 is a flow chart of generating water flows by using a music control washing machine according to the present invention.

## DETAILED DESCRIPTION

**[0034]** The present invention is further described in detail through embodiments in the following.

### Embodiment 1

**[0035]** In this embodiment, the washing machine starts a washing program, a weak audio-frequency electric signal output when a control system plays music is first amplified into a strong audio-frequency electric signal by using an amplifier, and the strong audio-frequency electric signal is divided into two paths: one path of signal passes through a signal delayer to a loudspeaker and is converted into a sound signal, so as to transmit into an auditory and tactile music hall from the upper portion of the hall; the other path of strong audio-frequency electric signal is input to a frequency converter, and the frequency converter is controlled to change the frequency and voltage of a power supply of a motor of the washing machine, so as to change the rotation and stopping ratio and rotation speed of the motor of the washing machine, and enable the change of the rotation speed to be the same as the change of rhythm of the sound signal output by the control system, so that the water flow output by the motor of the washing machine has the same rhythm change with the music; therefore, a user may hear the music and feel the change of the water flow by ears.

### Embodiment 2

**[0036]** In this embodiment, methods such as mode recognition, digital signal process, artificial intelligence, and computer multimedia technologies are added to a control device of the washing machine, and music elements are recognized, analyzed and extracted by using computer software. The music signal of the computer is divided into two channels A and B, the music signal A is subjected to feature recognition and extraction of music elements by means of a digital audio signal processing software packet of the computer, so as to form various control signals, that is, bass, median, treble and beat; then, based on a "professional music arrangement knowledge base", manifestation forms of water flows corresponding to the rotation and stopping ratio and rotation speed of the motor of the corresponding washing machine are selected, and by means of a computer parallel port, discrete control signals from a controller are input to a digital isolated output card to output a simulation signal, the signal is transmitted by a protection device and a driving device to execution mechanisms of the motor: the motor and a light device, so as to control changes of rotation and stopping ratio and rotation speed of motors of various washing machines; at the same time, a response time of the music signal B lags behind that of the music signal A due to mechanical inertia of the motor and the control device, and therefore, the signal B is transmitted to the control device and a sound system after a period of delay time, so as to ensure that changes of the water flow and the light are synchronous to and harmonious with the music.

**[0037]** When the washing machine is started to work after a washing program is selected, a control program invokes corresponding music according to motor rotation and stopping ratios and rotation speeds at different time nodes, and transmits the music to the user by using a disposed buzzer or loudspeaker.

### Embodiment 3

**[0038]** In this embodiment, a system sets a corresponding sound feature library according to different rotation and

stopping ratios and rotation speeds of a washing machine, and the sound feature library stores sounds corresponding to various different frequencies, tones and volumes. After a user selects a washing program, the washing machine starts to work, and according to invoked sounds of adjacent nodes and the selected program in a control device, a sound is retrieved from various sounds in the sound feature library corresponding to the rotation and stopping ratio and rotation speed at different time nodes, and then transmitted to the user by using an output device.

#### Embodiment 4

**[0039]** In this embodiment, a control system operates a musical composition according to a musical composition file by using a "play, pause, confirm, reset" menu; the musical composition file is converted into actual sound features, for example, feature physical waveforms such as frequency, tone and tune, segments of the musical composition are marked according to the shape of the waveform while the music is playing, and information such as segmentation time is recorded; after segmentation of the musical composition is completed, the divided segments are modified and adjusted according to content of the segments of the musical composition, and one segment may be added or deleted, or the time of a segment may be adjusted; controls signals, such as bass, median, treble, drumbeat, rhythm, melody, program control and blank, are filled into a table according to the divided music segments and content and feeling presented by the music; then, motor rotation and stopping ratios and rotation speeds corresponding to different time periods are set according to music features assigned at different time nodes; and they are recorded and stored for future use.

**[0040]** The system controls and outputs the music segments one by one according to the music arrangement file of music performance, until the music ends. First, the control system needs to perform some initialization processes, and when the music is played, from the first segment, effective components of the music are extracted by means of digital audio signal processing to form control signals, and the signals are output to the an audio device of the output device according to the music arrangement solution specified by the music arrangement file stored in the music arrangement stage. In this process, the motor of the washing machine works according to the correspondingly set rotation and stopping ratio, so as to generate synchronous water flows corresponding to the music. After the first segment ends, the control device determines whether the musical composition ends or not, if not, the next segment is performed, and the digital audio signal processing is performed to the execution mechanism, the process is repeated until the musical composition ends.

**[0041]** When the "Symphony of Fate" is used for music arrangement, the following mapping table of rotation and stopping ratios and music time nodes is generated:

5  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55

| Serial Number    |    | Time          | Water Flow              | Frequency (Hz) | Time (S) | Time (100mS) | Serial Number | Rotate | Stop |
|------------------|----|---------------|-------------------------|----------------|----------|--------------|---------------|--------|------|
| Symphony of Fate | 0  | 0s-3.5s       | 3.0/0.5 (clockwise)     | 75             | 3.5      | 35           | 0             | 30     | 5    |
|                  | 1  | 3.5s-8s       | 4.0/0.5 (anticlockwise) | 75             | 8        | 80           | 1             | 40     | 5    |
|                  | 2  | 8s-12.5s      | 4.0/0.5 (anticlockwise) | 30             | 13       | 125          | 2             | 40     | 5    |
|                  | 3  | 12.5s-15.5s   | 1.0/0.5                 | 40             | 16       | 155          | 3             | 10     | 5    |
|                  | 4  | 15.5s-17.5s   | 2.0/0 (clockwise)       | 50             | 18       | 175          | 4             | 20     | 0    |
|                  | 5  | 17.5s-20.5s   | 2.5/0.5 (clockwise)     | 70             | 21       | 205          | 5             | 25     | 5    |
|                  | 6  | 20.5s-25.5s   | 4.0/1.0 (anticlockwise) | 75             | 26       | 255          | 6             | 40     | 10   |
|                  | 7  | 25.5s-28s     | 2.5/0 (clockwise)       | 25             | 28       | 280          | 7             | 25     | 0    |
|                  | 8  | 28s-30s       | 2.0/0 (clockwise)       | 30             | 30       | 300          | 8             | 20     | 0    |
|                  | 9  | 30s-32s       | 2.0/0 (clockwise)       | 40             | 32       | 320          | 9             | 20     | 0    |
|                  | 10 | 32s-34s       | 2.0/0 (clockwise)       | 50             | 34       | 340          | 10            | 20     | 0    |
|                  | 11 | 34s-36s       | 2.0/0 (clockwise)       | 60             | 36       | 360          | 11            | 20     | 0    |
|                  | 12 | 36s-37.5s     | 1.5/0 (clockwise)       | 65             | 38       | 375          | 12            | 15     | 0    |
|                  | 13 | 37.5s-39s     | 1.5/0.0 (clockwise)     | 70             | 39       | 390          | 13            | 15     | 0    |
|                  | 14 | 39s-41s       | 2.0/0.0 (clockwise)     | 75             | 41       | 410          | 14            | 20     | 0    |
|                  | 15 | 41s-43.5s     | 2.3/0.2 (clockwise)     | 80             | 44       | 435          | 15            | 23     | 2    |
|                  | 16 | 43.5s-45.1s   | 0.8/0.8                 | 65             | 45       | 451          | 16            | 8      | 8    |
|                  | 17 | 45.1s-46.2s   | 0.8/0.3                 | 55             | 46       | 462          | 17            | 8      | 3    |
|                  | 18 | 46.2s-48.5s   | 2.0/0.3 (anticlockwise) | 50             | 49       | 485          | 18            | 20     | 3    |
|                  | 19 | 48.5s-1:00.5s | 2.5/0.5                 | 30             | 61       | 605          | 19            | 25     | 5    |
|                  | 20 | 1:00.5s-1:03s | 2.5/0 (clockwise)       | 30             | 63       | 630          | 20            | 25     | 0    |
|                  | 21 | 1:03s-1:05s   | 2.0/0 (clockwise)       | 45             | 65       | 650          | 21            | 20     | 0    |
|                  | 22 | 1:05s-1:07s   | 2.0/0.0 (clockwise)     | 70             | 67       | 670          | 22            | 20     | 0    |
|                  | 23 | 1:07s-1:08.5s | 1.2/0.3 (clockwise)     | 70             | 69       | 685          | 23            | 12     | 3    |
|                  | 24 | 1:08.5s-1:17s | 8.3/0.2 (anticlockwise) | 60             | 77       | 770          | 24            | 83     | 2    |
|                  | 25 | 1:17s-1:21.7  | 4.5/0.2 (clockwise)     | 65             | 82       | 817          | 25            | 45     | 2    |

|             |    |                 |                     |    |    |     |    |    |    |   |
|-------------|----|-----------------|---------------------|----|----|-----|----|----|----|---|
| (continued) |    |                 |                     |    |    |     |    |    |    |   |
| 55          | 50 | 45              | 40                  | 35 | 30 | 25  | 20 | 15 | 10 | 5 |
|             | 26 | 1:21.7-1:24.3   | 0.8/0.5             | 75 | 84 | 843 | 26 | 8  | 5  |   |
|             | 27 | 1:24.3s-1:27.1s | 1.0/1.8 (clockwise) | 75 | 87 | 871 | 27 | 10 | 18 |   |

## Embodiment 5

**[0042]** In this embodiment, for the washing machine, a washing machine body may be any structure available in the market, and the washing machine body may be further provided with a converting module. Specifically, the converting module is disposed on a control device, the control device is connected to a motor for introducing water flows, the control device is provided with a storage device connected to the converting module, and an output device is connected to the control device. The output device includes an audio device and a light device.

**[0043]** In this embodiment, the audio device may be configured as a buzzer, an alarm or the like disposed on the washing machine, and may also be a sound device for emitting music and independently disposed on the washing machine, or an externally connected sound device. The light device may be configured as a light disposed on the washing machine body and capable of changing the color, intensity and brightness, and may also be configured as a light connected to the washing machine body, disposed at the external, and capable of changing the color, intensity and brightness.

**[0044]** In this embodiment, the control device obtains the rotation and stopping ratio and rotation speed of the current motor, and generates a rotation and stopping ratio and rotation speed signal; for the control device, an analyzing module on the control device analyzes and processes the obtained rotation and stopping ratio and rotation speed signal, so as to generate a convertible signal that can be converted into a music feature such as frequency, tone and volume. The convertible signal is converted by the converting module into a frequency signal, a tone signal and a volume signal. The control device invokes, according to the corresponding signal, a corresponding sound signal stored in the storage device, and the sound signal is transmitted to the user by a music output device.

**[0045]** Meanwhile, the control device invokes a light signal corresponding to the music feature in the storage device, and presents it to the user by generating different light colors, intensities, brightness and the like with the light device.

## Embodiment 6

**[0046]** In this embodiment, a user transmits a song into a storage device of a control device, an analyzing device of the control device extracts and analyzes a feature signal of the song such as frequency, tone and volume, so as to generate a processable and convertible musical characteristic signal; a converting device disposed on the control device converts the generated musical characteristic signal to generate a corresponding converted rotation and stopping ratio and rotation speed signal of the motor of the washing machine, and stores the signal. The control device determines, by means of a determining device, the generated rotation and stopping ratio and rotation speed signal as a corresponding washing program, and stores music into a music library of a corresponding washing program. Therefore, when the user selects the corresponding washing program, corresponding music may be selected from the corresponding music library, so that the motor of the washing machine performs washing according to the set program, and at the same time, an audio device plays the selected music.

**[0047]** The embodiments and drawings are not intended to limit the production form and pattern of the present invention, and any appropriate variation or modification made by a person of ordinary skill in the art shall fall within the patent scope of the present invention.

**[0048]** The implementation solutions in the embodiments may be further combined or replaced, and the embodiments merely describe preferred embodiments of the present invention, which are not intended to limit the concept and scope of the present invention. Various variations and improvements made by a person skilled in the art on the technical solution of the present invention shall fall within the protection scope of the present invention.

**[0049]** While there has been shown several and alternate embodiments of the present invention, it is to be understood that certain changes can be made as would be known to one skilled in the art without departing from the underlying scope of the present invention as is discussed and set forth above and below including claims. Furthermore, the embodiments described above and claims set forth below are only intended to illustrate the principles of the present invention and are not intended to limit the scope of the present invention to the disclosed elements.

## Claims

1. A music washing machine, comprising: a motor for introducing washing water flows and an output device, wherein the motor is connected to a control device for performing mutual conversion between a rotation and stopping ratio and/or rotation speed of the motor and a musical characteristic signal, so that during a washing process of the washing machine, music emitted by the output device synchronizes with the rotation and stopping ratio and/or rotation speed of the motor;  
wherein the motor is connected to a control device for collecting a motor rotation and stopping ratio and/or rotation speed signal, the control device is provided with a converting module for converting the motor rotation and stopping

ratio and/or rotation speed signal into a corresponding music signal, and the converting module is connected to the output device for emitting the music;

**characterized in that**

the motor is connected to a control device controlling the rotation and stopping ratio and/or rotation speed of the motor, the control device is provided with a storage device for storing music, the storage device is connected to an analyzing device for extracting, analyzing and processing a music feature, the analyzing device is connected to a converting device for converting the music signal into a rotation and stopping ratio and/or rotation speed signal of the motor, and the converting device is connected to an executing device for controlling the rotation speed of the motor.

2. A control method of the music washing machine according to claim 1, wherein a rotation and stopping ratio and/or rotation speed of a motor of the washing machine and a musical characteristic signal are mutually converted by a converting device of the washing machine, so that in the washing process of the washing machine, an output device emits corresponding music obtained through conversion of the rotation and stopping ratio and/or rotation speed of the motor.
3. The control method of the music washing machine according to claim 2, wherein the rotation and stopping ratio and/or rotation speed of the motor of the washing machine is analyzed and processed by the control device, and then converted into a corresponding sound feature signal, and the output device emits corresponding music to the user.
4. The control method of the music washing machine according to claim 3, wherein the rotation and stopping ratio and/or rotation speed of the motor of the washing machine is extracted by the converting device to generate a corresponding electric signal, and then converted into corresponding musical characteristic signals such as frequency, tune, and tone, and the output device outputs corresponding music to the user.
5. The control method of the music washing machine according to claim 2, wherein the user transmits music into the control device of the washing machine, the control device extracts features of the music such as frequency, volume and tone, analyzes and processes the features, and then converts the features into a corresponding motor rotation and stopping ratio and/or rotation speed signal, and the motor of the washing machine performs the washing process according to the corresponding signal.
6. The control method of the music washing machine according to claim 5, wherein features such as frequency, tone and volume of the music at different time nodes are stored, analyzed and processed, different time nodes are matched with corresponding motor rotation and stopping ratios and/or rotation speeds, and they are stored in the control device, so that the washing machine works according to the motor rotation and stopping ratio and/or rotation speed matching the music during washing.

**Patentansprüche**

1. Musikwaschmaschine, umfassend: einen Motor zur Einleitung von Waschwasserflüssen und eine Ausgabevorrichtung, wobei der Motor mit einer Steuervorrichtung zur Durchführung einer gegenseitigen Umwandlung zwischen einem Dreh- und Anhalteverhältnis und/oder einer Drehzahl des Motors und einem musikalischen charakteristischen Signal verbunden ist, so dass während eines Waschprozesses der Waschmaschine Musik, die durch die Ausgabevorrichtung ausgegeben wird, mit dem Dreh- und Anhalteverhältnis und/oder der Drehzahl des Motors synchron läuft;  
wobei der Motor mit einer Steuervorrichtung zur Erfassung eines Motordreh- und Anhalteverhältnisses und/oder Drehzahlsignals verbunden ist, die Steuervorrichtung mit einem Umwandlungsmodul zur Umwandlung des Motordreh- und Anhalteverhältnisses und/oder Drehzahlsignals in ein entsprechendes Musiksignal versehen ist und das Umwandlungsmodul mit der Ausgabevorrichtung zur Ausgabe der Musik verbunden ist;  
**dadurch gekennzeichnet, dass**  
der Motor mit einer Steuervorrichtung verbunden ist, die das Dreh- und Anhalteverhältnis und/oder die Drehzahl des Motors steuert, die Steuervorrichtung mit einer Speichervorrichtung zur Speicherung von Musik versehen ist, die Speichervorrichtung mit einer Analysevorrichtung zur Abfrage, Analyse und Verarbeitung einer Musikfunktion verbunden ist, die Analysevorrichtung mit einer Umwandlungsvorrichtung zur Umwandlung des Musiksignals in ein Dreh- und Anhalteverhältnis und/oder Drehzahlsignal des Motors verbunden ist und die Umwandlungsvorrichtung mit einer Ausführungsvorrichtung zur Steuerung der Drehzahl des Motors verbunden ist.

2. Steuerungsverfahren der Musikwaschmaschine nach Anspruch 1, wobei ein Dreh- und Anhalteverhältnis und/oder eine Drehzahl eines Motors der Waschmaschine und ein musikalisches charakteristisches Signal durch eine Umwandlungsvorrichtung der Waschmaschine gegenseitig umgewandelt werden, so dass beim Waschprozess der Waschmaschine eine Ausgabevorrichtung entsprechende Musik ausgibt, die durch Umwandlung des Dreh- und Anhalteverhältnisses und/oder der Drehzahl des Motors erlangt wird.
3. Steuerungsverfahren der Musikwaschmaschine nach Anspruch 2, wobei das Dreh- und Anhalteverhältnis und/oder die Drehzahl des Motors der Waschmaschine durch die Steuervorrichtung analysiert und verarbeitet werden/wird und dann in ein entsprechendes Schallfunktionssignal umgewandelt werden/wird und die Ausgabevorrichtung entsprechende Musik an den Benutzer ausgibt.
4. Steuerungsverfahren der Musikwaschmaschine nach Anspruch 3, wobei das Dreh- und Anhalteverhältnis und/oder die Drehzahl des Motors der Waschmaschine durch die Umwandlungsvorrichtung abgefragt werden/wird, um ein entsprechendes elektrisches Signal zu erzeugen, und dann in entsprechende musikalische charakteristische Signale, wie zum Beispiel Frequenz, Melodie und Ton, umgewandelt werden/wird und die Ausgabevorrichtung entsprechende Musik an den Benutzer ausgibt.
5. Steuerungsverfahren der Musikwaschmaschine nach Anspruch 2, wobei der Benutzer Musik in die Steuervorrichtung der Waschmaschine überträgt, die Steuervorrichtung Funktionen der Musik, wie zum Beispiel Frequenz, Lautstärke und Ton, abfragt, die Funktionen analysiert und verarbeitet und dann die Funktionen in ein entsprechendes Motordreh- und Anhalteverhältnis und/oder Drehzahlsignal umwandelt und der Motor der Waschmaschine den Waschprozess gemäß dem entsprechenden Signal durchführt.
6. Steuerungsverfahren der Musikwaschmaschine nach Anspruch 5, wobei Funktionen, wie zum Beispiel Frequenz, Ton und Lautstärke der Musik an unterschiedlichen Zeitknoten, gespeichert, analysiert und verarbeitet werden, unterschiedliche Zeitknoten an entsprechende Motordreh- und Anhalteverhältnisse und/oder Drehzahlen angepasst werden und in der Steuervorrichtung gespeichert werden, so dass die Waschmaschine gemäß dem Motordreh- und Anhalteverhältnis und/oder der Drehzahl, das/die zu der Musik passt, während des Waschens arbeitet.

## Revendications

1. Machine à laver musicale, comprenant : un moteur pour introduire des flux d'eau de lavage et un dispositif de sortie, le moteur étant relié à un dispositif de commande pour exécuter une conversion mutuelle entre une rotation et un rapport d'arrêt et/ou une vitesse de rotation du moteur et un signal de caractéristique musicale, de telle sorte que, pendant un processus de lavage de la machine à laver, de la musique émise par le dispositif de sortie est synchronisée avec la rotation et le rapport d'arrêt et/ou la vitesse de rotation du moteur ;  
le moteur étant relié à un dispositif de commande pour recevoir un signal de rotation et de rapport d'arrêt et/ou de vitesse de rotation du moteur, le dispositif de commande étant muni d'un module de conversion pour convertir le signal de rotation et de rapport d'arrêt et/ou de vitesse de rotation du moteur en un signal musical correspondant, et le module de conversion étant relié au dispositif de sortie pour émettre la musique ;  
**caractérisée en ce que**  
le moteur est relié à un dispositif de commande contrôlant la rotation et le rapport d'arrêt et/ou la vitesse de rotation du moteur, le dispositif de commande est muni d'un dispositif de stockage pour stocker la musique, le dispositif de stockage est relié à un dispositif d'analyse pour extraire, analyser et traiter une caractéristique musicale, le dispositif d'analyse est relié à un dispositif de conversion pour convertir le signal musical en un signal de rotation et un rapport d'arrêt et/ou une vitesse de rotation du moteur, et le dispositif de conversion est relié à un dispositif d'exécution pour contrôler la vitesse de rotation du moteur.
2. Procédé de commande de la machine à laver musicale selon la revendication 1, une rotation et un rapport d'arrêt et/ou une vitesse de rotation du moteur de la machine à laver et un signal de caractéristique musicale étant convertis mutuellement par un dispositif de conversion de la machine à laver, de telle sorte que, pendant le processus de lavage de la machine à laver, un dispositif de sortie émet de la musique correspondante obtenue par conversion de la rotation et du rapport d'arrêt et/ou de la vitesse de rotation du moteur.
3. Procédé de commande de la machine à laver musicale selon la revendication 2, la rotation et le rapport d'arrêt et/ou la vitesse de rotation du moteur de la machine à laver étant analysés et traités par le dispositif de commande, puis convertis en un signal de caractéristique sonore correspondant, et le dispositif de sortie émettant de la musique

correspondante pour l'utilisateur.

4. Procédé de commande de la machine à laver musicale selon la revendication 3, la rotation et le rapport d'arrêt et/ou la vitesse de rotation du moteur de la machine à laver étant extraits par le dispositif de conversion pour générer un signal électrique correspondant, puis convertis en des signaux de caractéristiques musicales correspondants, tel que la fréquence, la hauteur et le timbre, et le dispositif de sortie émettant de la musique correspondante pour l'utilisateur.
5. Procédé de commande de la machine à laver musicale selon la revendication 2, l'utilisateur transmettant de la musique dans le dispositif de commande de la machine à laver, le dispositif de commande extrayant des caractéristiques de la musique telles que la fréquence, le volume et la hauteur, analysant et traitant les caractéristiques, puis convertissant les caractéristiques en un signal de rotation et de rapport d'arrêt et/ou de vitesse de rotation du moteur, et le moteur de la machine à laver exécutant le processus de lavage conformément au signal correspondant.
6. Procédé de commande de la machine à laver musicale selon la revendication 5, des caractéristiques telles que la fréquence, la hauteur et le volume de la musique étant stockés, analysés et traités à différents noeuds temporels, différents noeuds temporels étant comparés pour correspondre à la rotation et aux rapports d'arrêt et/ou aux vitesses de rotation du moteur, et étant stockés de telle sorte dans le dispositif de commande que la machine à laver fonctionne conformément à la rotation et au rapport d'arrêt et/ou à la vitesse de rotation du moteur correspondant à la musique pendant le lavage.

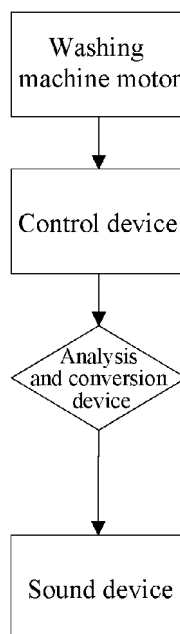


FIG. 1

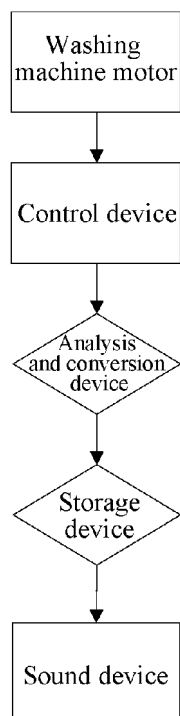


FIG. 2

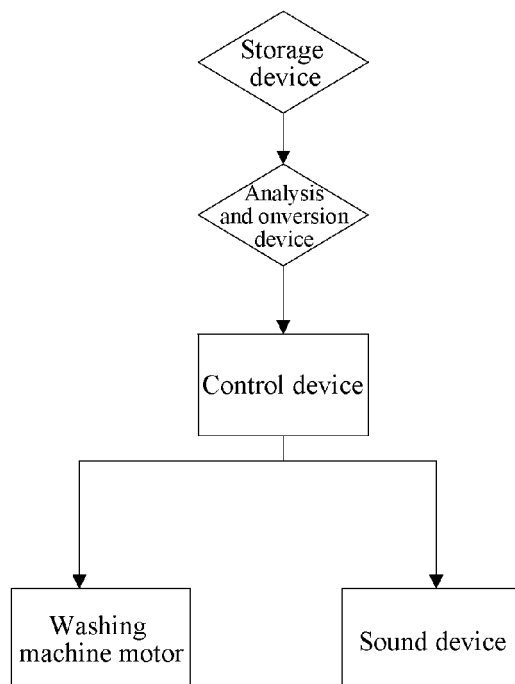


FIG. 3

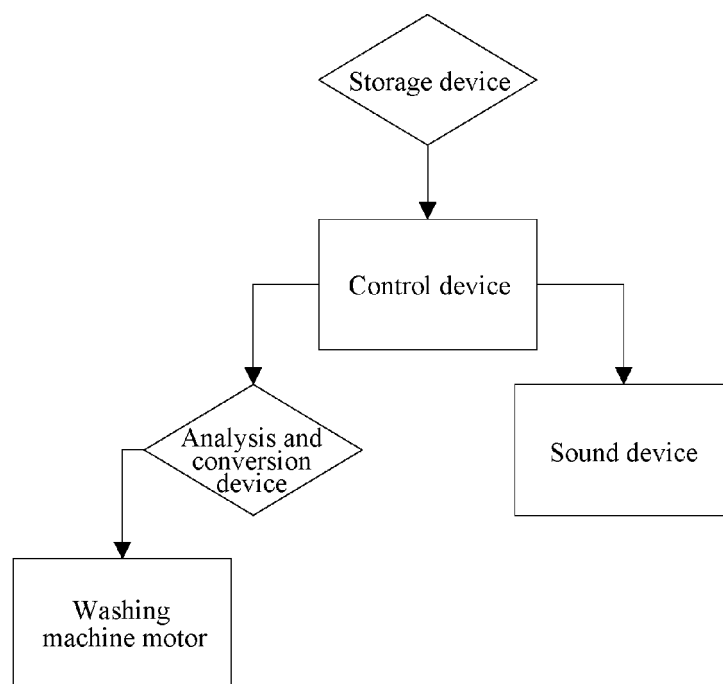


FIG. 4

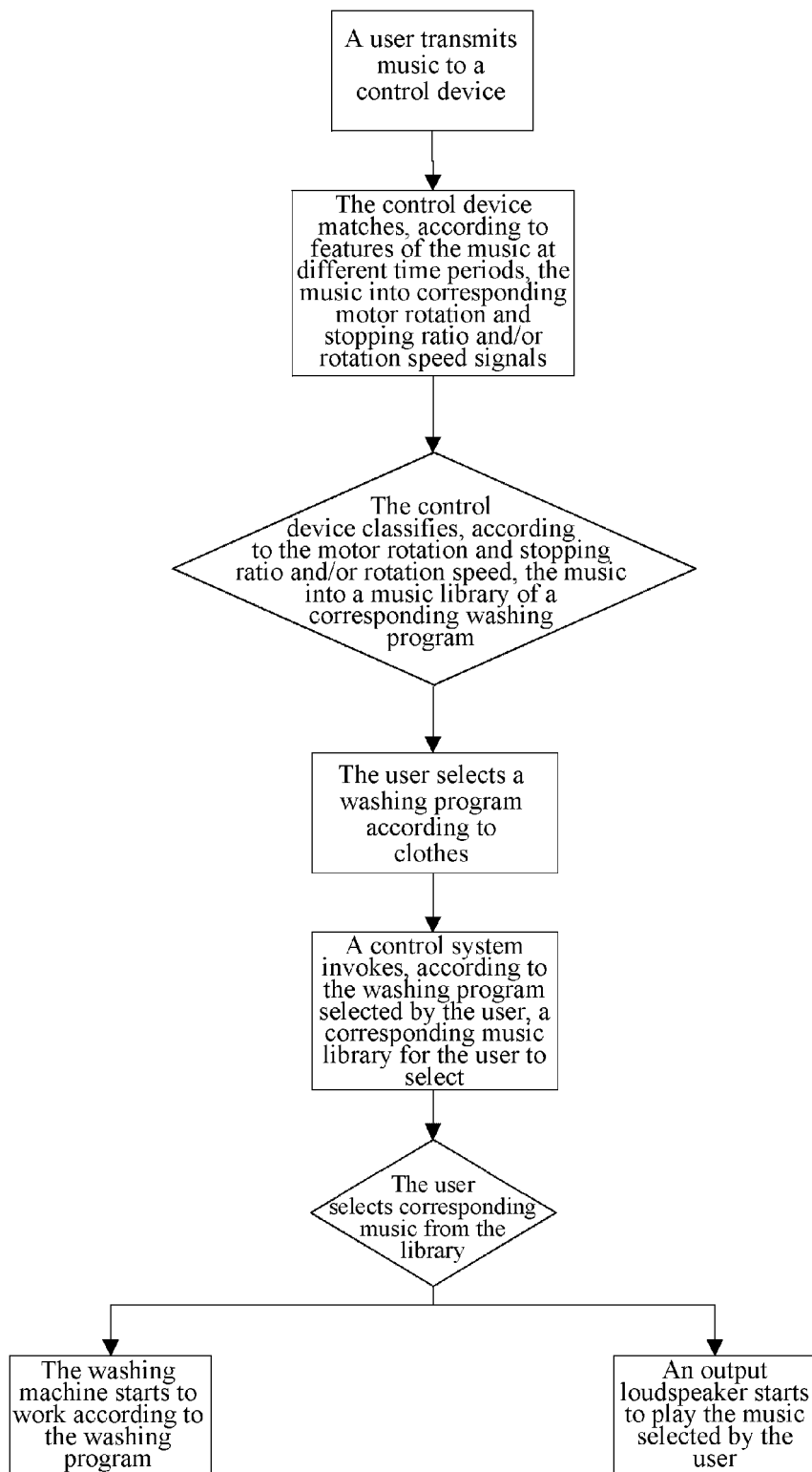


FIG. 5

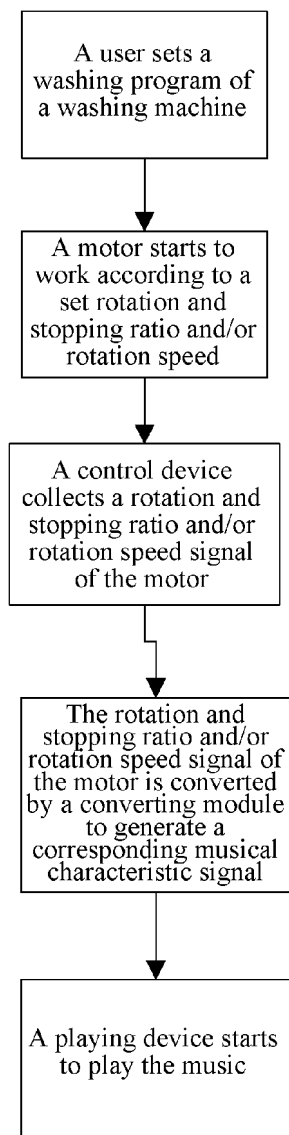


FIG. 6

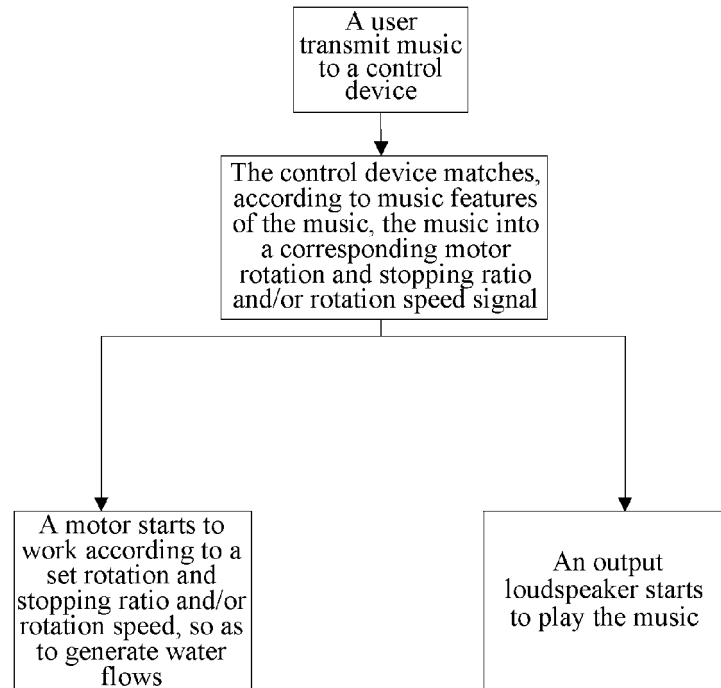


FIG. 7

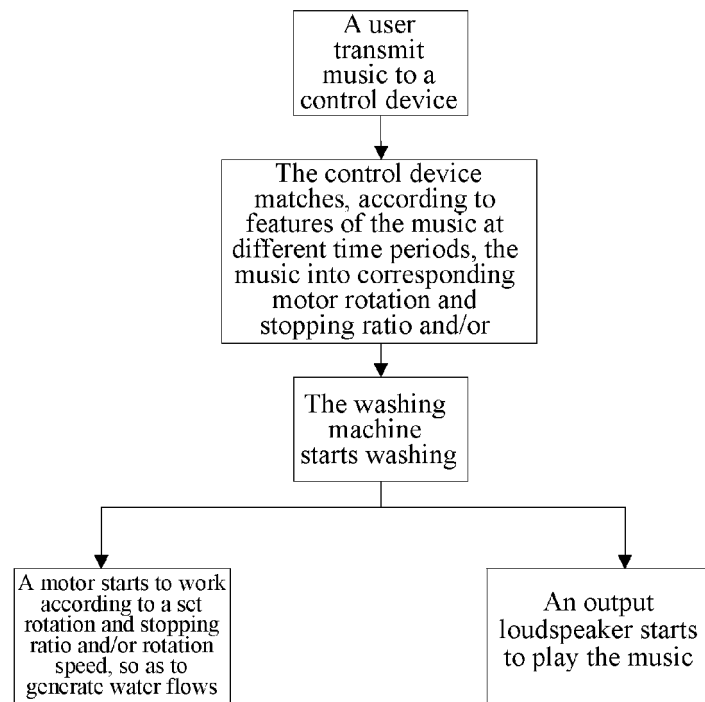


FIG. 8

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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