



(11) **EP 4 020 414 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.06.2022 Bulletin 2022/26

(51) International Patent Classification (IPC):
G07F 9/00 (2006.01) G07F 9/02 (2006.01)
G07F 9/10 (2006.01) G07F 11/64 (2006.01)

(21) Application number: **20217236.7**

(52) Cooperative Patent Classification (CPC):
G07F 9/105; G07F 9/023; G07F 9/026

(22) Date of filing: **24.12.2020**

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

(71) Applicant: **Philip Morris Products S.A.**
2000 Neuchâtel (CH)
(72) Inventor: **The designation of the inventor has not yet been filed**
(74) Representative: **Morabito, Sara**
Cantaluppi & Partners S.r.l.
Piazzetta Cappellato Pedrocchi, 18
35122 Padova (IT)

(54) **METHOD OF DISPENSING AEROSOL-GENERATING ARTICLES AT A POINT OF SALE AND VENDING MACHINE FOR VENDING AEROSOL-GENERATING ARTICLES**

(57) The invention relates to a method of dispensing aerosol-generating articles at a point of sale, the method comprising:

- providing a vending machine at the point of sale, the vending machine comprising a housing containing aerosol-generating articles and a dispensing mechanism for dispensing the aerosol-generating articles from the housing through a dispensing aperture;
- detecting the concentration of at least one of the follow-

ing air-borne substance in the air present in the housing:

- a volatile substance produced by microbiological activity;
- a hormone or pheromone from an insect;

- regulating access to the aerosol-generating articles from the dispensing aperture depending on the detected concentration of the at least one air-born substance.

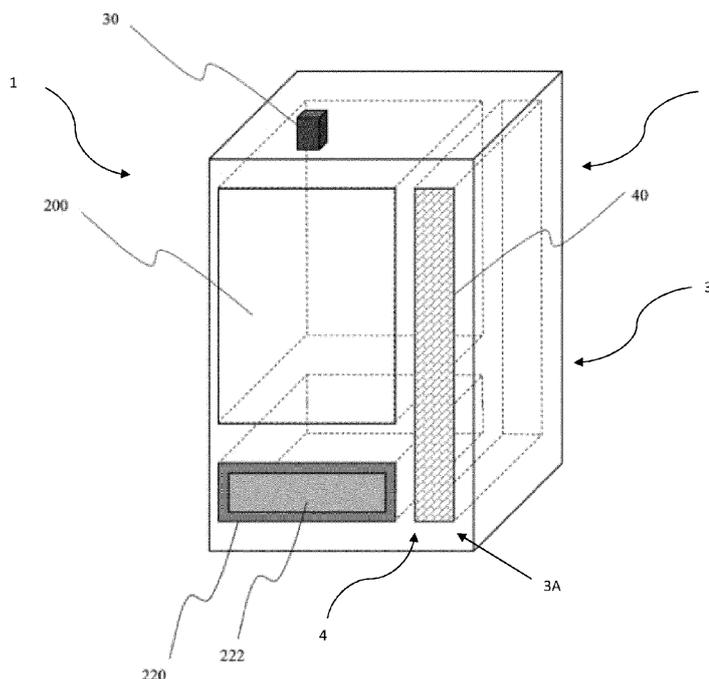


Fig. 1

EP 4 020 414 A1

Description

[0001] The present invention relates to a method of dispensing aerosol-generating articles at a point of sale. The invention further relates to a vending machine for vending aerosol-generating articles.

[0002] The vending machines, are typically stand-alone devices that allow a customer access to a variety of goods on a "self-service" basis, i.e. without the intervention of a human, and are usually located in public areas, for example in airports, cafes or bars, or on the street. The vending machines usually comprise a storing portion in which a certain number of items of the product to be sold is stored. Usually, the storing portion contains a plurality of goods the customer can select from. The vending machines usually comprise an interface portion through which the user may pay for the desired item, select the desired item and the number of items to buy. The vending machines comprises a release portion through which items may be released to customers.

[0003] From time to time it is necessary to check the quantity of the items of the article or articles to be sold contained in the storing portion of the vending machines and to replenish the supply of items in the storing portion.

[0004] The quantity of items stored in the storing portion is usually decided taking into account the requests for the items in that particular area, or at that particular vending machine, in order to avoid that the items to be sold remain for a too long period of time inside the storing portion of the vending machine. Nonetheless, sometimes the items to be sold remains in the vending machine for a period of time longer than usual and this could impair the properties of the items to be sold. The request of the users may change even abruptly, and the items of the article to be sold remain for long time in the storing portion.

[0005] The operator accesses the vending machines from time to time for checking the quality of the items to be sold contained in the storing portion and for replenishing the supply of items to be sold in the storing portion.

[0006] Some items of the article to be sold remain for long time in the storing portion of the vending machine and the properties of the items of the article to be sold are impaired.

[0007] Additionally, during the intervention of the operator there is usually little control on the status of the items being sold in the vending machine.

[0008] Furthermore, the environmental conditions, such as, temperature, humidity, sunlight exposure and other environmental factors, may affect the quality of the items of the article to be sold. The external environmental conditions influence directly the internal environment inside the vending machine and, therefore, have possible direct impact on the quality of items of the article to be sold inside the vending machine.

[0009] Therefore, it is an object of the invention to provide a method of dispensing aerosol-generating articles at a point of sale which allows aerosol-generating articles

having high quality to be dispensed to the user.

[0010] According to an aspect, the invention relates to a method of dispensing aerosol-generating articles at a point of sale. Preferably, the method comprises providing a vending machine at the point of sale. Preferably, the vending machine comprises a housing containing aerosol-generating articles. Preferably, the vending machine comprises a dispensing mechanism for dispensing the aerosol-generating articles from the housing through a dispensing aperture. Preferably, the method comprises detecting the concentration of at least one air-borne substance in the air present in the housing. Preferably, the method comprises detecting the concentration of a volatile substance produced by microbiological activity. Preferably, the method comprises detecting the concentration of a hormone or pheromone from an insect. Preferably, the method comprises regulating access to the aerosol-generating articles from the dispensing aperture depending on the detected value of concentration of the at least one air-borne substance.

[0011] According to the method of the invention, the dispensing of aerosol-generating articles at a point of sale is regulated. The access to the aerosol-generating articles is regulated by detecting the concentration of at least one air-borne substance in the air present in the housing. The access to the aerosol-generating articles at the point of sale is regulated in dependence of the detected value of concentration of the at least one air-borne substance. Basing on the detected value of concentration of the at least one air-borne substance, it is thus possible, for example, to allow or to impede the access to the aerosol-generating articles at the point of sale.

[0012] The air-borne substance is at least one of a volatile substance produced by microbiological activity or a hormone or pheromone from an insect. The concentration of at least one volatile substance produced by microbiological activity and a hormone or pheromone from an insect in the housing is detected and basing on the detected value of concentration, the access to the aerosol-generating article is regulated. The method provides the step of detecting the concentration of at least one air borne substance that is associated with the quality of the aerosol-generating article and to regulate the access to the aerosol-generating article on the basis of the detected value of concentration of the at least one air-borne substance.

[0013] Owing to the method of the invention it is possible to monitor the quality and properties of the aerosol-generating articles stored in the housing.

[0014] Owing to the method of the invention, it is possible to monitor the condition of the aerosol-generating articles in the housing and to regulate the access to the aerosol-generating article basing on the detected value of concentration of the at least one air-borne substance.

[0015] It is possible to prevent the customer from gaining the access to aerosol-generating articles having undesired properties.

[0016] Owing to the method of the invention, the ac-

cess is gained to aerosol-generating articles having desired properties without the necessity of increasing the frequency or the accuracy of the intervention of the operator for checking the condition of the aerosol-generating article.

[0017] Owing to the method of the invention, the condition of the aerosol-generating articles may be easily monitored in any desired vending machine, also located in remote locations.

[0018] Preferably, the at least one air-borne substance to be detected includes a volatile substance produced by microbiological activity. Moulds, bacteria, fungi, larvae or other microorganisms may develop in the aerosol-generating articles. The presence of these microorganism may be due to different factors, for example the age of the aerosol-generating article, the environmental condition in which the aerosol-generating article are stored, the residence time in which the aerosol-generating articles are stored in the vending machine, etcetera. These microorganisms reduce the quality of the aerosol-generating articles.

[0019] When a microorganism is present in the aerosol-generating article, some volatile substances are produced and dispersed in the environment surrounding the aerosol-generating article. The volatile substances flows out from the aerosol-generating article and are dispersed in the housing of the vending machine in which the aerosol-generating article is stored.

[0020] Preferably, the at least one air-borne substance to be detected includes a hormone or pheromone from an insect. In the aerosol-generating articles containing tobacco, or tobacco product, insects may develop, in particular *Lasioderma Serricone*, or *Ephestia elutella* which infest the tobacco containing product, seriously impairing the quality of the aerosol-generating articles. The *Lasioderma Serricone*, known also as Tobacco beetle, is a pest that may be found in tobacco containing products. The *Ephestia elutella* is a tobacco moth of the family Pyralidae. The insects eat the tobacco containing product and reproduce themselves in the aerosol-generating article infesting the aerosol-generating article also with bugs, larvae and eggs. The presence of insects affects the quality of the aerosol-generating article and thus impairs the organoleptical properties of the aerosol-generating article.

[0021] The insects emit hormones and pherormones which flow out from the aerosol-generating article and diffuse in the housing of the vending machine.

[0022] Detecting the concentration of at least one of a volatile substance produced by microbiological activity and a hormone or pheromone from an insect in the housing, allows the quality of the aerosol-generating articles in the housing to be efficiently monitored.

[0023] The housing preferably contains a plurality of aerosol-generating articles. The vending machine preferably comprises an interface portion preferably defined on a wall of the housing through which a user may interact with the vending machine for buying aerosol-generating

articles. The interface portion preferably comprises a selection portion through which a user may select the desired aerosol-generating article, or the number of aerosol-generating articles, a paying interface through which the user may pay the selected articles. The selecting interface is preferably provided with buttons for selecting the desired aerosol-generating article. The interface portion may be preferably provided with a screen for visualizing the operations performed by the user.

[0024] The housing preferably comprises a storing portion defined in the housing and arranged for storing the aerosol-generating articles. The storing portion preferably comprises a plurality of storing elements, each one of the storing elements being intended for storing one aerosol-generating articles. The storing elements are preferably arranged in a plurality of column and rows. Preferably, the storing elements in different rows and columns store different type of aerosol-generating article. In some cases some of the storing elements in the storing portion store aerosol-generating articles, whilst some other storing elements in the storing portion store accessory for the aerosol-generating articles. Preferably, the storing elements are provided with identification code for identifying the aerosol-producing article contained in the storing element, the code being selectable by the user through the interface so as to select the desired aerosol-generating article.

[0025] The housing is preferably defined by a plurality of walls defining a parallelepiped housing. Preferably, at least one of the housing wall is at least partly transparent to allow the user to see the aerosol-generating articles in the storing portion.

[0026] The dispensing mechanism is arranged for dispensing the aerosol-generating articles from the housing to a dispensing portion of the vending machine. The dispensing portion is defined in the housing. The dispensing portion is preferably operatively connected with the storing portion, so that the aerosol-generating articles may be moved from the storing portion to the dispensing portion.

[0027] Alternatively, the dispensing portion is provided outside the housing and it is operatively connected with the housing so that the aerosol-generating articles may be moved from the storing portion to the dispensing portion.

[0028] The dispensing portion is preferably provided with the dispensing aperture. The dispensing aperture is adapted to dispense the aerosol-generating articles. The dispensing aperture is preferably provided with a closure element, that is movable between an opening position in which the dispensing aperture is opened and the user may access to the aerosol-generating article contained in the dispensing portion and a closing position in which the dispensing aperture is closed and the access to the aerosol-generating articles is impeded.

[0029] Preferably, the closure element is slidable on the wall of the housing for opening/closing the dispensing aperture. Preferably, the closure element is configured

as a shutter, that is hinged to a wall of the housing. Preferably, the dispensing aperture is so dimensioned that a hand of a user may be inserted into the dispensing aperture for grabbing the aerosol-generating article.

[0030] Preferably, the regulating step comprises acting on the closure element for allowing/impeding the access to the dispensing aperture. The customer may thus access the aerosol-generating article having desired properties through the dispensing aperture, being at the same time impeded the access to aerosol-generating article lacking of desired properties.

[0031] Preferably, the dispensing portion is provided in a lower portion of the vending machine, i.e. a portion of the vending machine close to the resting surface on which the vending machine is positioned. In this way, the access to the aerosol-generating article is easier.

[0032] The dispensing mechanism is preferably arranged for moving an aerosol-generating article from the storing portion to the dispensing portion. The dispensing mechanism preferably comprises a selecting element for selecting one aerosol-generating article in the storing portion. The dispensing mechanism preferably comprises a moving device arranged for receiving the aerosol-generating article from the selecting element and to move the aerosol-generating article to the dispensing portion. In a version, the dispensing mechanism comprises a conveying channel for conveying the aerosol-generating article to the dispensing portion. In another version, the selecting element is so configured to select the aerosol-generating article from the storing portion and to move the aerosol-generating article to the dispensing portion.

[0033] Preferably, in response to the desired aerosol-generating article selected by the user, the method of the invention provides the step of sending a command to the dispensing mechanism for moving the desired aerosol-generating article from the storing portion to the dispensing portion.

[0034] Preferably, the detecting step is performed at regular intervals of time, preferably at an interval comprised between about 1-72 hours, preferably between about 12-48 hours. By doing so, information about the properties of the aerosol-generating articles in the housing at regular intervals of time is obtained and updated information about the condition of the aerosol-generating articles are obtained.

[0035] Preferably, the detecting step is performed when the user selects an aerosol-generating article. By doing so, updated information about the properties of the aerosol-generating article to be sold are obtained.

[0036] Preferably, the method provides for actuating the detection step at predefined intervals of time. In this way, the condition of the aerosol-generating article to be sold are constantly monitored.

[0037] Preferably the method provides for actuating the detection step when the user has selected an aerosol-generating article.

[0038] Preferably, the actuation may be performed remotely. The actuation may be automatic or made by an

operator.

[0039] Preferably, the detecting step is performed constantly in real time. In this way, the condition of the aerosol-generating articles in the housing is constantly monitored and updated information on the condition of the aerosol-generating articles is obtained.

[0040] Preferably, the method provides for detecting the concentration of at least one volatile substance produced by microbiological activity and a hormone or pheromone from an insect in the housing. By doing so the overall condition of the aerosol-generating articles in the housing is monitored.

[0041] Preferably, the method provides for detecting the concentration of at least one volatile substance produced by microbiological activity and a hormone or pheromone from an insect in different areas of the housing. By doing so, the general overall condition of aerosol-generating articles in the housing can be more precisely monitored.

[0042] Preferably, the method provides for detecting the concentration of at least one volatile substance produced by microbiological activity and a hormone or pheromone from an insect at the dispensing portion. In this way, the properties of aerosol-generating articles to be dispensed are more precisely monitored.

[0043] Preferably, the method provides for detecting the concentration of at least one volatile substance produced by microbiological activity and a hormone or pheromone from an insect at the storing elements. In this way, the properties of the different aerosol-generating articles stored in the storing elements are monitored.

[0044] Preferably, the method provides for regulating the access to the aerosol-generating article depending on the detected value of concentration of the at least one of the volatile substance produced by microbiological activity and a hormone or pheromone from an insect in the housing. In this way, it is assured that an aerosol-generating article having desired properties is made available to the customer.

[0045] Preferably, the method provides for detecting a plurality of volatile substances produced by microbiological activity in the housing. In this way, it is possible to better check the quality of the aerosol-generating articles, considering many different factors that could impair the quality of the aerosol-generating articles.

[0046] Preferably, the method provides for detecting a plurality of hormones or pheromones from an insect in the housing. In this way, different possible detrimental factors are checked and a better monitoring of the quality of the aerosol-generating articles is obtained.

[0047] Detecting a plurality of air-borne substances in the housing allows for monitoring the quality of the aerosol-generating articles by taking many features into account. It also allows many different pests or microorganism that could with their presence affect the quality of the aerosol-generating articles to be considered.

[0048] Preferably, the method provides for detecting serricornine.

[0049] Preferably, the method provides for detecting the volatile substances produced by some fungi, for example *Aspergillus Amstelodami*, *Aspergillus flavus*, *Fusarium culmorum*, *Penicillium cyclopium*.

[0050] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 1-octen-3-ol. The 1-octen-3-ol is a mushroom alcohol formed during oxidative breakdown of linoleic acid. The detection of 1-octen-3-ol allows an indication of the quality of the aerosol-generating article to be obtained.

[0051] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 1,3-octadiene. The presence of 1,3-octadiene is associated with fermentative process. The detection of 1,3-octadiene allows an indication of the quality of the aerosol-generating article to be obtained.

[0052] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of methyl- 2-ethylhexanoate.

[0053] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 2-methylfuran.

[0054] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 3-methylfuran.

[0055] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 3-methyl-1-butanol.

[0056] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 2-methyl-1-butanol.

[0057] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 2-heptene.

[0058] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of dimethylsulfide.

[0059] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 4-heptanone.

[0060] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of (5H) -furanone;

Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of 3-heptanol.

[0061] Preferably, detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of methoxybenzene.

[0062] Preferably, the method provides for detecting more than one volatile substance. In this way, it is possible to obtain a better indication of the quality of the aerosol-generating article. It is possible to take many possible detrimental factors into account and to better regulate the access to the aerosol-generating article.

[0063] Preferably, detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of (2S,3R,1'S)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one.

[0064] Preferably, detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of (2S,3R,1'R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one.

[0065] Preferably, detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of (2S,3R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6-(1-methyl-2-oxobutyl)-4H-pyran-4-one.

[0066] Preferably, detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of (4S,6S,7S)-4,6-Dimethyl-7-hydroxynona-3-one.

[0067] Preferably, detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of (2S,3S)-2,6-Diethyl-3,5-dimethyl-3,4-dihydro-2H-pyran.

[0068] Preferably, the method provides for detecting more than one hormone or pheromone from an insect. In this way, it is possible to obtain a better indication of the quality of the aerosol-generating articles in the housing.

[0069] Preferably, the method comprises the step of providing a database. Preferably, the database contains at least a substance corresponding to the at least one air-born substance to be detected. Preferably, the database comprises a list of substances corresponding to the plurality of air-born substances to be detected.

[0070] Preferably, the database comprises a first threshold for the concentration of the at least one air-born substance to be detected. Preferably, the database comprises a first threshold for each substance of the list of substances. Preferably, the first threshold comprises a first threshold range. In this way, a range of tolerance is defined and a more efficient monitoring method is obtained.

[0071] Preferably, the method comprises the step of accessing the database to retrieve the first threshold.

[0072] Preferably, the step of accessing the database comprises retrieving the first threshold for each substance of the list of substances contained in the database. In this way, the first threshold stored in the database is

accessible.

[0073] Preferably, the method comprises the step of comparing the detected value of concentration of the at least one air-borne substance with the first threshold for the concentration of the at least one air-borne substance retrieved from the database. Preferably, the detected value of concentration of the at least one air-borne substance and the first threshold for the concentration of the at least one air-borne substance have the same, or corresponding unity of measurement, so that they are comparable one with another. By comparing the detected value of concentration of the at least one air-borne substance with the first threshold for the concentration of the at least one air-borne substance retrieved from the database an information about the quality of the aerosol-generating article is obtained. It is possible to check if the concentration of the detected value of concentration of the at least one air-borne substance is lower or greater than the corresponding first threshold, and thus if the aerosol-generating articles are deteriorating.

[0074] In another version, the method provides for transforming the detected value of concentration into a different unity of measurement so that the first threshold and the detected values are comparable.

[0075] Preferably, the method of the invention comprises the step of blocking the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the air-borne substance is above the first threshold. The access to the aerosol-generating article is thus impeded when the concentration of at least one of the detected substances is higher than the first threshold.

[0076] If the first threshold comprises a first threshold range, the access to aerosol-generating articles from the dispensing aperture is blocked if the detected value of concentration of the air-borne substance is outside the first threshold range and higher than the first threshold range. The provision of a first threshold range increases the efficiency of the method avoiding that too little differences between the value of concentration of the air-borne substance and the corresponding first threshold affects the step of the method of the invention.

[0077] Preferably, the range of the first threshold may be different for each air-borne substance. In this way, the range of tolerance for each air-borne substance may be adjusted. The precision of the method is thus increased.

[0078] The access to the aerosol-generating article is avoided when the concentration of at least one of the detected substances is higher than the first threshold range.

[0079] When more than one air-borne substances is detected, the method provides for blocking the access to the aerosol-generating article when at least one of the detected substance in the aerosol-generating article is higher than the corresponding first threshold or first threshold range. It is, therefore, assured that aerosol-generating article having high quality is made available to the user.

[0080] Preferably, the access to the aerosol-generating articles is blocked by blocking the access to the dispensing aperture. Preferably, the access to the dispensing aperture is blocked by locking the closure element in the closed position.

[0081] Preferably, in case the access to the aerosol-generating articles is blocked the method provides for reimbursing the client.

[0082] Preferably, the method provides for moving the blocked aerosol-generating article to a storage where blocked aerosol-generating articles, i.e. aerosol-generating articles having a detected value of concentration of at least one air-borne substance higher than the corresponding first threshold, are stored. The storage is preferably defined in the housing. The storage is intended for storing blocked aerosol-generating articles which are not suitable to be sold. Preferably, the storage is separate from the storing portion. In this way, the risk of contamination of the aerosol-generating articles in the storing portion is reduced and the properties of the aerosol-generating articles in the housing is preserved.

[0083] Preferably, the vending machine comprises a channel for moving the blocked aerosol-generating article from the dispensing portion to the storage.

[0084] Preferably, the method comprises the step of providing the database with a second threshold for the concentration of the at least one air-borne substance to be detected. Preferably, the database comprises a second threshold for each substance of the list of substances.

[0085] Preferably, the second threshold is lower than the corresponding first threshold. The provision of a first threshold and a second threshold for the substance to be detected allows a more precise monitoring of the quality of the aerosol-generating article to be obtained.

[0086] Preferably, the second threshold comprises a second threshold range. In this way, a second range of tolerance is defined and a more efficient monitoring method is obtained. This increases the efficiency of the method avoiding that too little differences are taken into account. Preferably, the second range threshold is different for each one of the detected air-borne substance.

[0087] The second threshold is stored in the database in a form that is comparable with the detected value of concentration of the at least one air-borne substance obtained in the detecting step. In another version, the method provides for transforming the detected value of concentration into a different unity of measurement so that the first threshold and the detected values are comparable one with another.

[0088] Preferably, the method comprises the step of accessing the database to retrieve the second threshold.

[0089] Preferably, the method of the invention comprises a second comparing step in which the detected value of concentration is compared with the corresponding second threshold for the concentration of the air-borne substance retrieved from the database.

[0090] If the detected value of concentration is below

the second threshold the quality of the aerosol-generating article is considered high or acceptable and the article may be sold and accessed by the user. In the case in which the concentration of all the detected substances is lower than the corresponding second thresholds, the aerosol-generating article may be sold and accessed by the user. Thus, it is assured that high quality aerosol-generating articles are sold and made accessible to the user.

[0091] Preferably, the method comprises the step of issuing a warning signal if the detected value of concentration is above the second threshold and below the first threshold. Owing to this feature, the operator is warned about the quality of the aerosol-generating article and may for example take some actions for hindering the deterioration of the quality of the aerosol-generating article. If the detected value of concentration is above the second threshold and below the first threshold, the quality of the aerosol-generating article is still acceptable but it is preferable to take some actions to preserve the quality of the aerosol-generating article and avoiding the deterioration of the aerosol-generating article. The quality of the aerosol-generating article is thus preserved. It is thus avoided or reduced the discarding of the aerosol-generating article by preventing or hindering the deterioration of the aerosol-generating article.

[0092] Preferably, the concentration of a plurality of airborne substances is detected in the detecting step. In the case in which the concentration of one of the detected substances is higher than the corresponding second threshold the warning signal is issued. Therefore, the operator is promptly warned about the possible deterioration of the condition of the aerosol-generating article. Therefore any possible action can be taken promptly. This increases the efficacy of the preventive measures. This reduce the possibility of discarding the aerosol-generating article in the housing. The quality of the aerosol-generating article is thus very efficiently preserved and the number of discarded items greatly reduced.

[0093] If the second threshold comprises a second threshold range, the warning signal is issued if the detected value of concentration of the air-born substance is outside the second threshold range and higher than the second threshold range.

[0094] The warning signal is preferably transmitted through communication system to a remote control unit. The warning signal is thus received and the operator is advised that the quality of the aerosol-generating product in the housing is decreasing. The operator may thus set the intervention operation to the vending machine, for example for substituting some aerosol-generating articles.

[0095] Preferably, the method comprises the step of measuring the temperature of the air in the housing. The temperature at which the aerosol-generating articles are stored affects the quality of the aerosol-generating articles and the experience for the user. By measuring the temperature a better monitoring of the condition of the

aerosol-generating article is obtained.

[0096] Preferably, the temperature is measured in the housing in an area of the housing close to the aerosol-generating articles. This increases the efficiency of the method, giving a more precise indication of the temperature of the aerosol-generating articles.

[0097] Preferably, the temperature is measured at the storing elements. Preferably, it is provided for measuring the temperature in different areas of the housing. In this way, it is ascertained if different areas of the housing have different temperature and thus if the aerosol-generating articles in different areas are consequently affected.

[0098] Preferably, the method comprises the step of storing a preset range of temperature in a database. Preferably, the method comprises the step of accessing the database for accessing the preset range of temperature. Preferably, the method comprises the step of comparing the measured temperature value with a corresponding preset range of temperature.

[0099] Preferably, the method provides for setting different ranges of temperature basing on the ideal preserving conditions for different aerosol-generating articles stored in the vending machine.

[0100] Preferably, the method comprises the step of issuing a warning signal if the measured temperature value is outside the preset range set for temperature. The warning signal is preferably communicated to the operator. The operator is advised that the temperature in the housing is not optimal for maintaining a high quality of the aerosol-generating articles.

[0101] Preferably, the temperature is measured at preset measuring intervals of time, preferably at an interval comprised between about 1-72 hours, preferably between about 12-48 hours.

[0102] Preferably, the method provides for issuing the warning signal if the measured temperature value is outside the respective range preset for temperature for a predetermined number of measurements. It is issued a warning signal when the temperature in the housing may really jeopardise the quality of the aerosol-generating article.

[0103] Preferably, the method provides for issuing the warning signal if the measured temperature value is outside the respective range preset for temperature for a predetermined period of time. It is avoided to consider accidental changes in temperature that would not affect the quality of the aerosol-generating article.

[0104] Preferably, the method comprises the step of measuring the humidity of the air in the housing. The humidity in the housing affects the quality of the aerosol-generating articles. The aerosol-generating article produces an aerosol assuring good experience for the user when the humidity of the aerosol generating product is within a desired range.

[0105] Preferably, the method of the invention is provided for measuring the humidity in different areas of the housing. In this way, it is possible to take into account

any change of humidity in the housing.

[0106] Preferably, the method provides for measuring the humidity in an area of the housing close to the aerosol-generating articles. Thus, a more precise monitoring is obtained. Preferably, the method provides for measuring the humidity at the storing elements.

[0107] Preferably the method comprises the step of storing a preset range of humidity in a database. Preferably the method comprises the step of accessing the database for accessing the preset range of humidity. Preferably, the method comprises the step of comparing the measured humidity value with the corresponding preset range of humidity.

[0108] Preferably, the method provides for setting different ranges of humidity basing on the ideal preserving conditions for different aerosol-generating articles stored in the vending machine. Owing to this feature it is possible to obtain a more precise monitoring of the condition of the aerosol-generating article in the housing.

[0109] Preferably, the method comprises the step of issuing a warning signal if the measured humidity value is outside the respective preset range of humidity. The warning signal may be communicated to the operator. The operator is advised that the humidity in the housing is not optimal for the storing the aerosol-generating articles.

[0110] Preferably, the humidity is measured at preset humidity measuring intervals of time, preferably comprised between about 1-72 hours, preferably between about 12-48 hours.

[0111] Preferably, the method provides for issuing the warning signal if the if the measured humidity value is outside the respective preset range set for humidity for a predetermined number of measurements. In this way, the operator is warned that the humidity value may really jeopardise the property of the aerosol-generating article.

[0112] Preferably, the method provides for issuing the warning signal if the if the measured humidity value is outside the respective preset range of humidity for a predetermined period of time. In this way, the operator is warned that the humidity value may be really detrimental for the properties of the aerosol-generating article.

[0113] Preferably, the method comprises the step of measuring the illuminance in a target surface inside the housing. Preferably, it is provided for illuminating the inside of the housing. Preferably, it is provided for illuminating the storing portion of the housing to make the aerosol-generating articles clearly visible to the user. The illuminance in the housing may affect the external appearance of the aerosol-generating articles, or of the packs of the aerosol-generating articles. If a light is directed towards some of the aerosol-generating articles, the colors of the packs of the aerosol-generating articles are faded. Additionally the exposure to sunlight may affect the quality of the aerosol-generating article, for example causing loss of flavours, increasing the development of parasites or bugs.

[0114] Preferably, the method provides for measuring

the illuminance in an area of the housing close to the aerosol-generating articles. In this way more precise monitoring of the condition of the aerosol-generating article is obtained. Preferably, the method provides for measuring the illuminance at the storing elements. Preferably, the method of the invention provides for measuring the illuminance in different areas of the housing. This allows a more precise monitoring of the aerosol-generating article to be obtained taking into account localised condition.

[0115] Preferably the method comprises the step of storing a preset range of illuminance in a database. Preferably the method comprises the step of accessing the database for accessing the preset range of illuminance. Preferably, the method comprises the step of comparing the measured illuminance value with a corresponding preset range of illuminance. Preferably, the method provides for setting different ranges of illuminance basing on the ideal preserving conditions for different aerosol-generating articles stored in the vending machine.

[0116] Preferably, the method comprises the step of issuing a warning signal if the measured illuminance value is outside the respective preset range set for illuminance. The warning signal may be communicated to the operator. The operator is advised that the illuminance in the housing is not optimal for maintaining a high quality of the aerosol-generating articles.

[0117] Preferably, the illuminance is measured at preset illuminance measuring intervals of time, preferably comprised between about 1-72 hours, preferably between about 12-48 hours.

[0118] Preferably, the method provides for issuing the warning signal if the if the measured illuminance value is outside the respective preset range set for illuminance for a predetermined number of measurements. In this way, it is avoided that accidental events not affecting the quality of the aerosol-generating article are taken into account.

[0119] Preferably, the method provides for issuing the warning signal if the measured illuminance value is outside the respective preset range set for illuminance for a predetermined period of time.

[0120] Preferably, the method further comprises for storing the preset range of temperature, humidity, or illuminance in a memory unit. The memory unit is preferably provided in the housing. Preferably, the step of issuing a warning signal includes generating a visual warning. Preferably, the step of issuing a warning signal includes generating an audible warning. Preferably, the step of issuing a warning signal includes sending an e-mail to an operator. Preferably, the step of issuing a warning signal includes sending an SMS to an operator.

[0121] A warning signal is preferably sent to a remotely positioned operator.

[0122] Preferably, the vending machine comprises a ventilation system to force air to flow through the housing. Preferably, the ventilation system comprises a conduit for forcing into the housing ambient air in the surrounding

of the vending machine. The conduit is preferably provided with a plurality of holes for allowing air to flow out from the conduit. The holes are preferably positioned in different areas of the housing so that the air may reach different aerosol-generating articles in the housing. Owing to this feature it is possible to circulate air into the housing preserving the quality of the aerosol-generating articles.

[0123] Preferably, the ventilation system comprises an inlet hole for allowing ambient air from the outside surrounding of the vending machine to flow into the housing. Preferably, the ventilation system comprises a filtering unit for filtering the air flowing from outside before forcing the air into the housing.

[0124] The ventilation system allows air to be circulated into the housing so as to establish almost uniform temperature and humidity condition in the housing. This avoids that in some areas of the housing the temperature or the humidity is considerable different than in other areas. This avoids that in some areas of the housing environmental condition deleterious for the aerosol-generating article are maintained over time. This also avoids that the properties of aerosol-generating articles located in some areas of the housing are impaired.

[0125] Preferably, the ventilation system comprises a plurality of conduits for forcing ambient air into the surrounding of the vending machine into the housing.

[0126] The ventilation system preferably comprises a pump for forcing ambient air in the surrounding of the vending machine through the ventilation system into the housing.

[0127] The pump is preferably arranged outside the housing.

[0128] Preferably, the vending machine comprises an air conditioning system adapted to modify the temperature or the humidity of the air inside the housing. Owing to this feature, it is possible to obtain in the housing a temperature or humidity that allow the desired properties of the aerosol-generating article to be maintained. It is possible to optimise the temperature and humidity in the housing.

[0129] The air conditioning system preferably comprises a first air conduit for conducting air to the air conditioning system. The air conditioning system preferably comprises a refrigerating unit or a heater for modifying the temperature or the humidity of the air flowing through the refrigerating unit or a heater. The air conditioning system preferably comprises a second air conduit receiving air from the refrigerating unit or heater and for conducting air into the housing. The second air conduit comprises a hole for flowing the conditioned air received from the refrigerating unit or heater into the housing.

[0130] Preferably, the second air conduit comprises a plurality of holes for flowing the conditioned air into the housing. In this way, a better regulation of temperature and humidity into the housing is obtained.

[0131] The air conditioning system preferably comprises an actuating unit for actuating the air conditioning sys-

tem and for moving air therethrough. The air conditioning system preferably comprises an aspiration unit for aspirating air from the housing towards the air conditioning system. The air conditioning system preferably comprises a blowing unit for blowing air through the air conditioning system and into the housing.

[0132] Preferably, the method comprises the step of activating the ventilation system if the measured value of temperature is outside the predefined range set for temperature.

[0133] Preferably, the method comprises the step of activating the ventilation system if the measured value of humidity is outside the predefined range set for humidity.

[0134] By activating the ventilation system, it is possible to improve the storing condition for aerosol-generating articles.

[0135] Preferably, the method comprises the step of activating the air conditioning system if the measured value of temperature is outside the predefined range set for temperature

[0136] Preferably, the method comprises the step of activating the air conditioning system if the measured value of humidity is outside the predefined range set for humidity.

[0137] By activating the air conditioning system it is possible to modify the temperature or humidity into the housing, thus restoring the desired temperature or humidity. It is possible to restore an optimal storing condition for aerosol-generating articles in the housing.

[0138] Preferably, the method comprises the step of activating the ventilation system depending on the detected value of concentration of the at least one air-borne substance.

[0139] Preferably, the method comprises the step of activating the ventilation system if the detected value of concentration of the at least one air-borne substance is above the corresponding second threshold.

[0140] Preferably, the method comprises the step of activating the air conditioning system depending on the detected value of concentration of the at least one air-borne substance.

[0141] Preferably, the method comprises the step of activating the air conditioning system if the detected value of concentration of the at least one air-borne substance is above the corresponding second threshold.

[0142] Preferably, the method comprises the step of detecting the concentration of the least one air-borne substance in the air present in the housing when the aerosol-generating articles are not present in the housing. The condition of the housing of the vending machine before loading the aerosol-generating articles in the housing are thus monitored.

[0143] Preferably, the method comprises the step of detecting the concentration of a volatile substance produced by microbiological activity when the aerosol-generating articles are not present in the housing. A possible contamination of the housing of the vending machine be-

fore loading the aerosol-generating articles may thus be detected.

[0144] Preferably, the method comprises the step of detecting the concentration of a hormone or pheromone from an insect when the aerosol-generating articles are not present in the housing. It is possible to detect any possible contamination from insects of the housing of the vending machine before loading the aerosol-generating articles. The properties of the aerosol-generating article may thus be preserved. If desired, some measures could be taken for improving the condition of the housing before loading the aerosol-generating article therein.

[0145] Preferably, the database comprises an initial threshold for the concentration of the at least one air-born substance to be detected. The initial threshold corresponds to an acceptable value of concentration of the at least one air-born substance in the housing when the aerosol-generating articles are not present in the housing. Preferably, the initial threshold is lower than the second threshold.

[0146] Preferably, the method provides for accessing the database to retrieve the initial threshold for an air-born substance. Preferably, the method provides for comparing the detected value of concentration of the at least one air-born substance when the aerosol-generating articles are not in the housing with the corresponding initial threshold for the concentration of the at least one air-borne substance retrieved from the database.

[0147] Preferably, if the detected concentration of at least one air-borne substance when the aerosol-generating articles are not in the housing is higher than the initial threshold the method comprises the step of emitting an alarm. In this way, the operator is warned on the actual condition of the housing. It would be possible to clean or sanitize the housing before loading the aerosol-generating articles. Measures for improving the condition of the housing before loading the aerosol-generating article therein can be taken.

[0148] Preferably, the method comprises the step of adjusting the concentration of the at least one air-borne substance detected when the aerosol-generating articles are in the housing on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing.

[0149] Preferably, the method comprises an adjusting step for adjusting the value of the first threshold or of the second threshold of the air-borne substance on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing. In this way, the monitoring method is more precise. It is avoided that the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing affects the monitoring method. The regulation obtained with the method is more precise as it is not affected by the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing.

[0150] Preferably, the adjusting step is provided before

the comparing step in which the detected value of concentration of the air-borne substance detected when the aerosol-generating articles are in the housing is compared with the first threshold or with the second threshold of the corresponding air-borne substance. The efficacy of the monitoring method is then improved.

[0151] Preferably, the detecting step includes the step of detecting the concentration of at least one of the air-borne-substance in the air present in the housing by means of a detecting unit. By doing this, the quality of the aerosol-generating article is more precisely monitored. Preferably the detecting unit comprises a gas sensor.

[0152] Preferably, the gas sensor has a gas chamber.

[0153] Preferably, the method further comprises a circulating step for circulating air present in the housing towards the gas chamber. The efficacy of the monitoring method is improved, as the air born substance may be easier detected. It is possible to detect the air born substance even if it is produced in an aerosol-generating article located remotely from the gas sensor.

[0154] Preferably, the circulating step for circulating air towards the gas chamber comprises the step of blowing air towards the gas chamber at a given frequency.

[0155] Preferably, the frequency at which air is blown towards the gas chamber corresponds to the frequency at which the detecting step is performed. In this way, the precision of the method is increased.

[0156] Preferably, the step of blowing air towards the gas chamber comprises blowing a preset flow rate of air towards the gas chamber.

[0157] Preferably, the step of blowing air towards the gas chamber comprises blowing a preset quantity of air towards the gas chamber.

[0158] Preferably, the circulating step for circulating air towards the gas chamber comprises the step of blowing air towards the gas chamber constantly in real time.

[0159] Preferably, the circulating step is performed by means of a blower. Preferably, the blower is provided in the vending machine.

[0160] Preferably, the method comprises a blocking step of blocking the access to aerosol-generating article from the dispensing aperture till the detecting step is completed. In this way, it is avoided that the user can gain access to an aerosol-generating article having possibly impaired properties.

[0161] Preferably, the method comprises the step of detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article. The aerosol-generating articles may comprise different flavourants. The concentration of the volatile substance from a flavourant contained in the aerosol-generating article decreases over time. Therefore, the organoleptic properties of the aerosol-generating article are reduced. The use experience of the aerosol-generating article for the user is impaired. Conversely, in the housing, the concentration of the volatile substance from a flavourant contained in the aerosol-generating article increases with

the time of residence of the aerosol-generating articles in the housing.

[0162] By detecting the concentration of the volatile substance from a flavourant contained in the aerosol-generating article in the housing, it is obtained an indication of the quality of the aerosol-generating article.

[0163] Preferably, the method comprises the step of regulating the access to the aerosol-generating article from the dispensing aperture depending on the detected value of concentration of the volatile substance from a flavourant.

[0164] Preferably, the method comprises the step of detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article at the dispensing portion. Therefore, the concentration of a volatile substance from a flavourant contained in the aerosol-generating article is preferably detected when the aerosol-generating article is to be dispensed to the user. An information about the actual properties of the aerosol-generating article to be sold is thus obtained. The precision of the monitoring method is thus increased.

[0165] Preferably, the detecting step is performed when an aerosol-generating article containing a flavourant is selected by the user.

[0166] Preferably, the database comprises a third threshold for the concentration of the volatile substance from a flavourant contained in the aerosol-generating article to be detected.

[0167] Preferably the database comprises a third threshold for each one of the possible flavourant in the aerosol-generating article.

[0168] Preferably, the method comprises the step of accessing the database to retrieve the third threshold.

[0169] Preferably, the method comprises the step of comparing the detected value of concentration of the volatile substance from a flavourant contained in the aerosol-generating article with the third threshold retrieved from the database.

[0170] Preferably, the method comprises the step of blocking the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the volatile substance from a flavourant contained in the aerosol-generating article is below the third threshold. In this way, only aerosol-generating articles containing desired concentration of flavourants are made available to the user. Aerosol-generating articles having a quantity of flavourant lower than a preset value are discarded.

[0171] Preferably, the aerosol-generating article having a quantity of flavourant lower than a preset value are loaded in a storage defined in the housing.

[0172] Preferably, in case the access to the aerosol-generating articles is blocked the method provides for dispensing a second aerosol-generating article to the dispensing aperture. The method preferably provides for detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article before allowing the access to the second aerosol-gener-

ating article. The detecting step is performed for the second aerosol-generating article.

[0173] Preferably, the step of detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article includes detecting the concentration of Menthol.

[0174] Preferably, the step of detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article includes detecting the concentration of Eugenol.

[0175] Preferably, the step of detecting the concentration of a volatile substance from a flavourant contained in the aerosol-generating article includes detecting the concentration of vanilla.

[0176] According to another aspect, the invention relates to a vending machine for vending aerosol-generating articles. Preferably, the vending machine comprises a housing for containing aerosol-generating articles to be vended. Preferably, the vending machine comprises a dispensing aperture on the housing and adapted to dispense the aerosol-generating articles. Preferably, the vending machine comprises a detecting unit adapted to detect the concentration of at least one air-borne substance in the air present in the housing. Preferably, the at least one air-borne substance in the air present in the housing is a volatile produced by microbiological activity. Preferably, the at least one air-borne substance in the air present in the housing is a hormone or pheromone from an insect. Preferably, the vending machine is adapted to generate a signal representative of the detected value of concentration of the at least one air-borne substance. Preferably, the vending machine comprises a database containing a first threshold for the concentration of the air-borne substance. Preferably, the vending machine comprises a control unit adapted to receive the signal from the detecting unit and to compare the detected value of concentration of the at least one air-borne substance with the first threshold present in the database. Preferably, the vending machine comprises a dispensing mechanism connected to the control unit, the dispensing mechanism being adapted to control access to the aerosol-generating article through the dispensing aperture on the basis of the comparison performed by the control unit.

[0177] Owing to this aspect of the invention it is provided a vending machine in which the quality of the aerosol-generating articles is monitored. It is provided a vending machine in which the access to the aerosol-generating article is regulated on the basis of the concentration of the detected volatile substance produced by microbiological activity or a hormone or pheromone from an insect.

[0178] Preferably, the vending machine comprises an actuating unit for actuating the dispensing mechanism for moving an aerosol-generating article from the storing portion to the dispensing portion when the user select the desired aerosol-generating article.

[0179] The detecting unit detects the concentration of

at least one air-borne substance. Preferably, the vending machine comprises an actuating unit for actuating the detecting unit.

[0180] The actuating unit preferably actuates the detecting unit at a preset interval of time. Owing to this feature the access to the aerosol-generating article is more precisely regulated. The actuating unit actuates the detecting unit preferably at an interval of time comprised between about 1-72 hours, preferably between about 12-48 hours. By doing so, information about the properties of the aerosol-generating articles in the housing at regular intervals of time is obtained and updated information about the condition of the aerosol-generating articles are obtained.

[0181] The actuating unit preferably actuates the detecting unit when a user selects an aerosol-generating article. Owing to this feature the access to the aerosol-generating article is more precisely regulated.

[0182] Preferably, the detecting unit detects the at least one air-borne substance constantly in real time. Preferably, the detecting unit is provided in the housing. In this way the concentration of the at least one air-borne substance may be more precisely detected.

[0183] Preferably the detecting unit is adapted to generate a signal representative of the detected concentration of the air-borne substance. Therefore, the operator is warned about the condition of the aerosol-generating articles in the housing.

[0184] Preferably the vending machine comprises a memory unit containing the database.

[0185] The control unit is preferably arranged in the housing. In a version, the control unit may be positioned outside the housing or far from the vending machine.

[0186] Preferably the control unit, on the basis of the comparison between the detected value of concentration of the at least one air-borne substance and the first threshold present in the database actuates the dispensing mechanism so as to control access to the aerosol-generating article through the dispensing aperture on the basis of the comparison performed by the control unit.

[0187] Preferably, the dispensing mechanism comprises a locking mechanism of the closure element of the dispensing aperture for locking the dispensing aperture. Preferably the control unit actuates the locking mechanism for locking/unlocking the dispensing aperture.

[0188] Preferably if the detected value of concentration of the air-borne substance is above the first threshold, the control unit locks the closure element in the closing position impeding the access to aerosol-generating articles. Preferably, the control unit allows the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the air-borne substance is below the first threshold.

[0189] By doing so, the access to the aerosol-generating article is thus regulated to ensure only the aerosol-generating article whose quality meets certain defined quality criteria can be dispensed to the user.

[0190] The vending machine preferably comprises a

moving mechanism for moving the aerosol-generating article to a storage where aerosol-generating articles having a detected value of concentration of at least one air-borne substance higher than the corresponding first threshold, are stored. Preferably, if the concentration of at least one of the detected substances detected by the detecting unit is higher than the first threshold the control unit actuates the moving mechanism for moving the aerosol-generating article to the storage.

[0191] Preferably, the detecting unit comprises a gas sensor. The gas sensor is preferably, arranged in the housing.

[0192] The gas sensor is preferably arranged in the storing portion. The gas sensor is preferably arranged at the storing elements for the proximity of the aerosol-generating goods. The gas sensor is preferably arranged in the dispensing portion for the proximity of the aerosol-generating article to be sold.

[0193] Preferably, the detecting unit comprises a plurality of gas sensors arranged in different areas of the storing portion. This optimizes the accuracy of the detected value of concentration of the air-borne substance by gathering the detected values of the substance in the air at different locations.

[0194] Alternatively, the gas sensors of the plurality of gas sensors may also be arranged in different areas of the housing. The accuracy of the detection is optimized by considering detected values of the substance in the air at different locations in the housing.

[0195] Preferably, the plurality of gas sensor comprises at least one first gas sensor for detecting a volatile substance produced by microbiological activity and at least one second gas sensor for detecting a hormone or pheromone from an insect in the housing. In this way, the detection is optimised, optimising the gas sensors on the type of air-borne substance to be detected. The accuracy of the detection is optimised as the first gas sensor and the second gas sensor can be optimised on the type of the air-borne substance to be detected.

[0196] Preferably, the first gas sensor and the second gas sensor are different type of gas sensor. Preferably, the first gas sensor and the second gas sensor are different one from another.

[0197] Preferably, the first gas sensor is an electronic nose. Preferably, the first gas sensor is the electronic nose developed by Smelldect (<https://smelldect.de/>). This gas sensor is described in detail in DE102014002077 in the name of KARLSRUHER INST FUR TECHNOLOGIE.

[0198] Preferably as second gas sensor may be used in the present invention for example the gas sensor described in detail in US 2019/0234895. Further details of the gas sensor are described in US 2019/0234895. As second gas sensor may also be used the gas sensor developed and sold by Sensor Development Corporation, under the trade name ContraMoth®.

[0199] Preferably, the plurality of gas sensor comprises a gas sensor for each one of the air-borne substance

to be detected, each gas sensor being configured to detect one specific air-borne substance. This allows the quality of the aerosol-generating articles in the housing to be more efficiently monitored.

[0200] Preferably, the actuating unit actuates the gas sensor for detecting at least one air-borne substance.

[0201] Preferably, the vending machine comprises an air circuit to circulate air to the gas sensor.

[0202] The air circuit is preferably configured to generate a flow of air inside the housing. Preferably, the air circuit comprises an air conduit for circulating ambient air in the surrounding of the vending machine into the housing. The air circuit comprises an air pump for circulating the inside air in the housing. Preferably, the air circuit comprises a plurality of air conduits for circulating air towards different gas sensors. The provision of the air circuit allows to create a flow of air into the housing. This improves the quality of the air into the housing increasing the durability of the aerosol-generating articles stored into the storing portion. The air circulation to the gas sensors by the air circuit also moves the volatile substances inside the housing towards the gas sensors.

[0203] The detection of the volatile substances from the gas sensor is thus enabled and secured. Therefore, it is possible to detect volatile substances in the housing soon after they are emitted into the housing, namely even at low concentration. Therefore, the quality of the aerosol-generating articles is efficiently preserved.

[0204] Thanks to the air circulation inside of the vending machine, it is possible to detect a volatile substance even if it is emitted at a position into the housing far from the gas sensor. The quality of the aerosol-generating article is preserved also if a single gas sensor is provided.

[0205] Preferably, the vending machine comprises a telecommunication module connected to the control unit. Preferably, the telecommunication module is adapted to send signals relative to the detected value of concentration from the detecting unit to the control unit.

[0206] Therefore, the telecommunication module receives data from the detecting unit and sends data to the control unit. Owing to the telecommunication module the detecting unit may be positioned also remotely from the control unit.

[0207] Preferably, the control unit compares the detected value of concentration with the corresponding second threshold for the concentration of the air-borne substance retrieved from the database.

[0208] If the detected value of concentration is below the second threshold, the control unit sends a signal unlocking the locking mechanism of the dispensing aperture for allowing the access to the aerosol-generating article. Namely, if the detected value of concentration is below the second threshold, the quality of the aerosol-generating article is considered high or acceptable and the article may be sold and accessed by the user.

[0209] The control unit preferably sends a signal for unlocking the locking mechanism if the detected concentration of all the detected air-born substances is lower

than the corresponding second threshold. Thus, it is assured that high quality aerosol-generating articles are sold and made accessible to the user.

[0210] If the detected value of concentration is above the second threshold and below the first threshold the control unit sends a warning signal. In this way, an operator is warned about the possible deterioration of the aerosol-generating article.

[0211] When at least one of the detected value of concentration of at least one detected substance is above the corresponding second threshold, the control unit sends a warning signal. The operator is warned about the quality of the aerosol-generating article and may take some actions for hindering the deterioration of the quality of the aerosol-generating article. The quality of the aerosol-generating article is thus preserved and the waste of the aerosol-generating article reduced.

[0212] Preferably, the detecting unit comprises a further gas sensor to detect the concentration of a volatile substance from a flavourant contained in the aerosol-generating article. It is thus possible to monitor the quality of the aerosol-generating article. It is possible to check if the concentration of the flavourants in the aerosol-generating article is decreased to an undesirable level.

[0213] Preferably, the further gas sensor is arranged in the housing, or in the storing portion, or close to the dispensing aperture.

[0214] Preferably, the detecting unit comprises a plurality of further gas sensors. In this way, a more efficient detection is obtained. Preferably the further gas sensors are arranged in different areas of the housing. By doing so, the general overall condition of aerosol-generating articles in the housing can be more precisely monitored.

[0215] Preferably, each further gas sensor of the plurality of further gas sensors is configured to detect one specific flavourant of the aerosol-generating article. This increases the efficiency of the detection of the flavourants.

[0216] Preferably, the control unit regulates the access to the aerosol-generating article from the dispensing aperture depending on the detected value of concentration of the volatile substance from a flavourant. In this way, aerosol-generating article having a desired content of flavourant are sold.

[0217] Preferably, the control unit activates the further gas sensor when an aerosol-generating article containing a flavourant is selected by the user. The precision of the detection is thus optimised.

[0218] Preferably, the control unit activates the further gas sensor when an aerosol-generating article containing a flavourant is loaded in the dispensing portion. The precision of the detection is thus optimised avoiding that air-born substance present in the housing may affect the detection of the flavourant.

[0219] Preferably, the further gas sensor is located at the dispensing portion. By positioning the further gas sensor at the dispensing portion, the detection of the further gas sensors is not influenced by the flavourants of the

aerosol-generating article in the storing portion. The detection is not therefore influenced by the quality of all the aerosol-generating articles in the storing portion.

[0220] Preferably, the control unit compares the detected value of concentration of the volatile substance from a flavourant contained in the aerosol-generating article with the third threshold of the database.

[0221] Preferably, the control unit blocks the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the volatile substance from a flavourant contained in the aerosol-generating article is below the third threshold. In this way, only aerosol-generating articles containing desired concentration of flavourants are made available to the user.

[0222] Preferably, the control unit activates a moving mechanism for moving in the storage the aerosol-generating article having a quantity of flavourant lower than the third threshold.

[0223] Preferably, if the concentration of the volatile substance from a flavourant contained in the aerosol-generating article is below the third threshold, the control unit operates the dispensing device for dispensing a second aerosol-generating article to the dispensing aperture. The control unit actuates the detecting unit for detecting the concentration of a volatile substance from insect flavourant in the second aerosol-generating article before allowing the access to the second aerosol-generating article.

[0224] Preferably, the vending machine comprises a temperature measuring device for measuring the temperature in the housing. Preferably the vending machine comprises a plurality of temperature measuring devices arranged in different areas of the housing, preferably close to the aerosol-generating articles. This increases the efficiency of the measurement obtained.

[0225] Preferably, the control unit compares the measured temperature value with the corresponding preset range of temperature. Preferably, the control unit issues a warning signal if the measured temperature value is outside the preset range set for temperature.

[0226] Preferably, the control unit sends a warning signal to the operator through the telecommunication module.

[0227] Preferably, the vending machine comprises a humidity measuring device for measuring the humidity of the air in the housing. Preferably, the vending machine comprises a plurality of humidity measuring devices arranged in different areas of the housing for measuring the humidity in different areas of the housing. This increases the efficiency of the measurement obtained.

[0228] Preferably, the humidity measuring device for measuring is arranged close to the aerosol-generating articles. Preferably the control unit compares the measured humidity value with the corresponding preset range of humidity. Preferably, the control unit issues a warning signal if the measured humidity value is outside the respective preset range set for humidity.

[0229] Preferably, the vending machine comprises an

illuminance measuring device for measuring the illuminance in a target surface inside the housing. Preferably, the illuminance measuring device arranged in an area of the housing close to the aerosol-generating articles.

[0230] Preferably, the control unit compares the measured illuminance value with the corresponding preset range of illuminance. Preferably the control unit issues a warning signal if the measured illuminance value is outside the preset range of illuminance.

[0231] Preferably, the control unit sends the warning signal to the operator through the telecommunication module. Preferably, the control unit issues a visual warning. Preferably, the control unit issues an audible warning. Preferably, the control unit sends an e-mail to an operator. Preferably, the control unit sends an SMS to an operator. Preferably, the control unit sends a warning signal to a remotely positioned operator.

[0232] Preferably the control unit sends a warning signal if the measured temperature, or measured humidity, or measured illuminance is outside the preset corresponding range for a preset period of time. In this way the efficiency of the system is increased and it is avoided to consider accidental changes that would not affect the quality of the aerosol-generating article.

[0233] Preferably, the control unit actuates the air conditioning system to move the air inside the housing. By doing so, the temperature or humidity of the air into the housing may be adjusted, optimising the condition in the housing for the aerosol-generating articles.

[0234] Preferably, the control unit activates the ventilation system if the measured value of temperature is outside the predefined range set for temperature.

[0235] Preferably, the control unit activates the air conditioning system if the measured value of temperature is outside the predefined range set for temperature. This avoids that the properties of aerosol-generating articles located in some areas of the housing are impaired.

[0236] Preferably, the control unit activates the ventilation system if the measured value of humidity is outside the predefined range set for humidity.

[0237] Preferably, the control unit activates the air conditioning system if the measured value of humidity is outside the predefined range set for humidity. This avoids that the properties of aerosol-generating articles located in some areas of the housing are diminished.

[0238] Preferably, the control unit activates the ventilation system depending on the detected value of concentration of the at least one air-borne substance.

[0239] Preferably, the control unit activates the ventilation system if the detected value of concentration of the at least one air-borne substance is above the corresponding second threshold.

[0240] Preferably, the control unit activates the air conditioning system depending on the detected value of concentration of the at least one air-borne substance. It is thus possible to adjust the condition in the housing and improving the preservation of the aerosol-generating articles.

[0241] Preferably, the control unit activates the air conditioning system if the detected value of concentration of the at least one air-borne substance is above the corresponding second threshold. This allows to improve the preservation of the aerosol-generating articles.

[0242] Preferably, the control unit detects the concentration of the least one air-borne substance in the air present in the housing when the aerosol-generating articles are not present in the housing. Therefore, the condition of the housing of the vending machine before loading the aerosol-generating articles in the housing are monitored.

[0243] Preferably, the control unit compares the detected value of concentration of the at least one air-borne substance when the aerosol-generating articles are not in the housing with the corresponding initial threshold.

[0244] Preferably, the control unit emits an alarm if the detected concentration of at least one air-borne substance when the aerosol-generating articles are not in the housing is higher than the initial threshold. The operator is thus warned about the condition of the housing.

[0245] Preferably, the control unit adjusts the concentration of the at least one air-borne substance detected when the aerosol-generating articles are in the housing on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing.

[0246] Preferably, the control unit adjusts the value of the first threshold or of the second threshold of the air-borne substance on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing. The efficiency of the system is increased, as it is avoided that the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing affects the regulation through the control unit.

[0247] Preferably, the control unit makes the locking mechanism to block the access to aerosol-generating article from the dispensing aperture till the detecting step is completed.

[0248] Preferably, the control unit is adapted to open or close the shutter on the basis of the comparison between the detected value of concentration and the first or second or third threshold.

[0249] Basing on the result of the comparison, the control unit operates the locking mechanism so as to lock the shutter in the closed position to avoid any access to the dispensing aperture or to unlock the shutter and allowing the access to the dispensing aperture. Preferably, the detecting unit is located within the housing. Owing to this aspect a very reliable detection is obtained.

[0250] The detecting unit may be located outside the housing. An air conduit may be provided for connecting the detecting unit to the housing. The air conduit conducts air from the housing to the detecting unit. Preferably, an air conduit is provided for connecting the gas sensor or the further gas sensor to the housing. Owing to this feature the vending machine is more compact. Additionally,

the detecting unit may be accessed in case of necessity without opening the housing. Thus the condition in the housing are not modified.

[0251] The vending machine preferably comprises a storage in which discarded aerosol-generating articles are stored. The aerosol-generating articles having a too low concentration values of the flavourants or a too high concentration of the volatile substances produces by microbiological activity or hormone or pheromone from an insect are withdrawn from dispensing portion and stored in the storage.

[0252] These products may be removed from the storage during the periodic controls from the operator. This reduce the necessity of more frequent intervention from the operator.

[0253] "Aerosol-generating articles" according to the present invention may be in the form of articles in which a material, such as a tobacco material, is heated to form an aerosol, rather than combusted, and articles in which the aerosol is generated from a material, for example from a tobacco extract, or other nicotine source, without combustion or heating. Aerosol-generating articles according to the invention may be whole, assembled aerosol forming articles or components of aerosol-generating articles that are combined with one or more other components in order to provide an assembled article for producing an aerosol, such as for example, the consumable part of a heated smoking device. The aerosol-generating articles are in the present invention are suitable for producing an aerosol containing nicotine. The aerosol-generating articles as indicated herein are preferably aerosol-generating articles containing tobacco or tobacco extract, or nicotine. The aerosol-generating articles preferably contain nicotine. The aerosol-generating article preferably comprises a pack containing a plurality of the aerosol-generating article.

[0254] Advantageously, the tobacco material or extract in the aerosol-generating articles comprises an aerosol-former. Preferably, the aerosol-former is comprised in amount between about 5 percent and about 30 percent dry weight of the aerosol former.

[0255] Suitable aerosol-formers known in the art and include, but are not limited to: monohydric alcohols like menthol, polyhydric alcohols, such as triethylene glycol, 1,3-butanediol and glycerine; esters of polyhydric alcohols, such as glycerol mono-, di- or triacetate; and aliphatic esters of mono-, di- or polycarboxylic acids, such as dimethyl dodecanedioate and dimethyl tetradecanedioate.

[0256] A "point of sale" according to the present invention indicates a place where an item is offered for purchase and is bought by a user.

[0257] A "vending machine" as used herein denotes an automated machine that provides items to a consumer after consumer has paid for the desired item. The payment is made through an interface portion of the vending machine and can be effected by means for example of cash or credit card. The vending machine may contain

different type of items therein, for example snacks or tobacco containing products.

[0258] A "volatile substance" is defined as a substance that is readily vaporizable at a relatively low temperature. The volatile substances may be vaporized, i.e. transformed into gaseous form, at ambient temperature, about 25-20 Celsius degrees.

[0259] The term of "air-borne substance" as indicated herein denotes a substance which is carried into the air. The air-borne substance may be in gaseous, liquid or solid form.

[0260] A "hormone" as indicated herein denotes a regulatory substance produced in an organism by glands in multicellular organisms. Hormones are produced by many animals. Hormones are transported by the circulatory system to target distant organs. Hormones may have diverse chemical structures mainly belong to three classes: eicosanoids, steroids and amino acid/protein derivatives. Hormone secretion may occur in different tissues and the secreted hormone may be transported through the body in many different ways.

[0261] A "pheromone" is a compound that is secreted or excreted by an organism and that triggers a social response. Pheromones are chemical compounds capable of acting like hormones outside the body of the secreting organism to impact the behavior of the receiving organism. The receiving organism may be an organism of the same specie of the secreting organism.

[0262] A "Threshold" as indicated herein may denote a single value or a numerical range having a desired extent.

[0263] The invention is defined in the claims. However, below there is provided a non-exhaustive list of non-limiting examples. Any one or more of the features of these examples may be combined with any one or more features of another example, embodiment, or aspect described herein.

Example Ex1: A method of dispensing aerosol-generating articles at a point of sale, the method comprising:

- providing a vending machine at the point of sale, the vending machine comprising a housing containing aerosol-generating articles and a dispensing mechanism for dispensing the aerosol-generating articles from the housing through a dispensing aperture;
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile produced by microbiological activity;
 - a hormone or pheromone from an insect;
- regulating access to the aerosol-generating articles from the dispensing aperture depending

on the detected value of concentration of the at least one air-borne substance.

Example Ex2: The method according to Ex1, wherein detecting the concentration of a volatile produced by microbiological activity in the air present in the housing includes detecting the concentration of at least one of the following substances:

- 1-octen-3-ol;
- 1,3-octadiene;
- methyl- 2-ethylhexanoate;
- 2-methylfuran;
- 3-methylfuran;
- 3-methyl-1-butanol;
- 2-methyl-1-butanol;
- 2-heptene;
- Dimethylsulfide;
- 4-heptanone;
- (5H) -furanone;
- 3-heptanol;
- methoxybenzene.

Example Ex3: The method according to Ex1 or Ex2, wherein detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of at least one of the following substances:

- (2S,3R,1'S)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one;
- (2S,3R,1'R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one;
- (2S,3R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6-(1-methyl-2-oxobutyl)-4H-pyran-4-one;
- (4S,6S,7S)-4,6-Dimethyl-7-hydroxynona-3-one;
- (2S,3S)-2,6-Diethyl-3,5-dimethyl-3,4-dihydro-2H-pyran.

Example Ex4: The method according to one or more of the preceding Ex1- Ex3, comprising the steps of:

- providing a database, the database comprising a first threshold for the concentration of the at least one air-borne substance to be detected;
- accessing the database to retrieve the first threshold;
- comparing the detected value of concentration of the at least one air-borne substance with the first threshold for the concentration of the air-borne substance retrieved from the database;
- blocking the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the air-borne substance is above the first threshold.

Example Ex5: The method according to Ex4, com-

prising the steps of:

- providing the database with a second threshold for the concentration of the at least one air-borne substance to be detected; 5
- accessing the database to retrieve the second threshold;
- comparing the detected value of concentration of the at least one air-borne substance with the second threshold for the concentration of the air-borne substance retrieved from the database; 10
- issuing a warning signal if the detected value of concentration is above the second threshold and below the first threshold. 15

Example Ex6: The method according to one or more of the preceding Ex1- Ex5, comprising the steps of:

- measuring at least one of: 20
 - the temperature of the air in the housing;
 - the humidity of the air in the housing;
 - the illuminance in a target surface inside the housing; 25
- comparing the measured value with a corresponding predefined range of temperature, humidity or illuminance respectively;
- issuing a warning signal if the measured value is outside the respective predefined range set for temperature, humidity or illuminance respectively. 30

Example Ex7: The method according to Ex5 or Ex6, wherein the step of issuing a warning signal includes at least one of: 35

- generating a visual warning;
- generating an audible warning;
- sending an e-mail to an operator; 40
- sending an SMS to an operator.

Example Ex8: The method according to one or more of the preceding Ex1 - Ex7, wherein the vending machine comprises one of: 45

- a ventilation system to force air to flow through the housing;
- an air conditioning system adapted to modify the temperature or the humidity of the air inside the housing; 50

and the method comprises the steps of:

- measuring at least one of: 55
 - the temperature of the air in the housing;
 - the humidity of the air in the housing;

- comparing the measured value of temperature or humidity with a corresponding predefined range of temperature or humidity respectively;
- activating the ventilation system or the air conditioning system if the measured value of temperature or humidity is outside the respective predefined range set for temperature or humidity respectively.

Example Ex9: The method according to one or more of the preceding Ex1 - Ex8, wherein the vending machine comprises one of:

- a ventilation system to force air to flow through the housing;
- an air conditioning system adapted to modify the temperature or the humidity of the air inside the housing;

and the method comprises the steps of:

- activating the ventilation system or the air conditioning system depending on the detected value of concentration of the at least one air-borne substance. 25

Example Ex10: The method according to one or more of the Ex1- Ex9, comprising the steps of:

- detecting the concentration of at least one of the following air-borne substance in the air present in the housing: 30
 - a volatile produced by microbiological activity;
 - a hormone or pheromone from an insect; 35

when the aerosol-generating articles are not present in the housing;

- detecting the concentration of at least one of the following air-borne substance in the air present in the housing: 40

- a volatile produced by microbiological activity;
- a hormone or pheromone from an insect;

when the aerosol-generating articles are present in the housing;

- adjusting the concentration of the air-borne substance detected when the aerosol-generating articles are in the housing on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing. 55

Example Ex11: The method according to Ex4 or Ex5, comprising the steps of:

- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile produced by microbiological activity;
 - a hormone or pheromone from an insect;

when the aerosol-generating articles are not present in the housing;

- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile produced by microbiological activity;
 - a hormone or pheromone from an insect;

when the aerosol-generating articles are present in the housing;

- adjusting the value of the first threshold or of the second threshold on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing, before comparing the detected value of concentration of the air-borne substance detected when the aerosol-generating articles are in the housing with the first threshold or with the second threshold.

Example Ex12: The method according to one or more of the preceding Ex1 - Ex 11, wherein the step of detecting the concentration of at least of one of the air-borne-substance in the air present in the housing includes the step of:

- detecting the concentration of at least one of the air-borne-substance in the air present in the housing by means of a gas sensor having a gas chamber;
- circulating air present in the housing towards the gas chamber.

Example Ex13: The method according to Ex13, wherein the step of circulating air towards the gas chamber includes:

- blowing air towards the gas chamber at a given frequency.

Example Ex14: The method according to one or more of the preceding Ex1- Ex13 including:

- blocking the access to aerosol-generating article from the dispensing aperture till the detecting step is completed.

Example Ex15: The method according to one or more of the preceding Ex1 - Ex14, comprising:

- detecting the concentration of a volatile from a flavourant contained in the aerosol-generating article;
- regulating the access to the aerosol-generating article from the dispensing aperture depending on the detected value of concentration of the volatile from a flavourant.

Example Ex16: The method according to Ex15, comprising:

- providing the vending machine with a dispensing portion, the dispensing portion including the dispensing aperture;
- detecting the concentration of a volatile from a flavourant contained in the aerosol-generating article at the dispensing portion.

Example Ex17: Method according to Ex16 or Ex17, comprising the steps of:

- providing a database, the database comprising a third threshold for the concentration of the volatile from a flavourant contained in the aerosol-generating article to be detected;
- accessing the database to retrieve the third threshold;
- comparing the detected value of concentration of the volatile from a flavourant contained in the aerosol-generating article with the third threshold retrieved from the database;
- blocking the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration is below the third threshold.

Example Ex18: Method according to one or more of preceding Ex15 to Ex17, wherein detecting the concentration of a volatile from a flavourant contained in the aerosol-generating article includes detecting the concentration of at least one of:

- Menthol;
- Eugenol.

Example Ex19: A vending machine for vending aerosol-generating articles, comprising:

- a housing for containing aerosol-generating articles to be vended;
- a dispensing aperture defined on the housing

adapted to dispense the aerosol-generating articles;

- a detecting unit adapted to detect the concentration of at least one of the following air-borne substance detect in the air present in the housing:
 - a volatile produced by microbiological activity;
 - a hormone or pheromone from an insect;

and adapted to generate a signal representative of the detected value of concentration of the at least one air-borne substance;

- a database containing a first threshold for the concentration of the air-borne substance;
- a control unit adapted to receive the signal from the detecting unit and to compare the detected value of concentration of the at least one air-borne substance with the first threshold present in the database;
- a dispensing mechanism connected to the control unit, the dispensing mechanism being adapted to control access to the aerosol-generating article through the dispensing aperture on the basis of the comparison performed by the control unit.

Example Ex20: The vending machine according to Ex19, wherein the detecting unit comprises a gas sensor.

Example Ex21: The vending machine according to Ex20, comprising an air circuit to circulate air to the gas sensor.

Example Ex22: The vending machine of Ex 20 or Ex 21 wherein the gas sensor comprises a first gas sensor for detecting a volatile substance produced by microbiological activity and a second gas sensor for detecting a hormone or pheromone from an insect in the housing.

Example Ex23: The vending machine according to one or more of Ex19 to Ex21, comprising a telecommunication module connected to the control unit, wherein the telecommunication module is adapted to send signals relative to the detected value of concentration from the detecting unit to the control unit.

Example Ex24: The vending machine according to one or more of Ex19 to Ex23, comprising a second gas sensor to detect the concentration of a volatile from a flavourant contained in the aerosol-generating article.

Example Ex25: The vending machine according to

one or more of Ex24, comprising a dispensing portion including the dispensing aperture, the second gas sensor being located in the dispensing portion.

Example Ex26: The vending machine according to one or more of Ex19 to Ex25, wherein the detecting unit is located within the housing.

Example Ex27: The vending machine according to Ex20, wherein the detecting unit is located outside the housing and an air conduit connects the gas sensor to the housing.

Example Ex28: The vending machine according to one or more of Ex19 to Ex27 wherein the dispensing aperture comprises a shutter and the control unit is adapted to open or close the shutter on the basis of the comparison.

Examples will now be further described with reference to the Figures in which:

Figure 1 is a schematic perspective view of a vending machine according to the invention;

Figure 2 is a schematic view of the vending machine according to the invention;

[0264] In Figure 1 it is schematically shown a vending machine 1 according to the invention. The vending machine 1 comprises a plurality of walls 3' defining a housing 3 containing a plurality of aerosol-generating article 202. The vending machine 1 comprises detecting unit 30 for detecting the concentration of a volatile produced by microbiological activity or a hormone or pheromone from an insect or a flavourant contained in the aerosol-generating article. The vending machine 1 comprises a control unit 40 for controlling the functioning of the vending machine 1 and for allowing the access to the aerosol-generating article 202.

[0265] The control unit 40 comprises an interface portion 4 defined on a wall 3A of the plurality of walls 3' through which a user may interact with the vending machine 1 for buying an aerosol-generating article 202. The interface portion 4 comprises a selection portion, not indicated in the drawings, for selecting the desired type of aerosol-generating article or the number of articles, a paying interface, not indicated in the drawings, for paying the selected articles.

[0266] The vending machine 1 comprises a storing portion 200 defined inside of the housing 3 and arranged for storing the aerosol-generating articles 202 to be sold. The storing portion 200 comprises a plurality of storing elements, not visible in the drawings, arranged for examples in rows, and intended for storing different type of aerosol-generating articles 202.

[0267] The vending machine 1 further comprises a dispensing mechanism 210 for dispensing a selected aer-

osol-generating article 202 to the dispensing portion 220. The dispensing portion 220 is provided with a dispensing aperture 222 through which the aerosol-generating articles 202 are dispensed from the vending machine 1 and made available to the user. The dispensing aperture 222 is defined on the wall 3A of the housing 3. The dispensing aperture 222 is operatively connected to the control unit 40 for regulating the access to the aerosol-generating article 202. The vending machine 1 further comprises a dispensing mechanism, not visible in the drawings, for dispensing the aerosol-generating article 202 from the housing 3 through the dispensing aperture 222.

[0268] The detecting unit 30 is adapted to detect the concentration of at least one air-born substance in the air present in the housing. The detecting unit 30 is adapted to detect the concentration of a volatile produced by microbiological activity and a hormone or pheromone from an insect and to generate a signal representative of the detected value of concentration. The detecting unit 30 comprises a first gas sensor, not shown in the Figures, arranged for sensing at least one of a volatile produced by microbiological activity and a second gas sensor, not shown in the Figures, arranged for sensing a hormone or pheromone from an insect.

[0269] The first gas sensor is an electronic nose. Preferably, the second gas sensor is the electronic nose developed by Smelldect (<https://smelldect.de/>). This sensor is described in detail in DE102014002077 in the name of KARLSRUHER INST FUR TECHNOLOGIE.

[0270] The second gas sensor may be a gas sensor is the one developed and sold by Sensor Development Corporation, under the trade name ContraMoth® and described in US 2019/0234895.

[0271] The detecting unit 30 further comprises a further gas sensor, not shown in the Figures, arranged to detect the concentration of a volatile from a flavourant contained in the aerosol-generating article. The detecting unit 30 further comprises a humidity sensor for measuring the humidity into the housing 3, a temperature sensor for measuring the temperature inside the housing 3, a illuminance sensor for measuring the illuminance into the housing 3, none of these being shown in the Figures.

[0272] The vending machine further comprises a database 400. The database 400 contains threshold value 410. The threshold value 410 comprises a first threshold and a second threshold for the concentration of each air-born substance detected by the detecting unit 30. The database 400 further comprises a third threshold 403 for the volatile from a flavourant contained in the aerosol-generating article 202.

[0273] The control unit 40 is adapted to receive detected value of concentration from the detecting unit 30. The control unit 40 comprises comparison algorithm for comparing the signal from the detecting unit 30 with the corresponding threshold value in the database 400.

[0274] The control unit 40, basing on the result of the comparison, regulates the access to the aerosol-generating article 202 through the dispensing aperture 222.

[0275] The vending machine 1 further comprises a ventilation system 50 for forcing air into the housing.

[0276] If the detected value of an air-borne substance is higher than the first threshold 410 the control unit 40 blocks the access to the aerosol-generating article 202 locking the closure element of the dispensing aperture 222 and actuates the moving mechanism for moving the aerosol-generating article 202 into a storage 230 in which the blocked aerosol-generating articles are stored.

[0277] If the detected value of an air-borne substance is lower than the first threshold and higher than the second threshold, the control unit 40 activates the ventilation system 50 for forcing the air into the housing 3 and issues a warning signal.

[0278] If the detected value for all the detected air-borne substances is lower than the second threshold, the control unit 40 unlocks the closure element of the dispensing aperture 222 for allowing the access to the aerosol-generating article 202.

Claims

1. A method of dispensing aerosol-generating articles at a point of sale, the method comprising:

- providing a vending machine at the point of sale, the vending machine comprising a housing containing aerosol-generating articles and a dispensing mechanism for dispensing the aerosol-generating articles from the housing through a dispensing aperture;
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile substance produced by microbiological activity;
 - a hormone or pheromone from an insect;
- regulating access to the aerosol-generating articles from the dispensing aperture depending on the detected concentration of the at least one air-born substance.

2. The method according to claim 1, wherein detecting the concentration of a volatile substance produced by microbiological activity in the air present in the housing includes detecting the concentration of one of the following substances:

- 1-octen-3-ol;
- 1,3-octadiene;
- methyl- 2-ethylhexanoate;
- 2-methylfuran;
- 3-methylfuran;
- 3-methyl-1-butanol;
- 2-methyl-1-butanol;

- 2-heptene;
 - Dimethylsulfide;
 - 4-heptanone;
 - (5H) -furanone;
 - 3-heptanol;
 - methoxybenzene.
3. The method according to claim 1 or claim 2, wherein detecting the concentration in the air present in the housing of a hormone or pheromone from an insect includes detecting the concentration of one of the following substances:
- (2S,3R,1'S)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one;
 - (2S,3R,1'R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one;
 - (2S,3R)-2,3-Dihydro-3,5-dimethyl-2-ethyl-6(1-methyl-2-oxobutyl)-4H-pyran-4-one;
 - (4S,6S,7S)-4,6-Dimethyl-7-hydroxynona-3-one;
 - (2S,3S)-2,6-Diethyl-3,5-dimethyl-3,4-dihydro-2H-pyran.
4. The method according to one or more of the preceding claims, comprising the steps of:
- providing a database, the database comprising a first threshold for the concentration of the at least one air-borne substance to be detected;
 - accessing the database to retrieve the first threshold;
 - comparing the detected value of concentration of the air-borne substance with the first threshold for the concentration of the at least one air-borne substance retrieved from the database;
 - blocking the access to aerosol-generating articles from the dispensing aperture if the detected value of concentration of the at least one air-borne substance is above the first threshold.
5. The method according to claim 4, comprising the steps of:
- providing the database with a second threshold for the concentration of the at least one air-borne substance to be detected;
 - accessing the database to retrieve the second threshold;
 - comparing the detected value of concentration of the at least one air-borne substance with the second threshold for the concentration of the at least one air-borne substance retrieved from the database;
 - issuing a warning signal if the detected value of concentration is above the second threshold and below the first threshold.
6. The method according to one or more of the preceding claims, comprising the steps of:
- measuring at least one of:
 - the temperature of the air in the housing;
 - the humidity in the air in the housing;
 - the illuminance in a target surface inside the housing;
 - comparing the measured value with a corresponding predefined range of temperature, humidity or illuminance;
 - issuing a warning signal if the measured value is outside the respective predefined range set for temperature, humidity or illuminance.
7. The method according to one or more of the preceding claims, wherein the vending machine comprises one of:
- a ventilation system to force air to flow through the housing;
 - an air conditioning system adapted to modify the temperature or the humidity of the air inside the housing;
- and the method comprises the steps of:
- measuring at least one of:
 - the temperature of the air in the housing;
 - the humidity in the air in the housing;
 - comparing the measured value of temperature or humidity with a corresponding predefined range of temperature or humidity respectively;
 - activating the ventilation system or the air conditioning system if the measured value of temperature or humidity is outside the respective predefined range set for temperature or humidity respectively.
8. The method according to one or more of the preceding claims, wherein the vending machine comprises one of:
- a ventilation system to force air to flow through the housing;
 - an air conditioning system adapted to modify the temperature or the humidity of the air inside the housing;
- and the method comprises the steps of:
- activating the ventilation system or the air conditioning system depending on the detected concentration of the at least one air-borne sub-

- stance.
9. The method according to one or more of the preceding claims, comprising the steps of:
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile substance produced by micro-biological activity;
 - a hormone or pheromone from an insect;
- when the aerosol-generating articles are not present in the housing;
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile substance produced by micro-biological activity;
 - a hormone or pheromone from an insect;
- when the aerosol-generating articles are present in the housing;
- adjusting the concentration of the at least one air-borne substance detected when the aerosol-generating articles are in the housing on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing.
10. The method according to claim 4 or 5, comprising the steps of:
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile substance produced by micro-biological activity;
 - a hormone or pheromone from an insect;
- when the aerosol-generating articles are not present in the housing;
- detecting the concentration of at least one of the following air-borne substance in the air present in the housing:
 - a volatile substance produced by micro-biological activity;
 - a hormone or pheromone from an insect;
- when the aerosol-generating articles are present in the housing;
- adjusting the value of the first threshold or of the second threshold on the basis of the concentration of the air-borne substance detected when the aerosol-generating articles are not in the housing, before comparing the detected concentration of the at least one air-borne substance detected when the aerosol-generating articles are in the housing with the first threshold or with the second threshold.
11. The method according to one or more of the preceding claims including:
- blocking the access to aerosol-generating article from the dispensing aperture till the detecting step is completed.
12. A vending machine for vending aerosol-generating articles, comprising:
- a housing for containing aerosol-generating articles to be vended;
 - a dispensing aperture connected to the housing adapted to dispense the aerosol-generating articles;
 - a detecting unit adapted to detect the concentration of at least one of the following air-borne substance detect in the air present in the housing:
 - a volatile substance produced by micro-biological activity;
 - a hormone or pheromone from an insect;
- and adapted to generate a signal representative of the detected concentration of the at least one air-borne substance;
- a database containing a first threshold for the concentration of the air-borne substance;
 - a control unit adapted to receive the signal from the detecting unit and to compare the detected concentration of the at least one air-borne substance with the first threshold present in the database;
 - a dispensing mechanism connected to the control unit, the dispensing mechanism being adapted to control access to the aerosol-generating article through the dispensing aperture on the basis of the comparison performed by the control unit.
13. The vending machine according to claim 12, wherein the detecting unit comprises a gas sensor and an air circuit to circulate air to the gas sensor.
14. The vending machine according to claim 12 or 13, wherein the gas sensor comprises a first gas sensor for detecting a volatile substance produced by micro-

biological activity and a second gas sensor for detecting a hormone or pheromone from an insect in the housing.

15. The vending machine according to one or more of claims from 12 to 14, wherein the dispensing aperture comprises a shutter and the control unit is adapted to open or close the shutter on the basis of the comparison.

5

10

15

20

25

30

35

40

45

50

55

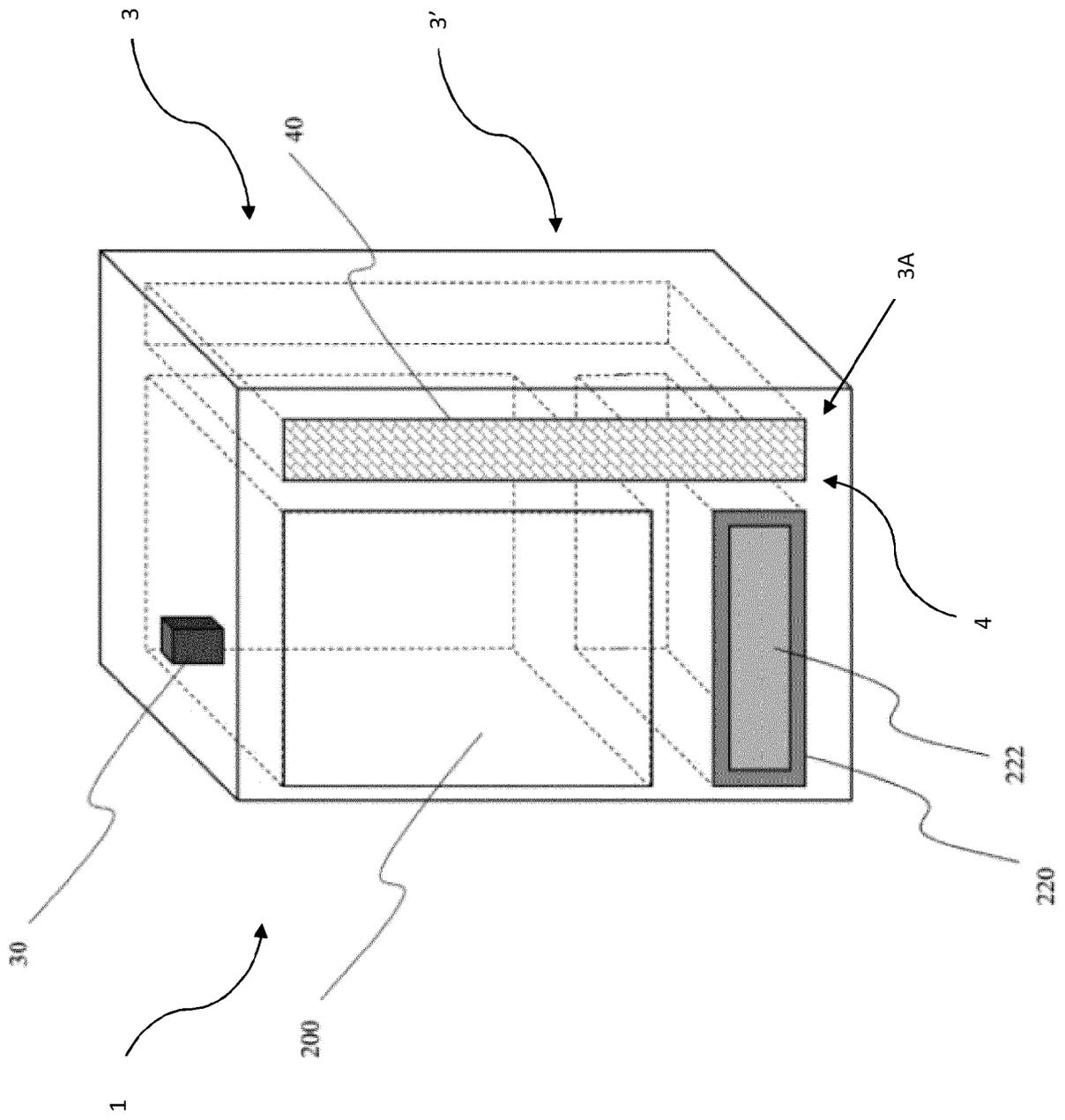


Fig. 1

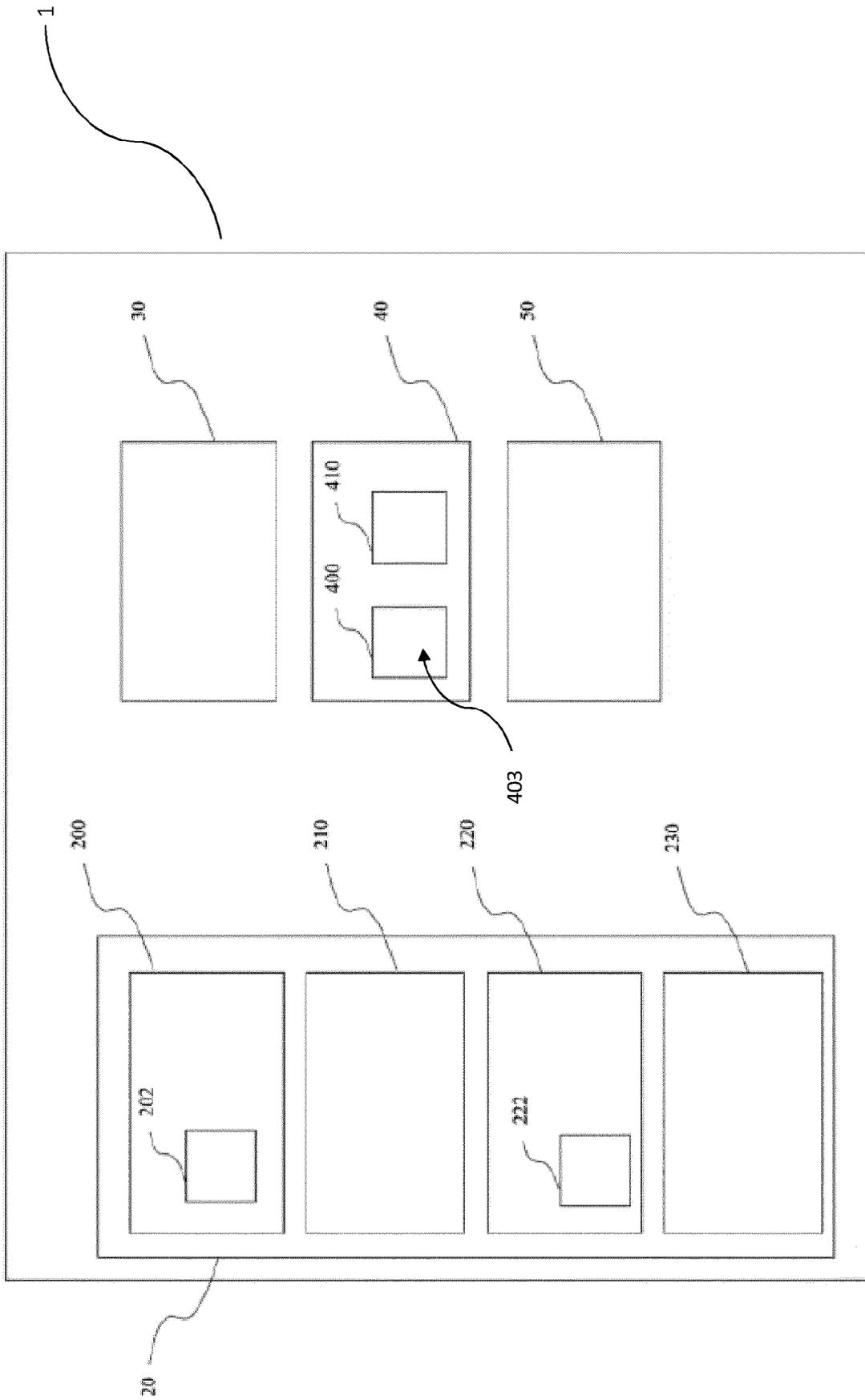


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 20 21 7236

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 107 680 257 A (HEFEI ZHONGCHI TIANXIA NETWORK TECH CO LTD) 9 February 2018 (2018-02-09) * paragraphs [0002], [0004] - [0005], [0007] - [0023], [0028] - [0033], [0042] - [0044], [0048] - [0054] * -----	1-15	INV. G07F9/00 G07F9/02 G07F9/10 G07F11/64
X	US 5 971 205 A (MICHAELS PETER T [US] ET AL) 26 October 1999 (1999-10-26) * column 7, line 51 - line 60 * -----	6-8	
A	WO 2020/087043 A1 (NARULA POONAM [US]) 30 April 2020 (2020-04-30) * the whole document * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			G07F G07G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 June 2021	Examiner Meijs, Koen
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

1
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 21 7236

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

04-06-2021

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	CN 107680257 A	09-02-2018	NONE	
	US 5971205 A	26-10-1999	NONE	
15	WO 2020087043 A1	30-04-2020	NONE	
20				
25				
30				
35				
40				
45				
50				
55				

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

- DE 102014002077 [0197] [0269]
- US 20190234895 A [0198] [0270]