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

(11) **EP 4 480 335 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.12.2024 Bulletin 2024/52

(21) Application number: **23756423.2**

(22) Date of filing: **16.02.2023**

(51) International Patent Classification (IPC):
A24F 40/60 *(2020.01)* ***A24F 40/50*** *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24F 40/50; A24F 40/60

(86) International application number:
PCT/JP2023/005369

(87) International publication number:
WO 2023/157898 (24.08.2023 Gazette 2023/34)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **17.02.2022 JP 2022022548**

(71) Applicant: **Japan Tobacco Inc.**
Tokyo 105-6927 (JP)

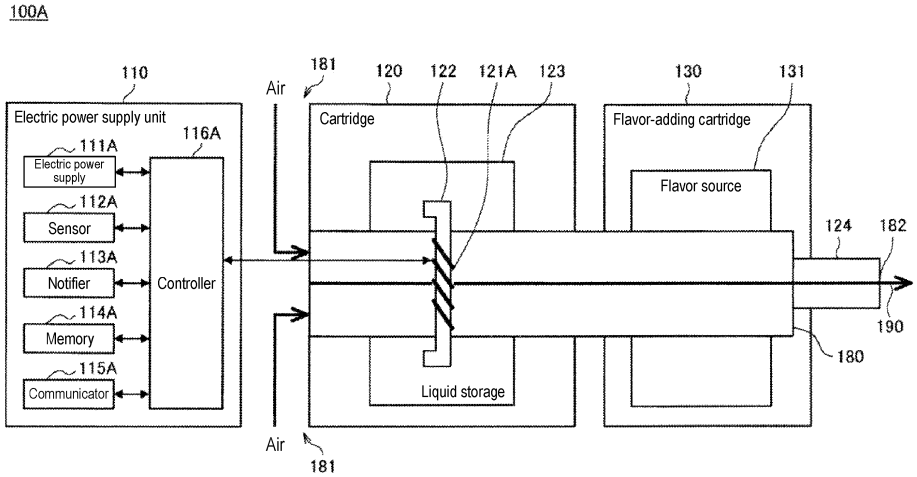
(72) Inventors:
- **KONDO, Suzuka**
Tokyo 130-8603 (JP)
- **JOMURA, Naohiro**
Tokyo 130-8603 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

(54) FLAVOR INHALER OR AEROSOL GENERATING APPARATUS, CONTROL METHOD THEREFOR, AND PROGRAM THEREFOR

(57) Provided is a flavor inhaler or the like that can improve the value of the flavor inhaler or the like by providing a user with a stimulus during preheat waiting time and that provides the user with a psychological effect during the preheat waiting time. A device (100A) is a flavor inhaler or an aerosol generation apparatus, and comprises a tactile stimulation element (113A) and a control part (116A) for controlling the tactile stimulation element (113A). The control part (116A) actuates the tactile stimulation element (113A) during the preheating of a flavor source or an aerosol source.

Fig. 1A



EP 4 480 335 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a flavor inhaler or an aerosol generation apparatus (hereinafter, a "flavor inhaler or the like").

BACKGROUND ART

[0002] In place of a cigarette, an inhaler or the like such as a heated tobacco product or the like, which heats a stick-type smoking article and supplies generated flavor to be inhaled therefrom, has been spread widely. For example, Patent Literature 1 discloses an aerosol generation device which is able to inform, by using vibration, a user of information relating to a start and completion of preheating, the quantity of battery charge, completion of charging of a holder, and so on.

CITATION LIST

PATENT LITERATURE

[0003] PTL 1: Japanese Patent Application Public Disclosure No. 2021-528980

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] In this regard, in a flavor inhaler which requires preheating, the length of time required for preheating is usually that in a range from ten and several seconds to several tens of seconds. After a heating process is started in a flavor inhaler or the like, a user has to postpone starting of inhalation action until the time when preheating is completed. The above waiting time is the time that is not required when consuming a cigarette, with respect to which an inhalation action can be performed right after lighting the cigarette with a lighter; and there is a case that a user, who has nothing to do during the waiting time and accordingly wishes to perform inhalation action immediately, feels that the waiting time is long even if it is that in a range from ten and several seconds to several tens of seconds, or the like.

[0005] The present invention has been achieved in view of the above matters; and objects of the present invention are to make it possible to enhance the value of the flavor inhaler or the like by applying stimulation to a user during the waiting time required for completing preheating, and to give psychological effect to a user during the waiting time required for completing preheating.

SOLUTION TO PROBLEM

[0006] For achieving the above objects, a mode of the present invention comprises a device which is a flavor inhaler or an aerosol generation apparatus, and the device comprises a tactile stimulator and a controller which controls the tactile stimulator, and the controller makes the tactile stimulator perform action during preheating of a flavor source or an aerosol source.

[0007] Further, a different mode of the present invention comprises the above device, and the controller makes the tactile stimulator perform the action a plural number of times during the preheating.

[0008] Further, a different mode of the present invention comprises the above device, and the controller makes the tactile stimulator perform the action at constant intervals during the preheating.

[0009] Further, a different mode of the present invention comprises the above device, and the controller changes intervals between a plural number of times of the action performed by the tactile stimulator during the preheating.

[0010] Further, a different mode of the present invention comprises the above device, and the controller changes the strength of the action performed by the tactile stimulator during the preheating.

[0011] Further, a different mode of the present invention comprises the above device, and, during the preheating, the controller obtains a signal relating to temperature of the flavor source or the aerosol source, or relating to temperature of a heater included in the device, and, in relation to the signal, changes the action performed by the tactile stimulator.

[0012] Further, a different mode of the present invention comprises the above device, and the controller makes the tactile stimulator perform the action at timing of a start or an end of the preheating of the flavor source or the aerosol source.

[0013] Further, a different mode of the present invention comprises the above device, and the action performed by the tactile stimulator during the preheating is different from that performed at timing of the start or the end of the preheating.

[0014] Further, a different mode of the present invention comprises the above device, and the action performed by the tactile stimulator is vibration.

[0015] Further, a different mode of the present invention comprises the above device, and the vibration comprises plural main vibrations, and each of the plural main vibrations comprises a set of plural vibrations.

[0016] Further, a different mode of the present invention comprises the above device, and the sets, each comprising plural vibrations, are those having strength that becomes weak gradually.

[0017] Further, a different mode of the present invention comprises the above device, and the vibration comprises a single continuous vibration, and the strength of the vibration changes in accordance with a predetermined pattern with time.

[0018] Further, a different mode of the present invention comprises a method for controlling a device which is a flavor inhaler or an aerosol generation apparatus and

comprises a tactile stimulator, and a flavor source or an aerosol source, and the method comprises a step for making the tactile stimulator perform action during preheating of the flavor source or the aerosol source

[0019] Further, a different mode of the present invention comprises a program which makes a processor in a device, which is a flavor inhaler or an aerosol generation apparatus and comprises a tactile stimulator, and a flavor source or an aerosol source, perform a step for making the tactile stimulator perform action during preheating of the flavor source or the aerosol source.

BRIEF DESCRIPTION OF DRAWINGS

[0020]

Fig. 1A is a schematic figure which schematically shows a construction example of a flavor inhaler or the like according to an embodiment of the present invention.

Fig. 1B is a schematic figure which schematically shows a construction example of a flavor inhaler or the like according to an embodiment of the present invention.

Fig. 2 is a figure which shows an example of a heating profile.

Fig. 3 is a figure which illustrates a variation of tactile stimulation.

Fig. 4 is a figure which illustrates a variation of tactile stimulation.

Fig. 5 is a figure which illustrates a variation of tactile stimulation.

Fig. 6 is a figure which illustrates a variation of tactile stimulation.

Fig. 7 is a figure which shows an outline of a sample (constant vibration) presented to a testee in an experiment relating to a flavor inhaler or the like according to the present invention.

Fig. 8 is a figure which shows an outline of a sample (changing vibration) presented to a testee in an experiment relating to a flavor inhaler or the like according to the present invention.

Fig. 9 is a figure which shows result of an experiment relating to a flavor inhaler or the like according to the present invention.

Fig. 10 is a figure which shows result of an experiment relating to a flavor inhaler or the like according to the present invention.

Fig. 11A is a figure which illustrates a variation of tactile stimulation.

Fig. 11B is a figure which illustrates a variation of tactile stimulation.

Fig. 11C is a figure which illustrates a variation of tactile stimulation.

Fig. 11D is a figure which illustrates a variation of tactile stimulation.

Fig. 12 is a figure which shows result of an experiment relating to a flavor inhaler or the like according to an embodiment of the present invention.

Fig. 13 is a figure which shows result of an experiment relating to a flavor inhaler or the like according to the present invention.

Fig. 14 is a figure which illustrates a construction of a system which comprises a flavor inhaler or the like according to the present invention.

DESCRIPTION OF EMBODIMENTS

[0021] In the following description, embodiments of the present invention will be explained in detail with reference to the figures. A flavor inhaler or the like according to the present embodiment is that which can make a preheating period be felt less tedium and can make the length of time until completion of preheating be felt short, by providing a user with tactile stimulation during the preheating period.

[0022] Further, the flavor inhaler or the like according to the present embodiment is a flavor inhaler or an aerosol generation apparatus which is a device for generating substances inhaled by a user. A substance generated by the flavor inhaler or the like may be aerosol, or a gas which is not aerosol. Further, the flavor inhaler is a device used for inhaling flavor; and, although there is no intention to limit the scope thereof, the flavor inhaler may be a device for an electronic cigarette, a heated tobacco product, conventional tobacco, or the like, for example. Further, the aerosol generation apparatus is a device used for inhaling generated aerosol; and, although there is no intention to limit the scope thereof, the aerosol generation device may be a device such as an electronic cigarette, a heated tobacco product, a medical nebulizer, or the like, for example. Further, the flavor inhaler or the like comprises a product which is so-called "RRP (Reduced-Risk Product)."

(Construction of Flavor Inhaler or the Like)

(First Construction Example)

[0023] Fig. 1A is a schematic figure which schematically shows a first construction example of a flavor inhaler or the like. As shown in Fig. 1A, the flavor inhaler or the like 100A according to the present construction example comprises an electric power supply unit 110, a cartridge 120, and a flavor-adding cartridge 130. The electric power supply unit 110 comprises an electric power supply 111A, a sensor 112A, a notifier 113A, a memory 114A, a communicator 115A, and a controller 116A. The cartridge 120 comprises a heater 121A, a liquid guide 122, and a liquid reservoir 123. The flavor-adding cartridge 130 comprises a flavor source 131 and a mouthpiece 124. An air flow path 180 is formed in the cartridge 120 and the flavor-adding cartridge 130.

[0024] In this regard, each of the cartridge 120 and the flavor-adding cartridge 130 is an example of a so-called "refill." At least part of one of or both the refills 120 and 130

may be colored by a color(s) corresponding to the type(s) of the refill(s). Further, components colored by colors corresponding thereto are not limited to the refills, and the components that are to be colored may be any components attached to the flavor inhaler or the like 100A.

[0025] The electric power supply 111A stores electric power. Further, the electric power supply 111A supplies, based on control performed by the controller 116A, electric power to respective components of the flavor inhaler or the like 100A. The electric power supply 111A may comprise, for example, a rechargeable battery such as a lithium-ion secondary battery or the like.

[0026] The sensor 112A obtains various kinds of information relating to the flavor inhaler or the like 100A. The sensor 112A may comprise a pressure sensor such as a microphone condenser or the like, a flow rate sensor, a temperature sensor, or the like. Further, the sensor 112A may comprise an input device, such as a button, a switch, or the like, which receives information inputted from a user. Further, the sensor may comprise a sensor constructed to detect the motion of the flavor inhaler or the like.

[0027] The notifier 113A has a function to inform a user of various kinds of information. The notifier 113A in the present embodiment may comprises, specifically, a tactile stimulator, such as a vibration device comprising a vibrator, a thermoelectric device for conducting heat to a user, an electrode which applies electrical stimulation to a user, or the like, which is constructed to apply tactile stimulation to a user. The vibrator may be a vibrating motor, a linear vibration actuator, a piezoelectric element, or the like. Further, the thermoelectric device may be a Peltier element. Further, the notifier 113A may additionally comprise a display device for displaying a message and/or an image, a light emission device or a light emitting element which emits light such as an LED (Light Emitting Diode), a sound outputting device or an acoustic element which outputs sound, or the like.

[0028] The memory 114A stores various kinds of information for operation of the flavor inhaler or the like 100A. For example, the memory 114A comprises a non-volatile storage medium such as a flash memory or the like. The memory 114A may comprise a volatile memory for providing a working area for control performed by the controller 116A. Further, the memory 114A holds a heating profile, that will be explained later, and data used for controlling the tactile stimulator.

[0029] The communicator 115A may comprise a communication interface (including a communication module) which conforms to a predetermined LPWA wireless communication standard or a wireless communication standard defining regulations similar to those defined in the above standard. In this regard, Sigfox, LoRA-WAN, or the like may be adopted as the above communication standard. The communicator 115A may comprise a communication interface which can perform communication conforming to any of wired/wireless communication standards. For example, Wi-Fi (a registered trademark), Bluetooth (a registered trademark), or the like may be adopted as the above communication standard.

[0030] The controller 116A functions as an arithmetic processing unit and a controller, and controls overall operation in the flavor inhaler or the like 100A in accordance with various kinds of programs. The controller is realized by using an electronic circuit such as a CPU (Central Processing Unit), a microprocessor, or the like, for example. For example, the controller 116A performs control for making the heater 121A perform a heating process for heating an aerosol source. For example, the controller 116A can control the heating process in accordance with a heating profile that shows the way to heat the aerosol source. Further, in the present embodiment, during the preheating period, the controller 116A may control the tactile stimulator in accordance with data that show the way to apply tactile stimulation to a user of the flavor inhaler or the like 100A.

[0031] The liquid reservoir 123 stores an aerosol source. Aerosol is generated as a result that the aerosol source is atomized. The aerosol source may be liquid such as polyhydric alcohol, such as glycerin, propylene glycol, or the like, or water, or the like, for example. The aerosol source may comprise a flavor component which is or is not originated from tobacco. In the case that the flavor inhaler or the like 100A is an inhaler for medical use, such as a nebulizer or the like, the aerosol source may comprise a medicine.

[0032] The liquid guide 122 guides an aerosol source, which is liquid stored in the liquid reservoir 123, from the liquid reservoir 123, and holds it. For example, the liquid guide 122 is a wick which is formed by twisting fiber material such as glass fibers or the like, or porous material such as porous ceramics or the like. In such a case, the aerosol source stored in the liquid reservoir 123 is guided by capillary effect occurring in the wick.

[0033] The heater 121A heats the aerosol source to atomize the aerosol source to thereby generate aerosol. In the example shown in Fig. 1A, the heater is constructed as a coil, and wound around the liquid guide 122. When heat is generated by the heater 121A, the aerosol source held in the liquid guide 122 is heated and atomized, and aerosol is generated thereby. The heater 121A generates heat when electric power is supplied thereto from the electric power supply 111A. In an example, supplying of electric power may be performed at the time when starting of user's inhalation action, inputting of predetermined information, manipulating of a button, a switch, or the like by a user at arbitrarily selected timing, or the like is detected by the sensor 112A. Further, supplying of electric power may be stopped at the time when either one of or both termination of user's inhalation action and inputting of predetermined information is/are detected by the sensor 112A.

[0034] The flavor source 131 is a component for adding flavor components to the aerosol. The flavor source 131 may comprise a flavor component which is or is not

originated from tobacco.

[0035] The air flow path 180 is a path for air sucked by a user. The air flow path 180 has a tubular structure having two ends, specifically, an air inflow hole 181 which is an inlet for taking air into the air flow path 180, and an air outflow hole 182 which is an outlet for releasing air from the air flow path 180. In the middle part of the air flow path 180, the liquid guide 122 is positioned on an upstream side thereof (a side close to the air inflow hole 181), and the flavor source 131 is positioned on a downstream side thereof (a side close to the air outflow hole 182). The air taken from the air inflow hole 181 during suction by a user is mixed with aerosol generated by the heater 121A, and, as shown by an arrow 190, passes through the flavor source 131 and is conveyed to the air outflow hole 182. When the fluid mixture comprising aerosol and air passes through the flavor source 131, the flavor components included in the flavor source 131 are added to the aerosol.

[0036] The mouthpiece 124 is a member which is held in the user's mouth when inhalation action is performed. The air outflow hole 182 is positioned in the mouthpiece 124. A user can take the mixed fluid comprising aerosol and air into the user's mouth by holding the mouthpiece 124 in the user's mouth and performing inhalation action.

[0037] In the above description, a construction example of the flavor inhaler or the like 100A has been explained. Although it is needless to state, the construction of the flavor inhaler or the like 100A is not limited to that explained above, and it may have any of various constructions shown below as examples.

[0038] For example, the flavor inhaler or the like 100A may not comprise the flavor-adding cartridge 130. In such a case, the cartridge 120 is provided with the mouthpiece 124.

[0039] In a different example, the flavor inhaler or the like 100A may comprise plural kinds of aerosol sources. Plural kinds of aerosol generated from plural kinds of aerosol sources may be mixed in the air flow path 180 and chemical reaction may occur therein, and, as a result, a different kind of aerosol may further be generated.

[0040] Further, the measure for atomizing the aerosol source is not limited to heating by the heater 121A. For example, the measure for atomizing the aerosol source may be oscillation atomization or induction heating.

(Second Construction Example)

[0041] Fig. 1B is a schematic figure which schematically shows a second construction example of a flavor inhaler or the like. As shown in Fig. 1B, the flavor inhaler or the like 100B according to the present construction example comprises an electric power supply 111B, a sensor 112B, a notifier 113B, a memory 114B, a communicator 115B, a controller 116B, a heater 121B, a holding part 140, and a heat insulator 144.

[0042] Each of the electric power supply 111B, the sensor 112B, the notifier 113B, the memory 114B, the communicator 115B, and the controller 116B is substantially identical with each of the corresponding components included in the flavor inhaler or the like 100A according to the first construction example.

[0043] The holding part 140 comprises an inner space 141, and holds the stick-type base material 150 by housing a part of the stick-type base material 150 in the inner space 141. In this regard, the stick-type base material 150 is also an example of a so-called "refill." The holding part 140 comprises an opening 142 which makes the inner space 141 communicate with the outside, and holds the stick-type base material 150 inserted from the opening 142 into the inner space 141. For example, the holding part 140 has a cylindrical shape having the opening 142 and a bottom part 143 which is a bottom plane, and defines the columnar inner space 141. The holding part 140 also has a function to define a path for air supplied to the stick-type base material 150. An air inflow hole which is an inlet for taking air into the above path is positioned in the bottom part 143, for example. On the other hand, an air outflow hole, which is an air outlet of the path, is the opening 142.

[0044] The stick-type base material 150 comprises a base material part 151 and a suction opening part 152. The base material part 151 comprises an aerosol source. The aerosol source may have a solid form or a liquid form; and the aerosol source is atomized as a result that it is heated, and aerosol is generated accordingly. The aerosol source may be that which originates from tobacco, such as shredded tobacco, a product which is made by processing tobacco raw material to have a granular form, a sheet form, or a powder form, for example. Further, the aerosol source may be that which does not originate from tobacco, such as that made by use of a plant other than tobacco (for example, mint, a herb, and so on). For example, the aerosol source may comprise a flavor component such as menthol or the like. In the case that the flavor inhaler or the like 100 is a medical inhaler, the aerosol source may comprise a medicine that is to be inhaled by a patient. In the state that the stick-type base material 150 is being held by the holding part 140, at least a part of the base-material part 151 is housed in the inside of the inner space 141, and at least a part of the suction opening part 152 protrudes from the opening 142. Thus, when the suction opening part 152, which protrudes from the opening 142, is held in a user's mouth and an inhalation action is performed by the user, air flows into the inner space 141 from the air inflow hole which is not shown in the figure, and the air, together with the aerosol generated in the base-material part 151, arrives at the inside of the user's mouth.

[0045] The heater 121B comprises a construction similar to that of the heater 121A according to the first construction example. However, in the example shown in Fig. 1B, the heater 121B is constructed to have a film shape, and is arranged to cover the outer periphery of the holding part 140. Thus, when heat is generated by the heater 121B, the base material part 151 of the stick-type

base material 150 is heated from the outer periphery thereof, and aerosol is generated accordingly.

[0046] The heat insulator 144 prevents heat transfer from the heater 121B to other components. For example, the heat insulator 144 comprises vacuum insulation material, aerogel insulation material, or the like.

[0047] In the above description, a construction example of the flavor inhaler or the like 100B has been explained. Although it is needless to state, the construction of the flavor inhaler or the like 100B is not limited to that explained above, and it may have any of various constructions shown below as examples.

[0048] For example, the heater 121B may be constructed to have a blade shape, and arranged to protrude from the bottom part 143 to the inner space 141 of the holding part 140. In such a case, the blade-shape heater 121B is inserted into the base material part 151 of the stick-type base material 150, and the base material part 151 of the stick-type base material 150 is heated from the inside thereof. In a different example, the heater 121B may be arranged to cover the bottom part 143 of the holding part 140. Further, the heater 121B may be constructed as that comprising a combination of two or more of a first heater covering the outer periphery of the holding part 140, a second heater having a blade shape, and a third heater covering the bottom part 143 of the holding part 140.

[0049] In a different example, the holding part 140 may comprise an opening/closing mechanism, such as a hinge or the like, for opening/closing a part of an outer shell which forms the inner space 141. The holding part 140 may hold the stick-type base material 150 inserted into the inner space 141, by opening/closing the part of the outer shell. In such a case, the heater 121 may be arranged in the position in the holding part 140 where the stick-type base material 150 is to be held, and may heat the stick-type base material 150 while it is being pressed in the above position.

[0050] Further, the measure for atomizing the aerosol source is not limited to heating by the heater 121B. For example, the measure for atomizing the aerosol source may be induction heating. Further, for example, the flavor inhaler or the like 100B itself may not comprise a heating element, and the stick-type base material 150 may comprise a heating element. In such a case, the flavor inhaler or the like 100B may be constructed in such a manner that the aerosol source included in the base material part 151 is atomized as a result that a kind of energy is sent to the heating element in the stick-type base material 150. More specifically, for example, it may be constructed in such a manner that a susceptor is buried in the stick-type base material 150, the flavor inhaler or the like 100B comprises a coil for generating a magnetic field, and the aerosol source is atomized as a result of induction heating.

[0051] Further, the flavor inhaler or the like 100B may comprise the heater 121A, the liquid guide 122, the liquid reservoir 123, and the air flow path 180 according to the first construction example, and the air outflow hole 182 of the air flow path 180 may double as an air inflow hole to the inner space 141. In such a case, the fluid mixture comprising air and aerosol generated by the heater 121A flows into the inner space 141, is further mixed with aerosol generated by the heater 121B, and arrives at the inside of a user's mouth.

(Heating Profile)

[0052] Fig. 2 is a figure which shows an example of a heating profile. In the example shown in Fig. 2, the heating profile is a graph representing chronological change in target temperature in controlling of the heater 121. Controlling of temperature of the heater 121 is realized by adopting publicly-known feedback control, for example. Specifically, the controller 116 may make the electric power supply 111 supply electric power in a pulse form to the heater 121, wherein the pulse may be formed by performing pulse width modulation (PWM) or pulse frequency modulation (PFM). In such a case, the controller 121 may perform controlling of the temperature of the heater 121 by adjusting the duty ratio of the electric power pulse.

[0053] In the feedback control, the controller 116 measures or estimates the temperature of the heater 121, and, based on difference between the measured or estimated temperature and the target temperature of the heater 121, or the like, controls electric power supplied to the heater 121, for example, the above-explained duty ratio. For example, the feedback control may be PID control. For example, the temperature of the heater 121 may be quantitated by measuring or estimating an electric resistance value of a heating resistor included in the heater 121. This is because the electric resistance value of the heating resistor changes according to the temperature. For example, the electric resistance value of the heating resistor may be estimated by measuring the quantity of voltage drop in the heating resistor. The quantity of voltage drop in the heating resistor may be measured by using a voltage sensor for measuring potential difference applied to the heating resistor. In a different example, the temperature of the heater 121 may be measured by a temperature sensor arranged in a position close to the heater 121.

[0054] As explained above, the controller 116 controls electric power supplied to the heater 121 in such a manner that actual temperature of the heater 121 comes close to target temperature defined in a heating profile.

[0055] In the example shown in Fig. 2, detection of completion of insertion of the stick-type base material 150, a request made by pressing a button or the like by a user for starting heating, or the like is used as a trigger to start supplying of electric power from the electric power supply 111 to the heater 121, and, after supplying of electric power is started, the controller 116 first controls the temperature of the heater 121 to make it approach first target temperature TA1 during a first period P1. That is, the controller 116 makes the heater 121 be heated to

change its initial temperature to approach the first target temperature TA1. In the first period P1, if the temperature of the heater 121 has reached the first target temperature TA1 in the first period P1, the controller 116 performs control to make the temperature of the heater 121 be maintained at the first target temperature TA1.

[0056] The first target temperature TA1 may preferably be 225-240 degrees Celsius, and may typically be 230 degrees Celsius, or may be 300 degrees Celsius or 350 degrees Celsius. The temperature raising speed of the heater 121 can be increased by setting the first target temperature TA1 in the first period P1 to relatively high temperature. By increasing the temperature raising speed of the heater 121, the period from the time when supplying of electric power to the heater 121 is started to the time when starting of suction of aerosol is allowed can be shortened.

[0057] The controller 116 may be constructed to provide, in a period that is in the first period P1 and during that the temperature of the heater 121 is being maintained at the first target temperature TA1, a user with information representing the state that a suction allowable period has started. Providing of information representing a start of the suction allowable period may be realized by controlling the notifier 113, for example, by performing a control process to change the color of light emitted from a light emitting element such as an LED or the like, a control process to change a light emitting pattern, or the like, or a control process comprising a combination of the above control processes.

[0058] In the example shown in Fig. 2, providing of information representing a start of the suction allowable period is performed at timing T2. More specifically, providing of information representing a state that the suction allowable period has started may be performed at either timing T2 when a predetermined period P1b has elapsed since the time when the temperature of the heater 121 has reached the first target temperature, or timing when a predetermined period has elapsed since the time when supplying of electric power to the heater 121 has started, that occurs earlier. The predetermined period P1b may preferably be 20-26 seconds, and may typically be 23 seconds. Preferably, the controller 116 may be constructed to provide, in the latter half of the first period P1, information representing the state that the suction allowable period has started. The latter half of the first period P1 means a period after the center of the first period P1.

[0059] In the present example, at timing T3 when a predetermined period P1c has elapsed since the timing T2 when information representing a start of the suction allowable period was provided, the controller 116 performs operation to start a second period P2 that will be explained later. The predetermined period P1c may be 5-15 seconds. According to the above construction, it is assumed that a user performs a first inhalation action during the first period P1. That is, it is possible to make a user perform a first inhalation action, during a period of time that the heater temperature is maintained at temperature near the first target temperature TA1 that is the highest temperature in the heating profile.

[0060] The first period P1 changes due to the state of heating, ambient temperature, and so on of the heater 121 and the smoking article 110; however, it may typically be that in the range of 35-55 seconds. Thus, the period of time from timing T1 to timing T2 corresponds to the so-called preheating period, and, in the present embodiment, it is assumed that the length of time thereof may be that in the range from ten and several seconds to several tens of seconds.

[0061] Regarding the suction allowable period that follows the above point in time, there are various kinds of possible temperature control methods; however, in the example shown in Fig. 2, during a second period P2 following the first period P1, the controller 116 controls the heater 121 to lower its temperature from the target temperature TA1, and to maintain the temperature at second target temperature TA2 that is lower than the first target temperature TA1. Further, during a third period P3 that follows the second period P2, the controller 116 controls the heater 121 to lower its temperature from the target temperature TA2, and to maintain the temperature at third target temperature TA3 that is lower than the second target temperature TA2. Since the second period is a period during that temperature higher than that in the third period P3 is maintained, the second period is a period during that aerosol can be supplied stably.

[0062] Regarding the above, the controller 116 may adopt a first off period, that spans from the end of the first period P1 to the beginning of the second period P2, for stopping supplying of electric power to the heater 121. By setting the first off period, lowering of temperature from the first target temperature TA1 to the second target temperature TA2 can be completed in a shortest period of time. It is assumed that the first off period may be that in the range from 15 seconds to 20 seconds, for example. The controller 116 can continue measurement of temperature of the heater 121 even in the first off period. In the above case, the controller 116 may be constructed to resume supplying of electric power to the heater 121 when the temperature of the heater 121 has lowered to that near the second target temperature TA2.

[0063] Additionally, the controller 116 stops supplying of electric power to the heater 121 at the time when the third period P3 ends. Next, the controller 116 provides information representing an end of the suction allowable period at timing T7 when a predetermined period of time has elapsed since supplying of electric power to the heater 121 is stopped (timing T6). That is, even in the time after supplying of electric power to the heater 121 is stopped, a user is prompted to perform an aerosol suction action, until a predetermined period has elapsed, to allow the user to taste the aerosol by using remaining heat in the heater 121 and the smoking article 110. In this regard, providing of information representing an end of the suction allowable period may be performed by the notifier

113, for example, by performing a control process to change the color of light emitted from a light emitting element such as an LED or the like, a control process to change a light emitting pattern, or the like, or a control process comprising a combination of the above control processes.

[0064] Further, the controller 116 may provide information representing a state that the suction allowable period is drawing to an end, at timing T5 that is earlier, by a predetermined period of time Pe, than timing T7 when information representing the end of the suction allowable period is provided. Providing of information such as that explained above may be performed, for example, 20-40 seconds before the end of the suction allowable period. Providing of information such as that explained above may be performed by the notifier 113, for example, by performing a control process to change the color of light emitted from a light emitting element such as an LED or the like, a control process to change a light emitting pattern, or the like, or a control process comprising a combination of the above control processes.

[0065] In the above-explained embodiment, the controller 116 stops supplying of electric power to the heater 121 at the time of the end of the third period P3. In addition, the controller 116 may stop supplying of electric power to the heater 121, even in the second period P2 or the third period P3, in the case that the number of times of inhalation actions performed by a user exceeds a predetermined number of times. An inhalation action performed by a user may be detected by the above-explained temperature sensor, for example.

[0066] A heating profile such as that illustrated in Fig. 2 and representing temperature control is stored in the memory 114 in the flavor inhaler or the like 100; and the controller 116 may read the heating profile from the memory 114, and perform control of the heater 121 in accordance with the heating profile relating to the preheating period and the suction allowable period.

(Variation 1 of Tactile Stimulation)

[0067] In the flavor inhaler or the like 100 according to the present embodiment, the controller 116 controls a tactile stimulator included in the notifier 113 to provide a user with tactile stimulation in the above-explained preheating period (the period between timing T0-T2 in Fig. 2). In the following description, variations of tactile stimulation will be explained. In this regard, in the following description, a case wherein the tactile stimulator included in the notifier 113 is a vibration device such as a vibrator or the like and vibration is to be applied to a user will be explained as an example.

[0068] Figs. 3-6 are figures which illustrate variations of tactile stimulation. In the graph in each of Figs. 3-6, the horizontal axis represents time and the vertical axis represents strength of vibration. That is, each of bars shown in the graphs represents timing for outputting vibration and strength of the vibration that is to be generated by controlling, by the controller 116, the vibration device such as a vibrator or the like which functions as the notifier 116.

[0069] An example shown in Fig. 3 represents a case wherein the controller 116 controls the vibration device (the notifier 113) in such a manner that intervals between vibrations applied to a user are kept constant and the strength of vibrations is kept constant. Further, it represents the construction that the notifier 113 provides, at the time of a start of preheating and at the time of an end of preheating, information by using a component, a device, or the like which is different from that used in the preheating period (the period of preheating except for the time of the start of preheating and the time of the end of preheating). For example, it may be constructed in such a manner that, at the time of the start of preheating and at the time of the end of preheating, the controller 116 performs control other than control relating to vibration, such as control for changing the color of light emitted from a light emitting element such as an LED or the like, changing a light emitting pattern (lighting, flashing, or the like), outputting sound, outputting an image, a character, a symbol, or the like on a display, or the like. Further, it may be constructed in such a manner that, at the time of the start of preheating and at the time of the end of preheating, tactile stimulation is applied to a user by using a tactile stimulator (a thermoelectric device, an electrode, or the like) which is different from the tactile stimulator used in the preheating period (the tactile stimulator in the present example). (The above embodiments may be applied similarly to any of other examples which relate to tactile stimulation and will be explained in the following description.)

[0070] Further, providing of information by using the component, the device, or the like, which is the same as that used in the preheating period, may be performed at the time of the start of preheating and at the time of the end of preheating. For example, it may be constructed in such a manner that the vibration device generates vibration at the time of the start of preheating, during the preheating period, and at the time of the end of preheating. Further, in such a case, it may be constructed in such a manner that, at the time of the start of preheating and at the time of the end of preheating, the vibration device generates vibration having a vibration pattern different from a vibration pattern of vibration generated in the preheating period. For example, it may be constructed in such a manner that, at the time of the start of preheating and at the time of the end of preheating, the vibration device generates vibration that is stronger, weaker, longer, or shorter than that generated in the preheating period, or generates a more number of times of vibrations than a number of times of vibrations generated in the preheating period, or the like. According to the above construction, a function to provide a user with information at the time of the start of preheating and at the time of the end of preheating is realized, and effect to make the preheating period be felt less tedium and make the length

of time until completion of preheating be felt short can be expected. Further, by using the component, the device, or the like, which is the same as that used in the preheating period, at the time of the start of preheating and at the time of the end of preheating, it becomes unnecessary to provide the flavor inhaler or the like 100 with plural kinds of components, devices, or the like, and, thus, becomes possible to reduce the weight of the flavor inhaler or the like 100. (The above embodiments may be applied similarly to any of other examples which relate to tactile stimulation and will be explained in the following description.)

[0071] An example shown in Fig. 4 represents a case wherein the controller 116 controls the vibration device (the notifier 113) in such a manner that, although the strength of vibrations applied to a user is kept constant, intervals between vibrations become short gradually. In such a case, intervals between vibrations may sequentially become short in a linear manner or a nonlinear manner. For example, an interval between the (N-1)th vibration and the Nth vibration may be set to ((Scheduled number of times of vibration)+1-N) seconds. In a different construction, intervals between vibrations may sequentially become short in an exponential manner. In a different construction, the controller 116 may control the vibration device (the notifier 113) in such a manner that intervals between vibrations become long gradually. In such a case, intervals between vibrations may sequentially become long in a linear manner or a nonlinear manner. For example, an interval between the (N-1)th vibration and the Nth vibration may be set to N seconds. In a different construction, intervals between vibrations may sequentially become long in an exponential manner. In a different construction, intervals between vibrations may change in a periodic manner. For example, intervals between vibrations may be changed in such a manner that a long interval and a short interval occur alternately.

[0072] An example shown in Fig. 5 represents a case wherein the controller 116 controls the vibration device (the notifier 113) in such a manner that, although intervals between vibrations applied to a user are kept constant, the strength of vibrations increases gradually. In such a case, the strength of vibrations may sequentially increase in a linear manner or a nonlinear manner. For example, the strength of the Nth vibration may be set to A(predetermined strength)*N. In a different construction, the strength of vibrations may sequentially increase in an exponential manner. In a different construction, the controller 116 may control the vibration device (the notifier 113) in such a manner that the strength of vibrations decreases gradually. In such a case, the strength of vibrations may sequentially decrease in a linear manner or a nonlinear manner. For example, the strength of the Nth vibration may be set to A(predetermined strength)* ((Scheduled number of times of vibration)+1-N). In a different construction, the strength of vibrations may sequentially decrease in an exponential manner. In a different construction, the strength of vibrations may change in a periodic manner. For example, the strength of vibrations may be changed between strong strength and weak strength alternately.

[0073] Further, the controller 116 may control the vibration device (the notifier 113) in such a manner that the intervals between vibrations and the strength of vibrations change every time when vibration is generated. For example, it may be constructed in such a manner that the intervals between vibrations become short sequentially, and, at the same time, the strength of vibrations increase or decrease sequentially. In a different construction, it may be constructed in such a manner that the intervals between vibrations become long sequentially, and, at the same time, the strength of vibrations increases or decreases sequentially.

[0074] Further, the length of time of each of vibrations may be fixed or varied. For example, every time when the vibration device generates vibration, the length of time of the vibration may be made longer or shorter sequentially. Further, the lengths of time of vibrations may be changed in a linear manner or a nonlinear manner. For example, the controller 116 may control the vibration device (the notifier 113) to set the length of time of the Nth vibration to X(a predetermined length of time)*N, or the controller 116 may control the vibration device (the notifier 113) to set the length of time to X(a predetermined length of time)* ((Scheduled number of times of vibration)+1-N). In a different construction, the length of time of the vibration may be changed in a periodic manner. For example, the length of time of the vibration may be changed between long length and short length alternately.

[0075] Further, each of vibrations may be a vibration group comprising a plural number of times of vibrations. That is, a plural number of times of vibrations may be regarded as those in a single action, and the controller 116 may perform the above-explained respective kinds of control. Fig. 6 is a figure which illustrates a case wherein each of vibrations comprises a vibration group comprising a plural number of times of vibrations. As shown in Fig. 6, the vibration device may be operated to generate a single vibration at the time of the start of preheating, generate three successive vibrations having short intervals between them at the time of the end of preheating, and repeatedly generate two successive vibrations having a short interval between them during the preheating period in such a manner that generating of the two successive vibrations is performed at regular intervals and the strength of the two successive vibrations is increased gradually (or the strength of the two successive vibrations is reduced gradually). According to the above-explained vibration pattern, a user will be explicitly informed of the start of preheating and the end of preheating when they have occurred, and effect to make the preheating period be felt less tedium and make the length of time until completion of preheating be felt short can be expected. Further, by using the vibration device only, i.e., without using devices other than the vibration device, at the time of the start of preheating, during the preheating

period, and at the time of the end of preheating, it becomes unnecessary to provide the flavor inhaler or the like 100 with other kinds of components, devices, or the like, and, thus, becomes possible to reduce the weight of the flavor inhaler or the like 100. In this regard, as explained above, it is possible to provide information at the time of the start of preheating and at the time of the end of preheating, by using a component, a device, or the like which is different from that used in the preheating period. By adopting the above construction, it becomes possible to allow a user to clearly distinguish, from the vibration pattern in the preheating period, information indicating the start of preheating and the end of preheating.

[0076] Further, for example, it may be constructed in such a manner that the vibration changes in relation to the temperature of the heater 121. For example, it may be constructed in such a manner that intervals of vibrations generated by the vibration device become short or long, the strength of vibrations increases or decreases, the lengths of time of vibrations become long or short, or the like, in relation to increase in the temperature of the heater 121. The controller 116 is able to determine the temperature of the heater by using a signal from a thermometer arranged in a position near the heater 121, a signal representing electric resistance of the heater, a signal representing inductance of a coil, or the like.

[0077] Further, it may be possible to apply, a single time during the preheating period, a vibration having a long vibrating time to a user. In such a case, the strength of the vibration may be kept constant, or the strength of the vibration may be changed. Further, it may be constructed in such a manner that the strength of the above vibration during the time when it is being generated changes periodically; for example, vibration is switched between strong vibration and weak vibration in an alternating manner every three seconds, and applied to a user. Further, it may be constructed in such a manner that the strength of the above vibration during the time when it is being generated is changed to become strong, or become weak. Further, it may be constructed in such a manner that the length of time of vibration relating to each of the degrees of strength changes periodically. Further, it may be possible to constantly apply vibration to a user throughout the preheating period.

[0078] Further, although the case wherein the tactile stimulator is a vibration device such as a vibrator or the like and vibration is applied to a user has been explained in relation to the above-explained tactile stimulation patterns, the tactile stimulator is not limited to that explained above. The tactile stimulator may be a thermoelectric device, and heat may be conducted to a user. Further, the tactile stimulator may be an electrode, and electrical stimulation may be applied to a user.

[0079] Further, it may be constructed in such a manner that, in addition to application of tactile stimulation to a user by the above-explained tactile stimulator during the preheating period, operation for changing the color of light emitted from a light emitting element such as an LED or the like, changing a light emitting pattern (lighting, flashing, or the like), outputting sound, outputting an image, a character, a symbol, or the like on a display, or the like may be performed as operation for providing a user with some kind of information. By adopting the above construction, it becomes possible to provide a user with psychological effect that makes the preheating period be felt less tedium and makes the length of time of preheating be felt short, and also ensure the convenience of the user.

(Experiment)

[0080] The inventors performed an experiment, that relates to the flavor inhaler or the like according to the present invention, as explained below.

(1) Outline of Experiment

- The number of testees was seven.
- Each testee was requested to grip a bar-shape vibrator which has the length of approximately 10 cm (centimeters) and is a substitute of the flavor inhaler or the like according to the present invention.
- The vibrator was operated to vibrate in accordance with three samples (vibration patterns).
- Regarding the sample, the duration thereof was regarded as that corresponding to the preheating period, and two kinds of duration, 10 seconds and 20 seconds, were set. That is, each testee took six kinds of tests ((three samples)* (two kinds of duration)).
- Every time after experiencing a single sample, each testee answered questions provided by answer software. Further, after presenting three samples, a moderator asked questions. The above process was performed in relation to the 10-second sample-duration and the 20-second sample-duration.
- For preventing each testee from performing the act of counting the number of seconds during the experiment, the testee was requested to perform "reading-aloud mental calculation." (Reading-aloud mental calculation: An act of performing, vocally, calculation to add 7 to a randomly selected two-digit integer (that is equal to or less than 50).)

(2) Questionnaires Provided After Experiencing Each Sample (Answers were provided by using software.)

- How long the length of the duration of the sample that each testee felt, in the number of seconds, was.
- How fast the time elapsed.

(3) Presented Vibration Patterns
The vibration patterns presented to each testee were the following three vibration patterns.

(i) Constant vibration: Vibrations are generated at predetermined intervals. At the time when an experience starts and at the time when the experience ends, two vibrations, each lasting for a short length of time, are generated consecutively.
(ii) Changing vibration: Vibrations are generated at predetermined intervals, and the strength of the vibrations increases gradually. At the time when an experience starts and at the time when the experience ends, two vibrations, each lasting for a short length of time, are generated consecutively.
(iii) Control: No vibration is generated. (Only at the time when an experience starts and at the time when the experience ends, two vibrations, each lasting for a short length of time, are generated consecutively.)

[0081] Fig. 7 is a figure which shows an outline of the constant vibration explained in above item (i). In the constant-vibration sample, the vibrator was controlled to generate two short vibrations consecutively, at the time when an experience starts and at the time when the experience ends (hereinafter, the "informing vibration"). The vibrator was controlled in such a manner that generation of the constant vibrations is started after the elapse of 0.5 seconds since generation of the informing vibration, and the information vibration is generated after the elapse of 0.5 seconds since generation of the constant vibrations is stopped.
[0082] Fig. 8 is a figure which shows an outline of the changing vibration explained in above item (ii). In the changing-vibration sample, the vibrator was controlled to generate the informing vibration (two short vibrations) at the time when an experience starts and at the time when the experience ends. The vibrator was controlled in such a manner that generation of the changing vibrations is started after the elapse of 0.5 seconds since generation of the informing vibration, and the information vibration is generated after the elapse of 0.5 seconds since generation of the changing vibrations is stopped. The vibrator was controlled in such a manner that the vibrations are generated at predetermined intervals, and the strength of the vibrations increases gradually in a linear manner.

(4) Result of Experiment

[0083] Each of Figs. 9 and 10 is a figure which shows result with respect to answers provided by the testees in response to the questions in above item (2).
[0084] Fig. 9 shows answers of the testees with respect to the question "How long the length of the duration of the sample that each testee felt, in the number of seconds, was." For example, the graph of "10-Control" represents answers of the users with respect to the control sample that is explained in above item (iii) and has the sample duration of 10 seconds. According to the answer result in Fig. 9, it can be understood that, with respect to both the 10-second sample-duration and the 20-second sample-duration, the duration relating to the "constant vibration" is felt shorter than that relating to the "control," and, further, the duration relating to the "changing vibration" is felt shorter than that relating to the "constant vibration." Further, in Fig. 9, the average value of the "10-Constant" exceeds 10 seconds, the average value of the "10-Changing" is less than 10 seconds, the average value of the "20-Constant" is approximately 17.6 seconds, and the average value of the "20-Changing" is less than 17 seconds. Taking it into consideration that the preheating period of an actual flavor inhaler or the like is generally that in a range from ten and several seconds to several tens of seconds, it could be proved that effect to make the length of time until completion of preheating be felt short can be expected substantially in the flavor inhaler or the like according to the present invention.
[0085] Fig. 10 shows answers of the testees with respect to the question "How fast the time elapsed," specifically, shows result obtained by defining the degree representing "very fast" as "0" and the degree representing "very slow" as "100," making the testees answer the speed of the passing of time, that they felt, in numerical values, and calculating average values thereof. According to the answer result in Fig. 10, it can be understood that, with respect to both the 10-second sample-duration and the 20-second sample-duration, the speed of the passing of time relating to the "constant vibration" was felt faster than that relating to the "control," and, further, the speed of the passing of time relating to the "changing vibration" was felt faster than that relating to the "constant vibration."

(Variation 2 of Tactile Stimulation)

[0086] Further examples of variations of tactile stimulation will be explained in the following description. Each of Figs. 11A-11D shows an example of a variation of tactile stimulation that will be explained below. As shown in Figs. 11A-11D, the following four tactile stimulation patterns will be explained in the present example.

- Pattern 1 (Fig. 11A)
- Pattern 2 (Fig. 11B)
- Pattern 3 (Fig. 11C)
- Pattern 4 (Fig. 11D)

[0087] Pattern 1 is a pattern wherein the strength of vibrations applied to a user is kept constant, and intervals between the vibrations become shorter gradually. In Fig. 11A, the horizontal direction from the left to the right represents the passing of time, and each of short horizontal lines represents a generated vibration. Further,

the asterisks at the both ends represent the time of a start and the time of an end, respectively.

[0088] Pattern 2 is a pattern that represents vibrations that are "made to resemble heartbeats," wherein a single major vibration comprises a set of plural vibrations and the strength of the plural vibrations in the set becomes weak gradually. A single major vibration comprises a set of three vibrations in the example in Fig. 1 1B; however, the construction is not limited to that explained above, and a single major vibration may comprise two vibrations, or four or more than four vibrations. Further, in the present example, the strength of the major vibrations becomes weak gradually. In this regard, although the strength of the major vibrations becomes weak gradually in the example in Fig. 11B, such a construction is a mere example. It may be constructed in such a manner that the strength of the major vibrations becomes strong gradually, becomes strong and weak by turns, is kept constant, or the like. Further, intervals between the major vibrations may be kept constant, may become short gradually, or may become long gradually. In the present example, it was supposed that the intervals between the major vibrations become short gradually.

[0089] Pattern 3 is a pattern that represents a single continuous vibration wherein the strength of the vibration increase or decrease with time. With respect to each of the graphs in Figs. 11B and 11C, the horizontal axis represents time and the vertical axis represents strength of vibration. In this regard, the bars at the both ends of each of the graphs represent the time of a start and the time of an end, respectively.

[0090] Pattern 4 is a pattern wherein the strength of vibrations and the intervals between the vibrations change in a random manner. With respect to the graph in Fig. 11D, the horizontal axis represents time and the vertical axis represents strength of vibration.

(Experiment)

[0091] With respect to the vibration patterns illustrated in Figs. 11A-11D, the inventors made each of twelve testees experimentally experience a flavor inhaler or the like which generates tactile stimulation in accordance with the patterns 1-4, and, with respect to each of the patterns 1-4, evaluate the pattern in terms of each of five evaluation items by performing seven-grade evaluation thereof. Details of the experiment are those explained below.

1. Conditions

[0092]

- The length of time from a start to an end of vibration in accordance with each of the patterns is 25 seconds.
- The order to present the patterns 1-4 to each testee is determined randomly.
- The way of presentation of each of the patterns is that explained below.

(No Vibration: No Vibration)

[0093] A start and an end of the experiment only are informed by using vibration, and no vibration is presented during a period from the start to the end.

(Pattern 1)

[0094] Each testee is informed of a start and an end of the experiment by using vibration, and vibrations are presented during the period from the start to the end in such a manner that "intervals between the vibrations become short gradually." (The strength of the vibrations is kept constant.)

(Pattern 2)

[0095] Each testee is informed of a start and an end of the experiment by using vibration, and vibrations are presented during the period from the start to the end, wherein the vibrations are those "made to resemble heartbeats." In the experiment, the vibration pattern explained by using Fig. 11B was used. The strength of the vibrations becomes weak gradually with time, and intervals between vibrations become short gradually with time. Further, in the present experiment, each of the vibration generated at the time of the start and the vibration generated at the time of the end comprises a set of plural vibrations, or a vibration that continues for a predetermined length of time (approximately 0.5 seconds to 1 second) (in this regard, the vibration generated at the time of the start and the vibration generated at the time of the end may be constructed to have forms that are different from each other). Further, the length of time from a point in time when the vibration generated at the time of the start of the experiment ends to a point in time when the vibration generated at the time of the end of the experiment starts is set to 25 seconds. In this regard, the above construction is similarly included in each of other vibration patterns, i.e., the pattern 1, the pattern 3, and the pattern 4.

(Pattern 3)

[0096] Each testee is informed of a start and an end of the experiment by using vibration, and a vibration is presented during the period from the start to the end, wherein the vibration has "a form similar to the form of a sine wave." More specifically, the strength of the vibration changes in accordance with a certain pattern. In the experiment, the vibration pattern explained by using Fig. 11C was used.

(Pattern 4)

[0097] Vibrations, that are randomly generated, are

presented during the period from a start to an end, and also at timing of the start and timing of the end of the experiment. The random vibration pattern is formed by constructing plural kinds of vibration patterns, each having short duration, that lack regularity with respect to strength and patterns of the vibrations, and making one of the constructed vibration patterns be used at timing that does not overlap with timing when any of the other constructed vibration patterns is used, during the period from the start to the end of the preheating period.

2. Procedures

[0098] Each testee was provided with an experimental device which is equivalent to the flavor inhaler or the like of the present example. Vibration was outputted in response to pressing of a button in the experimental device by the testee, or manipulating of a control computer by a person who conducts the experiment.

[0099] With respect to items displayed on a screen of a computer, each testee's subjective evaluations of vibrations that the testee had experienced were answered by the testee by inputting answers to the computer.

3. Evaluation Items

[0100] With respect to each of the five evaluation items, opposite evaluations were presented in such a manner that they were lined up in a horizontal direction, and, based on seven-stage score values representing "Extreme, Very, Relative, Moderate, Relative, Very, Extreme," each testee was required to provide an answer representing a score value, in the seven-stage score values, to which the subjective evaluation made by the testee was the closest. The evaluation items are (i) whether the time during that vibration was presented was an enjoyable time, (ii) whether the time during that vibration was presented was a calm time, (iii) whether the time during that vibration was presented was a time in which each testee was able to concentrate, (iv) whether the speed of elapsing of the time during that vibration was presented was felt fast, and (v) whether the time during that vibration was presented was a comfortable time. In this regard, the extremes with respect to each of the five evaluation items were as follows:

(Item i) It was an enjoyable time - It was a tedious time
(Item ii) It was a calm time - It was a tensed time
(Item iii) It was a time that allowed concentration - It was a time that made concentration be lost
(Item iv) The time passed quickly - The time passed slowly
(Item v) It was a comfortable time - It was an uncomfortable time

4. Result of Experiment

[0101] Each of Figs. 12 and 13 is a figure which shows result of the experiment. Fig. 12 shows result relating to item iv. Fig. 13 shows result relating to item i. The bar graphs in Figs. 12 and 13 show, respectively, average values of the score values relating to the vibration patterns, wherein the score values were those provided by the twelve testees. It can be understood, by referring to Fig. 12, that the respective score values relating to the respective vibration patterns are higher than the score value in the case of no vibration (NoVibration). That is, it can be stated that the testees felt significantly that "the time elapsed fast" in the case that any of the vibration patterns was generated, compared with the case that no vibration was generated. Further, it can be understood, by referring to Fig. 13, that the respective score values relating to the respective vibration patterns are higher than the score value in the case of no vibration (NoVibration). That is, it can be stated that the testees felt that "the time was an enjoyable time" in the case that any of the vibration patterns was generated, compared with the case that no vibration was generated. With respect to the above result, it can be stated that the vibration patterns except for the pattern 2 are effective, and that the pattern 2 appears to be effective.

[0102] According to the above experiment result, it can be understood that, when compared with the case that no vibration is generated, it is possible to expect effect that makes a user feel happy during preheating of the flavor inhaler or the like and makes the length of waiting time until completion of preheating be felt short, in the case that one of the vibration patterns 1-4 is used.

[0103] On the other hand, in terms of preheating of the flavor inhaler or the like 100, there are (a) a method wherein target temperature with respect to preheating has been set in advance as shown in Fig. 2, and preheating is performed to make temperature reach the target temperature, and (b) a method wherein the preheating period (the length of time) has been determined in advance, and the heater 121 is controlled in such a manner that preheating is completed at the time of the elapse of the preheating period.

[0104] In the case of item (b), the preheating period has been known (determined) in advance. Thus, for example, in the case that a vibration pattern such as that shown in Fig. 11B is to be used, timing when the tactile stimulator (the notifier 113) is activated to vibrate can be determined by dividing, according to the ratio that makes the intervals of vibrations short gradually (or according to the constant intervals), the whole preheating period. In the case of item (a), the length of time required to complete preheating is unknown. In the above case, for example, it may be possible to store a length(s) of a previous preheating period(s) in the memory 114, and assume the length of a previous preheating period or an average of the plural lengths of previous preheating periods, if they have been stored, to be a future preheating period. Further, timing

when the tactile stimulator (the notifier 113) is activated to vibrate can be determined by dividing, by taking the ratio that makes the intervals of vibrations short gradually (or according to the constant intervals) into consideration, the assumed preheating period. It may be possible to adopt a construction that vibration according to each of vibration patterns, that have been programmed in advance, is generated independent of the assumed preheating period, and that, in the case that the length of time of an actual heating period is shorter than the length of time required to reproduce the vibration having the vibration pattern, part of the vibration pattern corresponding to the remaining time is invalidated (vibration is not generated).

[0105] By the way, the above-explained tactile stimulation may be realized as a result that the controller 116 controls the tactile stimulator (the notifier 113) by using data, that has been held in the memory 114, for use for controlling the tactile stimulator. Regarding the data used for controlling the tactile stimulator, data of a specific tactile stimulation pattern(s) may be stored in the memory, for example, in such a manner that the data is stored in advance, i.e., when manufacturing the flavor inhaler or the like 100, or the like. On the other hand, it may be possible to adopt a construction wherein data of a tactile stimulation pattern(s) designated by a user is downloaded from a server, which holds data of various kinds of tactile stimulation patterns, to the memory 114 in the flavor inhaler or the like 100, as a result of manipulation performed by the user on a user's smartphone or the like.

[0106] Fig. 14 is a figure which shows a construction example of a system which is used in the case that data of a tactile stimulation pattern is downloaded from a server to the flavor inhaler or the like 100. The system may comprise, for example, the flavor inhaler or the like 100 according to the present embodiment, a user device 200, and a server 300. The user device 200 is a device used by a user of the flavor inhaler or the like 100. The user device 200 may comprise a general computer device; however, it is more preferable if the device is a portable computer device such as a smartphone, a feature phone, a PDA (Personal Digital Assistant), a notebook computer, a tablet computer, or the like. It should be reminded that the above matters are not those used for defining limitation. For example, the user device 200 may comprise a stationary computer device such as a desktop computer or the like. The flavor inhaler or the like 100 and the user device 200, and the user device 200 and the server 300, can transmit/receive data between them by using a wired or wireless communication technique(s).

[0107] Each of the user device 200 and the server 300 may comprise a hardware construction similar to that of a general computer. For example, each of the user device 200 and the server 300 comprises: a controller; a RAM (Random Access Memory); a ROM (Read Only Memory); an internal hard disk drive; a removable memory(s) such as an external hard disk drive, a CD, a DVD, a USB memory, a memory stick, an SD card, or the like; an input/output user interface (a keyboard, a mouse, a touch panel, a speaker, a microphone, an LED (light emitting diode), or the like) which allows a user to input/output data to/from the user device 200 and/or the server 300; a communication interface which allows wired/wireless communication with a different computer; and a display device such as a display or the like. The controller may be realized, for example, by using an electronic circuit such as a CPU, a microprocessor, or the like. The controller may appropriately read a program and data, that is required for processing, stored in a storage region in the hard disk drive, the ROM, or the like into a memory region in the RAM or the like, and execute the program to thereby make respective processes in the user device 200 and the server 300 be performed therein.

[0108] The server 300 holds, in advance, data of plural tactile stimulation patterns in a storage region in the RAM, the ROM, the internal hard disk drive, or the like, for example. On the other hand, the user device 200 appropriately receives, from the server 300, a list of the data of plural tactile stimulation patterns held by the serve 300, or the like, and stores the list in a storage region in the RAM, the internal hard disk drive, or the like. A user refers to the list displayed on the display device in the user device 200, and selects one or plural tactile stimulation patterns that the user wishes to download to the flavor inhaler or the like 100. The data indicating the one or plural tactile stimulation patterns selected by the user is transmitted to the server 300 via wired/wireless communication. The server 300, after receiving the above data indicating the one or plural tactile stimulation patterns, transmits data of the one or plural tactile stimulation patterns corresponding to the above received data to the user device 200. The user device 200, after receiving the data of the one or plural tactile stimulation patterns from the server 300, transmits the received data to the flavor inhaler or the like 100 via Bluetooth communication or other wired/wireless communication, for example. The flavor inhaler or the like 100 stores, in the memory 114, the data of the one or plural tactile stimulation patterns received from the user device 200. Thereafter, the controller 116 in the flavor inhaler or the like 100 controls the tactile stimulator (the notifier 113) by using the one or plural tactile stimulation patterns, and makes the tactile stimulator (the notifier 113) vibrate according to a tactile stimulation pattern that the user desires.

[0109] In the above description, embodiments of the present invention have been explained; and, although it is needless to state, the present invention is not limited to any of the above embodiments, and can be practiced in any of various kinds of forms in the scope of the technical idea of the present invention.

[0110] Further, the scope of the present invention is not limited by the illustrated embodiments which are shown in the figures and explained in the above description, and it includes all embodiments which provide effect that is equivalent to the effect expected to be provided by the present invention. Further, the scope of the present in-

vention is not limited to combinations of characteristics of the inventions defined in respective claims, and it may be defined by all desired combinations of specific characteristics in the all disclosed characteristics.

[0111] Further, the constructions such as those shown below are constructions within the scope of the technique of the present invention.

(1) A device which is a flavor inhaler or an aerosol generation apparatus, comprising:

a tactile stimulator, and
a controller which controls the tactile stimulator, wherein the controller makes the tactile stimulator perform action during preheating of a flavor source or an aerosol source

(2) The device as recited in above item (1), wherein the controller makes the tactile stimulator perform the action a plural number of times during the preheating.
(3) The device as recited in above item (1) or (2), wherein the controller makes the tactile stimulator perform the action at constant intervals during the preheating.
(4) The device as recited in above item (1) or (2), wherein the controller changes intervals between a plural number of times of the action performed by the tactile stimulator during the preheating.
(5) The device as recited in any one of above items (1)-(4), wherein the controller changes the strength of the action performed by the tactile stimulator during the preheating.
(6) The device as recited in any one of above items (1)-(5), wherein, during the preheating, the controller obtains a signal relating to temperature of the flavor source or the aerosol source, or relating to temperature of a heater included in the device, and, in relation to the signal, changes the action performed by the tactile stimulator.
(7) The device as recited in any one of above items (1)-(6), wherein the controller makes the tactile stimulator perform the action at timing of a start or an end of the preheating of the flavor source or the aerosol source.
(8) The device as recited in above item (7), wherein the action performed by the tactile stimulator during the preheating is different from that performed at timing of the start or the end of the preheating.
(9) The device as recited in any one of above items (1)-(8), wherein the action performed by the tactile stimulator is vibration.
(10) The device as recited in above item (9), wherein the vibration comprises plural main vibrations, and each of the plural main vibrations comprises a set of plural vibrations.
(11) The device as recited in above item (10), wherein the sets, each comprising plural vibrations, are those having strength that becomes weak gradually.
(12) The device as recited in above item (9), wherein the vibration comprises a single continuous vibration, and the strength of the vibration changes in accordance with a predetermined pattern with time.
(13) A method for controlling a device which is a flavor inhaler or an aerosol generation apparatus and comprises a tactile stimulator, and a flavor source or an aerosol source, comprising a step for:
making the tactile stimulator perform action during preheating of the flavor source or the aerosol source.
(14) A program which makes a processor in a device, which is a flavor inhaler or an aerosol generation apparatus and comprises a tactile stimulator, and a flavor source or an aerosol source, perform a step for:
making the tactile stimulator perform action during preheating of the flavor source or the aerosol source.

REFERENCE SIGNS LIST

[0112]

100A, 100B ... Flavor inhaler or the like
110 ... Electric power supply unit
111A, 111B ... Electric power supply
112A, 112B ... Sensor
113A, 113B ... Notifier
114A, 114B ... Memory
115A, 115B ... Communicator
116A, 116B ... Controller
117A, 117B ... Converter
120 ... Cartridge
121A, 121B ... Heater
122 ... Liquid guide
123 ... Liquid storage
124 ... Mouthpiece
130 ... Flavor-adding cartridge
131 ... Flavor source
140 ... Holding part
141 ... Inner space
142 ... Opening
143 ... Bottom
144 ... Heat insulator
150 ... Stick-type base material
151 ... Base material part
152 ... Suction opening
180 ... Air flow path
181 ... Air inflow hole
182 ... Air outflow hole

Claims

1. A device which is a flavor inhaler or an aerosol generation apparatus, comprising:

a tactile stimulator, and

a controller which controls the tactile stimulator, wherein the controller makes the tactile stimulator perform action during preheating of a flavor source or an aerosol source

2. The device as recited in Claim 1, wherein the controller makes the tactile stimulator perform the action a plural number of times during the preheating.

3. The device as recited in Claim 1 or 2, wherein the controller makes the tactile stimulator perform the action at constant intervals during the preheating.

4. The device as recited in Claim 1 or 2, wherein the controller changes intervals between a plural number of times of the action performed by the tactile stimulator during the preheating.

5. The device as recited in any one of Claims 1-4, wherein the controller changes the strength of the action performed by the tactile stimulator during the preheating.

6. The device as recited in any one of Claims 1-5, wherein, during the preheating, the controller obtains a signal relating to temperature of the flavor source or the aerosol source, or relating to temperature of a heater included in the device, and, in relation to the signal, changes the action performed by the tactile stimulator.

7. The device as recited in any one of Claims 1-6, wherein the controller makes the tactile stimulator perform the action at timing of a start or an end of the preheating of the flavor source or the aerosol source.

8. The device as recited in Claim 7, wherein the action performed by the tactile stimulator during the preheating is different from that performed at timing of the start or the end of the preheating.

9. The device as recited in any one of Claims 1-8, wherein the action performed by the tactile stimulator is vibration.

10. The device as recited in Claim 9, wherein the vibration comprises plural main vibrations, and each of the plural main vibrations comprises a set of plural vibrations.

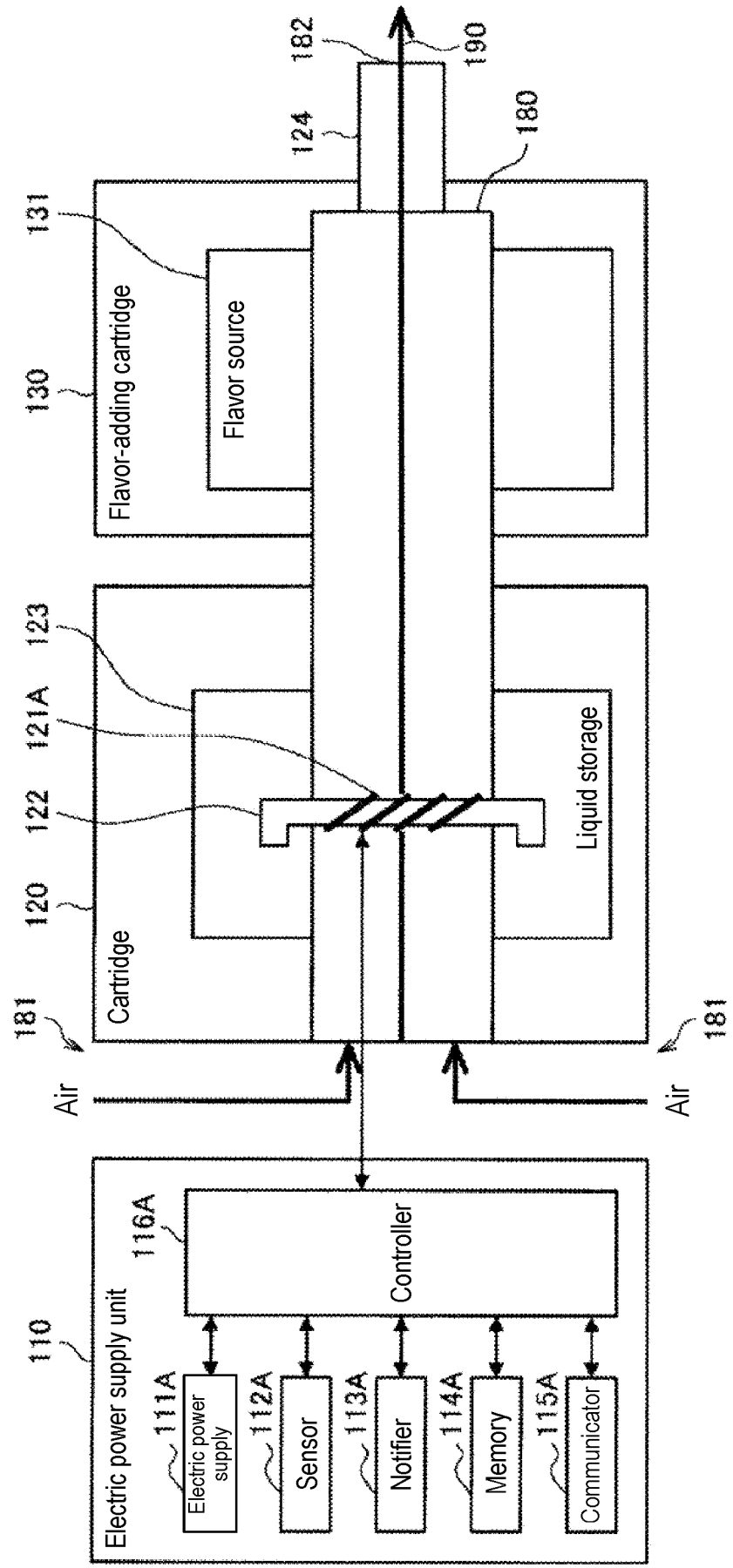
11. The device as recited in Claim 10, wherein the set of plural vibrations is a set of plural vibrations strength of which becomes weak gradually.

12. The device as recited in Claim 9, wherein the vibration comprises a single continuous vibration, and the strength of the vibration changes in accordance with a predetermined pattern with time.

13. A method for controlling a device which is a flavor inhaler or an aerosol generation apparatus and comprises a tactile stimulator, and a flavor source or an aerosol source, comprising a step for:
making the tactile stimulator perform action during preheating of the flavor source or the aerosol source.

14. A program which makes a processor in a device, which is a flavor inhaler or an aerosol generation apparatus and comprises a tactile stimulator, and a flavor source or an aerosol source, perform a step for:
making the tactile stimulator perform action during preheating of the flavor source or the aerosol source.

Fig. 1A


100A
110
Electric power supply unit
116A
Controller
111A
Electric power supply
112A
Sensor
113A
Notifier
114A
Memory
115A
Communicator
Air
Air
181
181
120
Cartridge
122
121A
123
Liquid storage
130
Flavor-adding cartridge
131
Flavor source
124
182
190
180

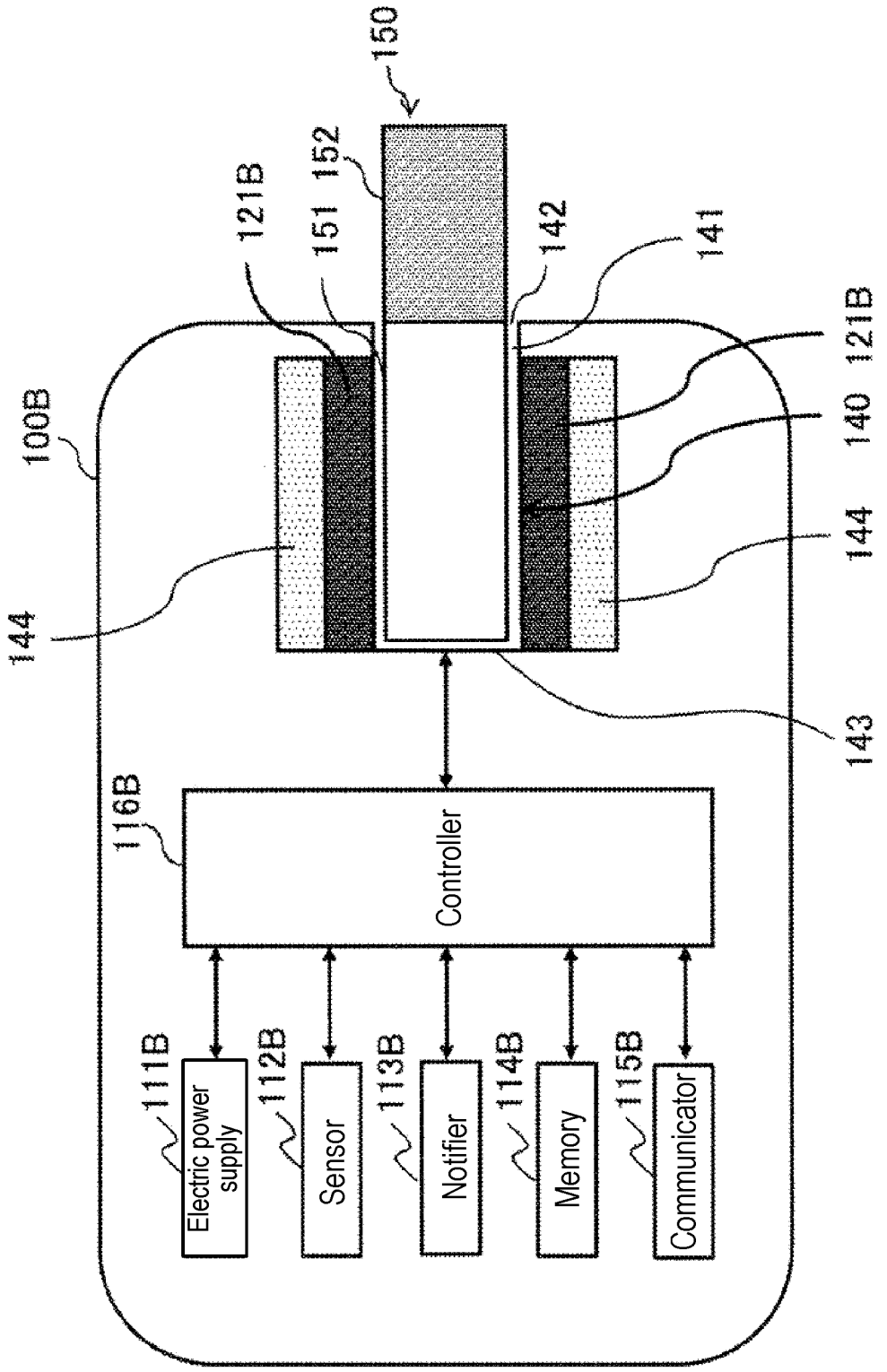

150
152
151
121B
142
141
100B
121B
140
144
144
143
116B
Controller
111B
Electric power supply
112B
Sensor
113B
Notifier
114B
Memory
115B
Communicator

Fig. 1B

Fig. 2

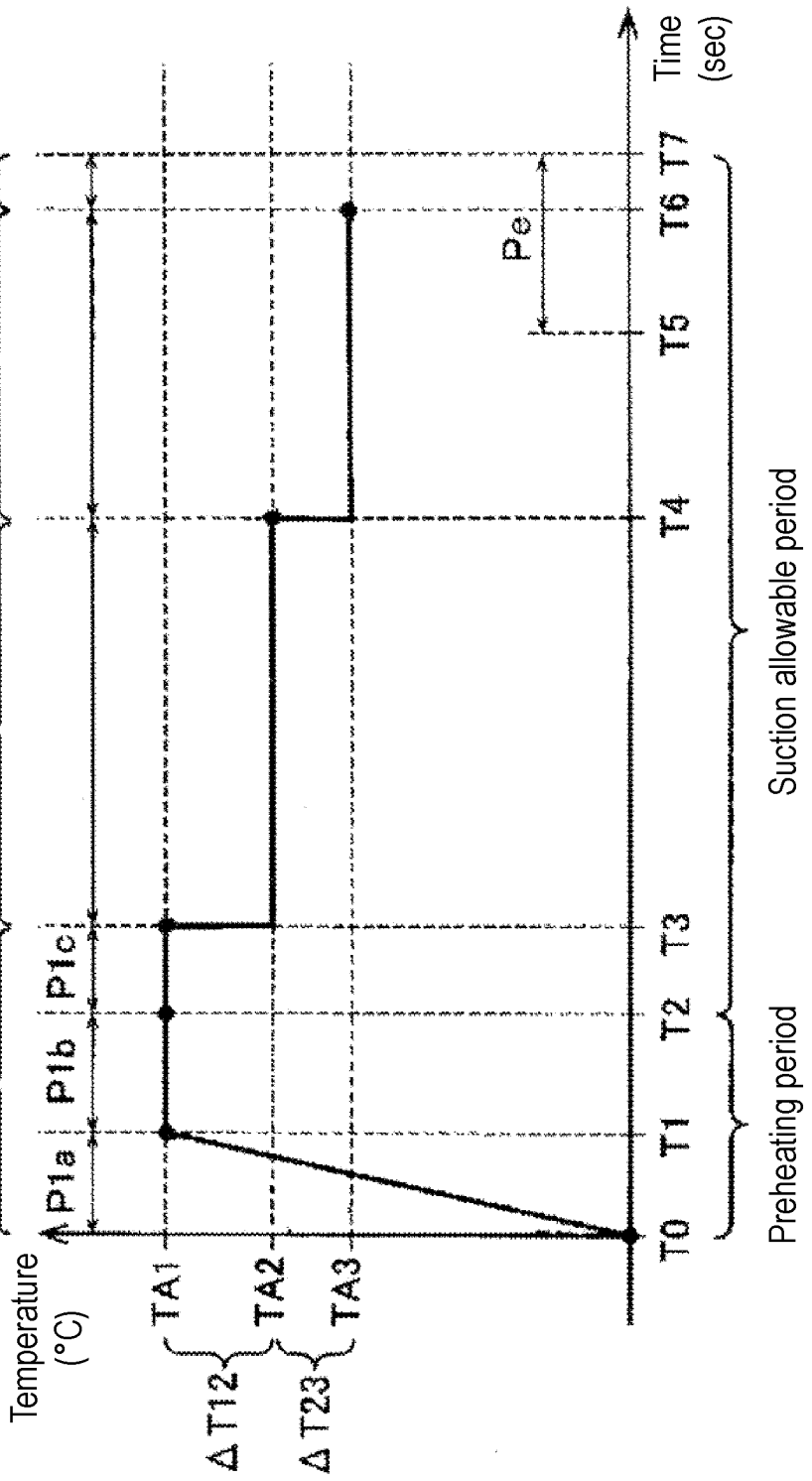

Temperature (°C)
Time (sec)
P1
P1a
P1b
P1c
P2
P3
P4
TA1
TA2
TA3
ΔT12
ΔT23
Pe
T0
T1
T2
T3
T4
T5
T6
T7
Preheating period
Suction allowable period

Fig. 3

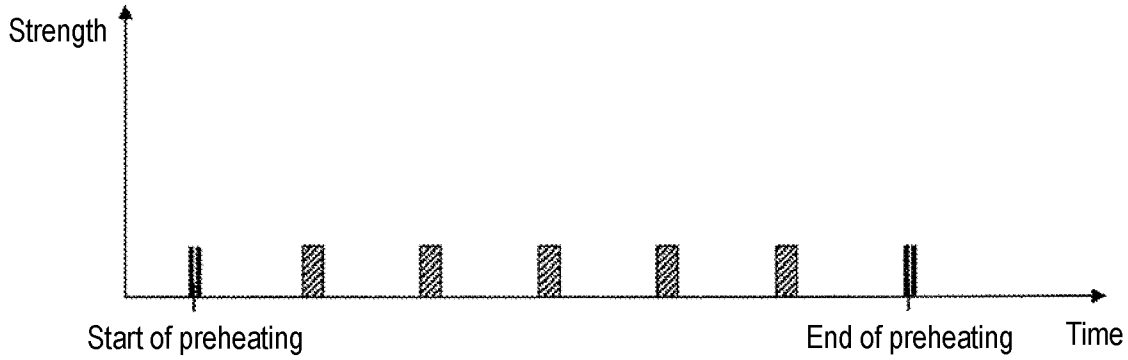


Fig. 4

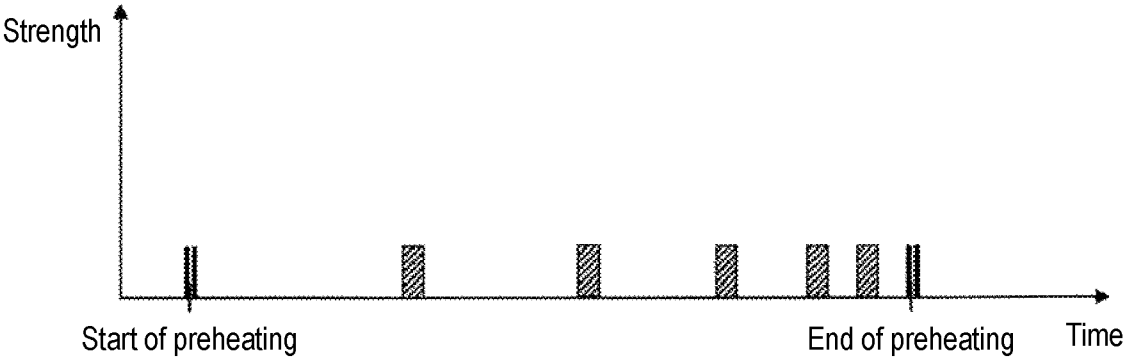


Fig. 5

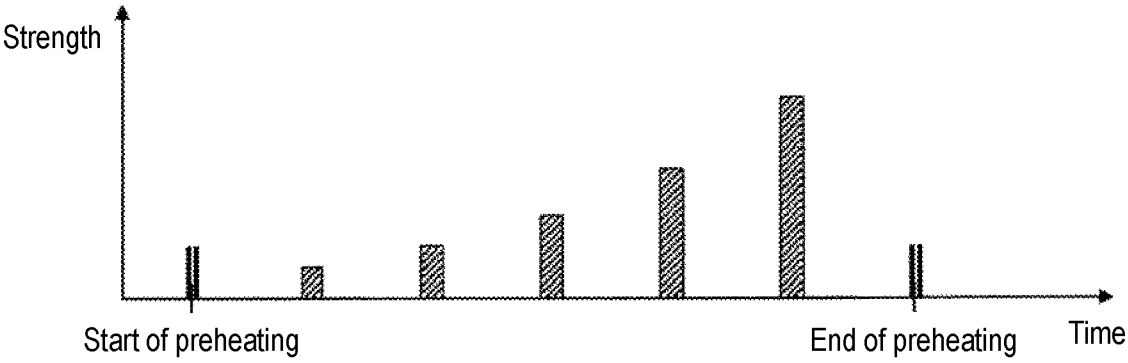


Fig. 6

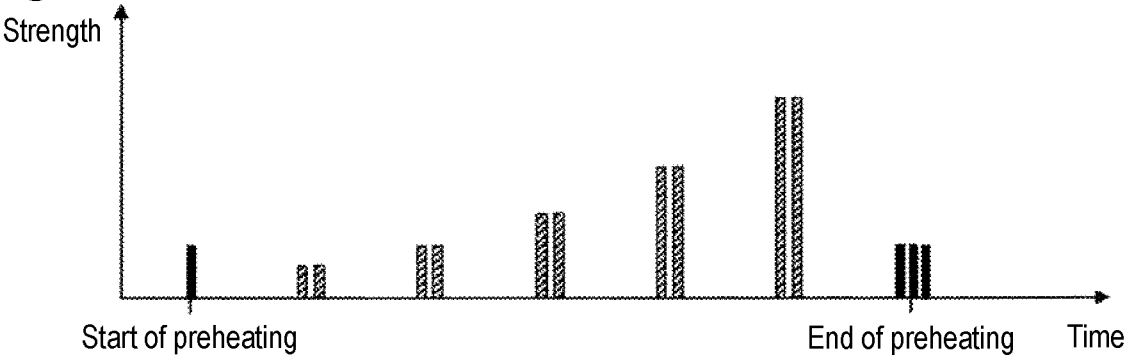


Fig. 7

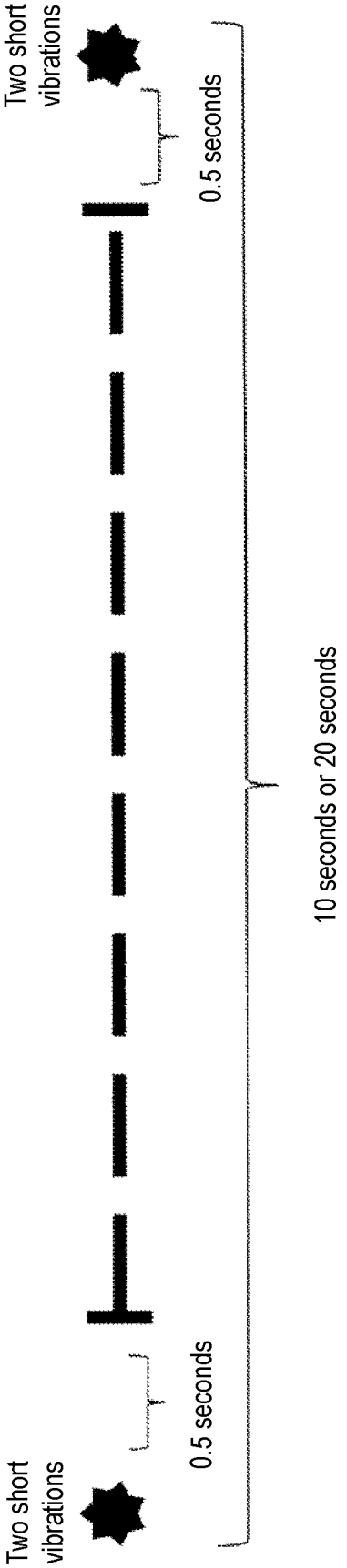

Two short vibrations
0.5 seconds
Two short vibrations
0.5 seconds
10 seconds or 20 seconds

Fig. 8

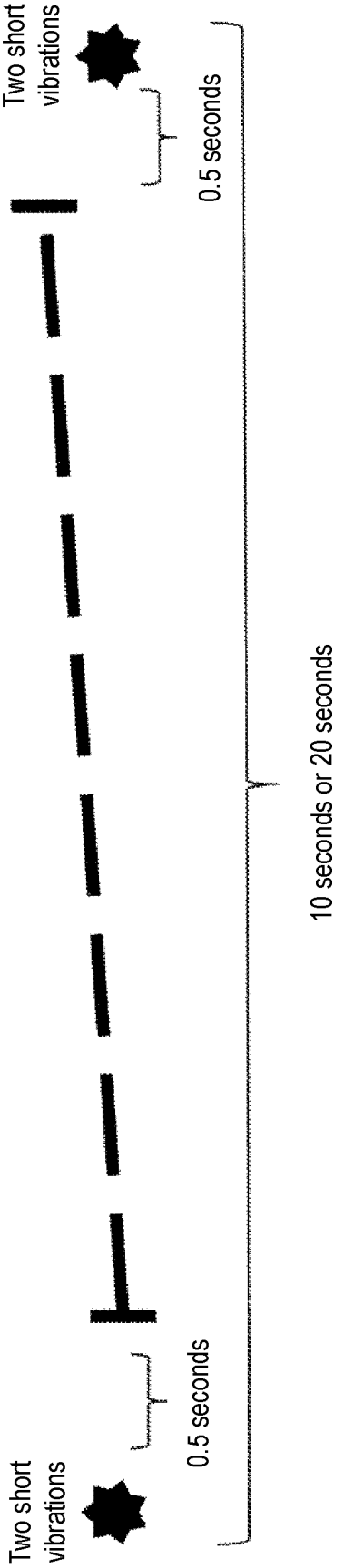

Two short vibrations
0.5 seconds
Two short vibrations
0.5 seconds
10 seconds or 20 seconds

Fig. 9

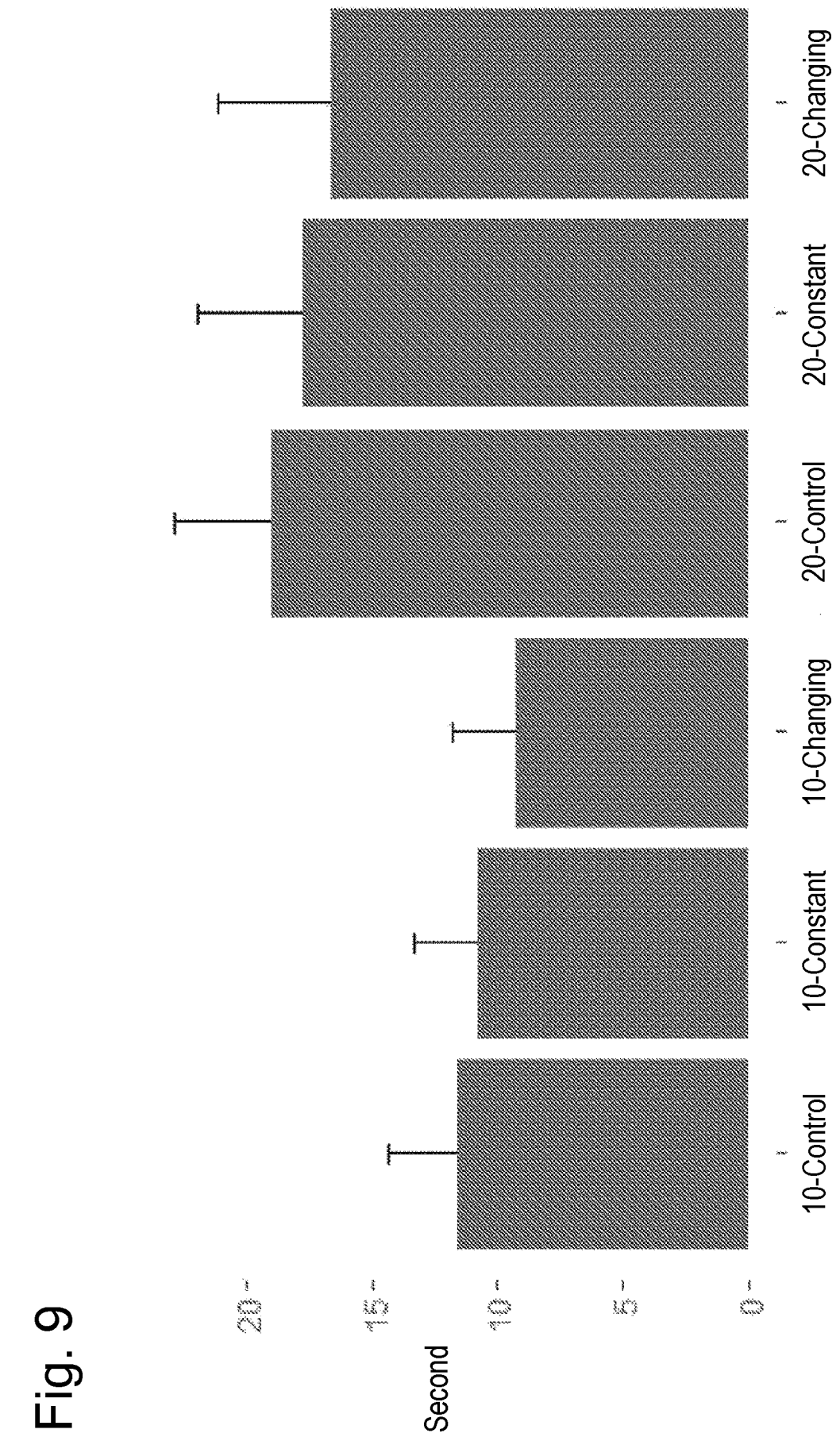

Second
20
15
10
5
0
10-Control
10-Constant
10-Changing
20-Control
20-Constant
20-Changing

Fig. 10

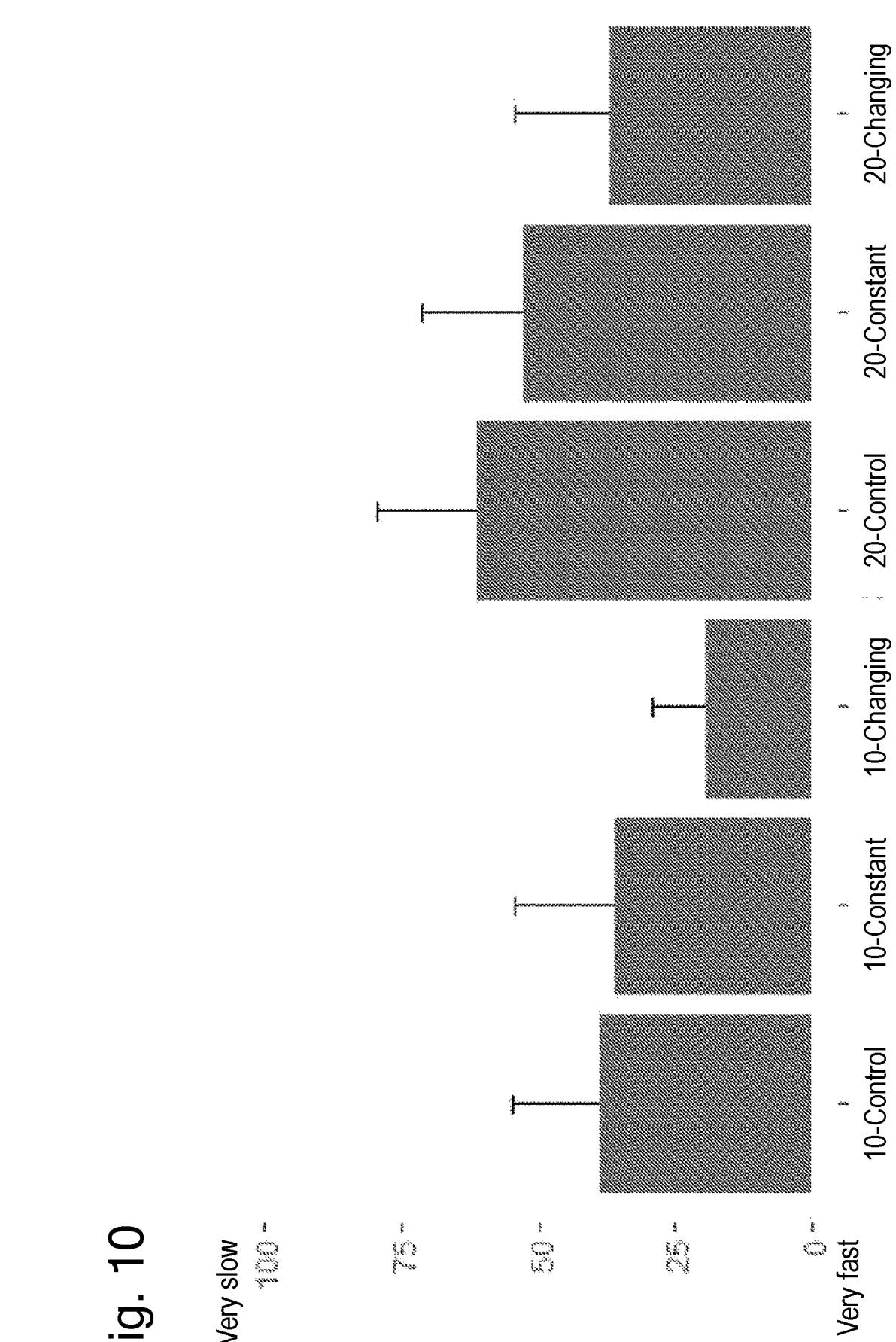

Very slow
100
75
50
25
0
Very fast
10-Control
10-Constant
10-Changing
20-Control
20-Constant
20-Changing

Fig. 11A

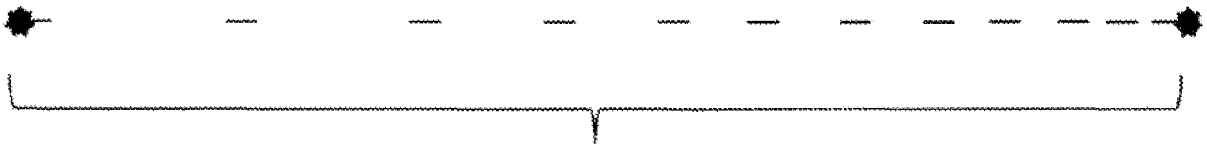


Fig. 11B

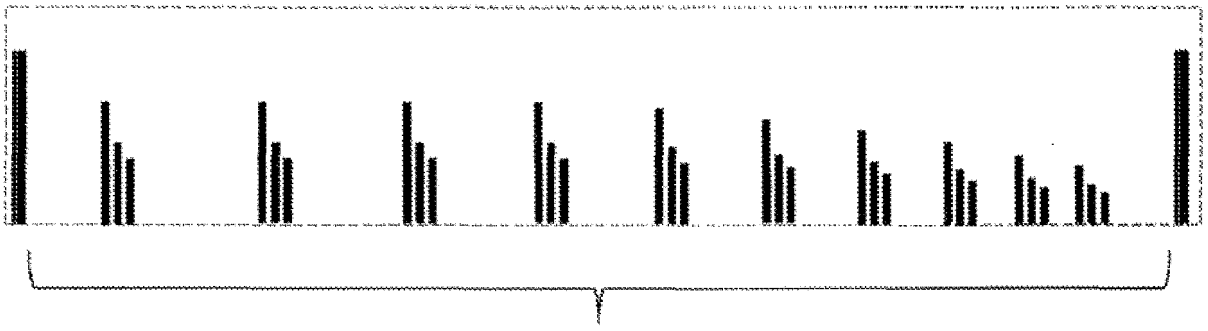


Fig. 11C

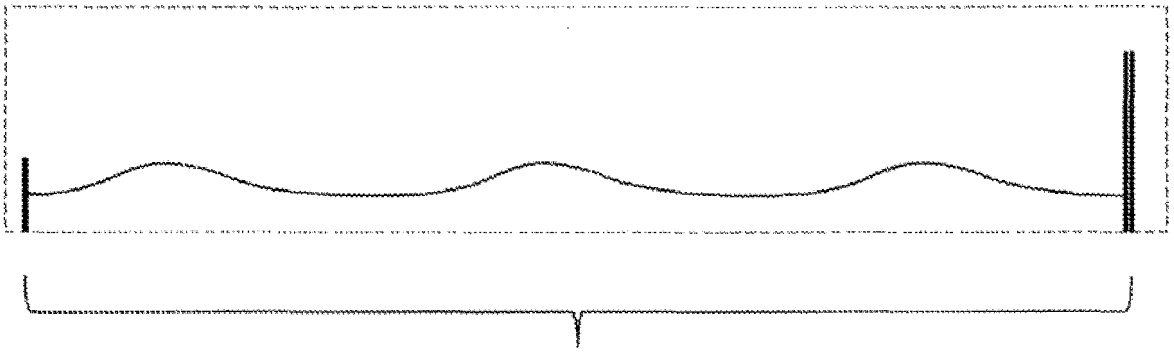


Fig. 11D

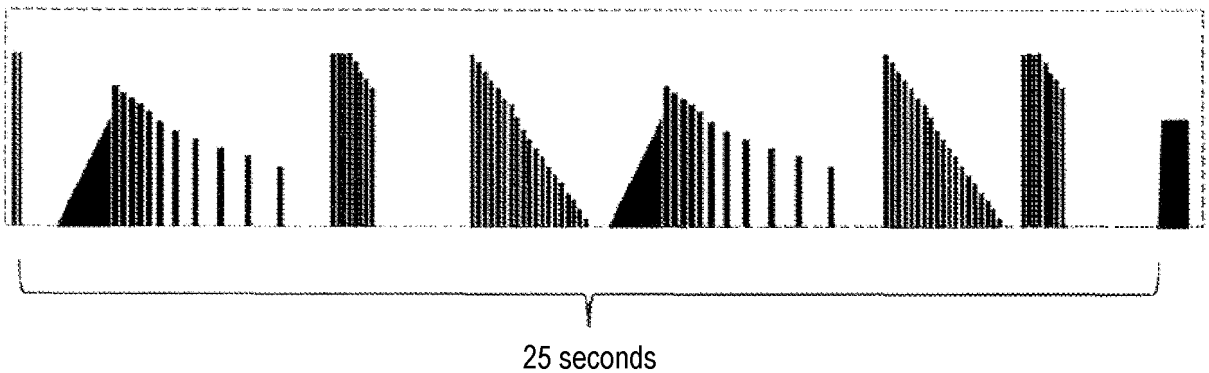


Fig. 12

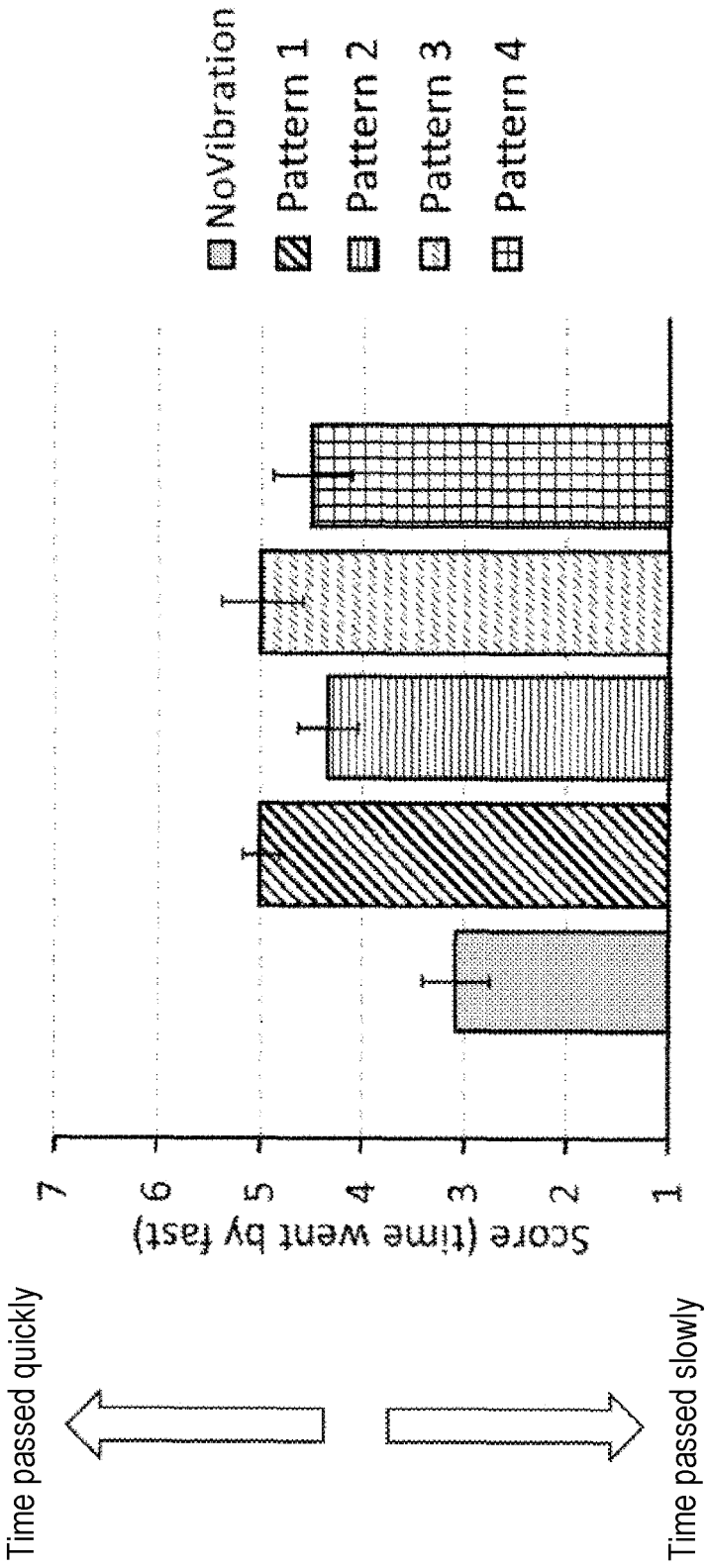

NoVibration
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Score (time went by fast)
7
6
5
4
3
2
1
Time passed quickly
Time passed slowly

Fig. 13

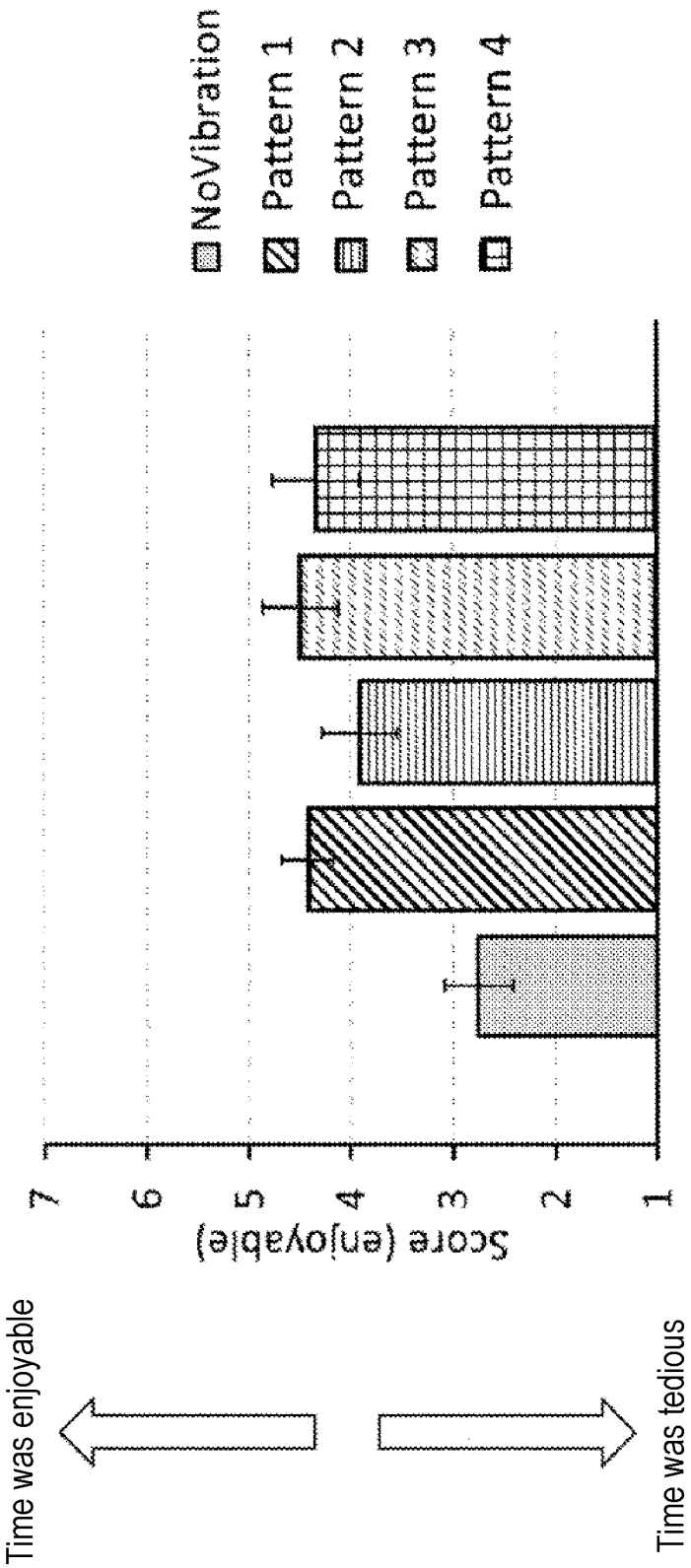
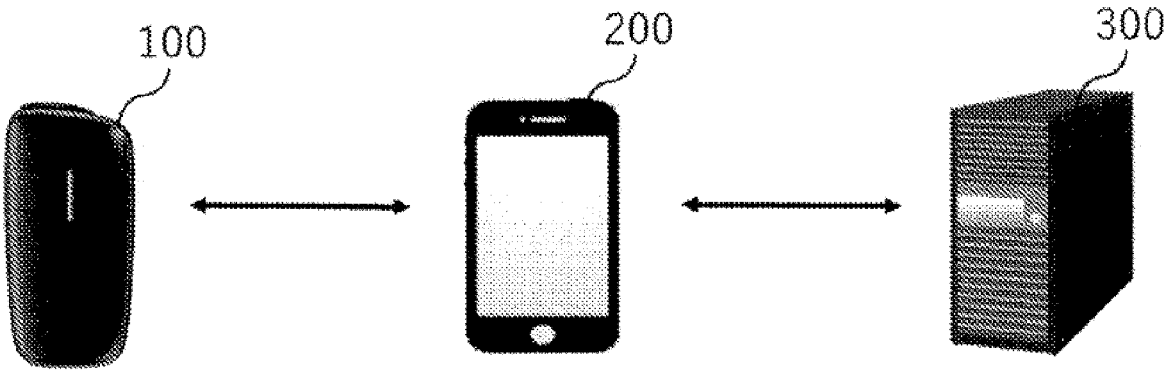

NoVibration
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Score (enjoyable)
7
6
5
4
3
2
1
Time was enjoyable
Time was tedious

Fig. 14



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2023/005369

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/60(2020.01)i; ***A24F 40/50***(2020.01)i
FI: A24F40/60; A24F40/50

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)

A24F40/60; A24F40/50

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

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2023
Registered utility model specifications of Japan 1996-2023
Published registered utility model applications of Japan 1994-2023

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2021-528980 A (KT&G CORP.) 28 October 2021 (2021-10-28) entire text, all drawings	1-14
A	WO 2021/220410 A1 (JAPAN TOBACCO INC.) 04 November 2021 (2021-11-04) entire text, all drawings	1-14
A	WO 2020/234053 A1 (PHILIP MORRIS PRODUCTS S. A.) 26 November 2020 (2020-11-26) entire text, all drawings	1-14

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"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
14 March 2023	**28 March 2023**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2023/005369

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2021-528980 A	28 October 2021	US 2021/0251299 A1 entire text, all drawings WO 2020/009412 A1 EP 3818857 A1 KR 10-2020-0004697 A CN 112334026 A	
WO 2021/220410 A1	04 November 2021	(Family: none)	
WO 2020/234053 A1	26 November 2020	JP 2022-534652 A US 2022/0232900 A1 CN 113710115 A KR 10-2022-0008808 A	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- JP 2021528980 A **[0003]**