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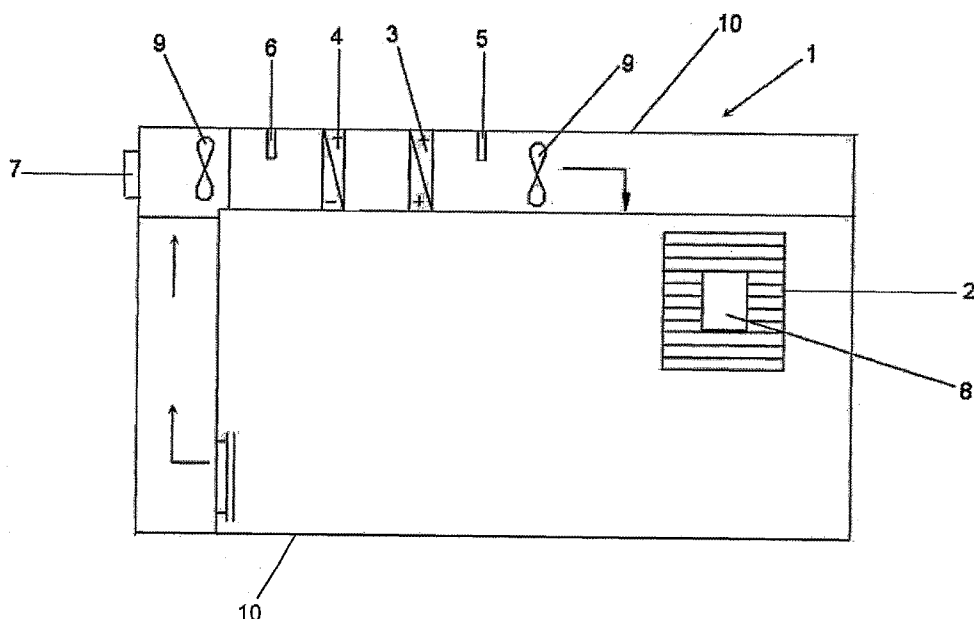
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(54) Title: NOVELTY IN DRYING OVENS



(57) Abstract: The invention relates particularly to the drying ovens (1), which enable the food products such as vegetables, fruit, and cereals, and the wooden products to be dried by removing their moisture content, so that said products may be processed and stored in a hygienic manner. Said drying oven (1) comprises a shelf (2) where the product to be dried (8) is positioned, a heating battery (3) used to heat the drying oven (1), a cooling battery (4) that enables to condense the moisture of the product to be dried (8) and of the air, a thermostat (5) that enables the temperature to be controlled, a moisture content member (6) that allows to control the moisture content, the control panel (7) that determines the direction of the air flow and the air circulation fans (9).

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NOVELTY IN DRYING OVENS

TECHNICAL FIELD

- 5 The invention relates to the drying ovens, which enable the food products such as vegetables, fruit, and cereals, and the wooden products to be dried by removing their moisture content, so that said products may be processed and stored in a hygienic manner.

10 PRIOR ART

- The humidity of the food products such as vegetables, fruits, cereals etc. and wooden products such as wooden, timber are to be dried in order to store them for long time periods without deformation. Because the relative humidity contained in the
15 said food and agricultural products cause mildew.

- Funguses are micro organisms naturally existing in air and soil and frequently seen in agricultural products. Most of food products are exposed to infection of alpha toxins during production, processing, shipment and storing. The most important factors
20 playing a role for fungus in food products and conversion into alpha toxin are relative humid surrounding the food product as well as storing temperature. Optimum temperature for fungus development and micro toxin formation is 25-30 °C and relative humid is 88-95%.

- 25 In the drying ovens used today external air used for drying is blown into the volume where the product is dried. Thus, drying can be provided by use of natural air. If hot air is needed during the processes, the cost is high as well as drying takes long time period. The products dried by use of such process are fragile to infection of fungus and harmful impacts such as dust, dirt, bacteria etc. in the external air. Adding sulfur
30 and saline for food products generally exceeds the acceptable amount.

In the conventional drying performed with hot air, the air blown inside is heated. It is difficult to control the humid level of the air taken from outside, which causes too much energy consumption. Also the dried products are not resistant against harmful

impacts from outside air. Much more energy and time is consumed for performing the said process particularly in high humid level regions.

5 In another drying process, the product to be dried is kept under sunlight and also exposed to wind. Particularly the products dried in open air or under sunlight are exposed to pollutants such as dust, dirt, exhaust emitted from outside. In addition, since drying food products of high humid level takes longer time period, the agents which are dangerous for health when used over the permitted amounts, such as saline, sulfur are used in order to prevent fungus and color changes. The said
10 process aims to improve the color of the products to be dried and enabling their storage for longer time periods without fungus and corruption but it is highly difficult to prevent fungus.

Another drying process is the drying by means of freezing. This process requires
15 high amount of investment and operating cost. In addition, methods such as drying by means of spraying liquid, removal of humid in a vacuumed atmosphere are also applied.

In order to eliminate the disadvantages of all said drying methods, it is needed to
20 develop a drying process drying in shorter time period with less consumption of energy and less cost and preventing exposure to harmful factors such as bacteria, dust, dirt etc. in the outside atmosphere and thus preventing fungus in the products and a drying oven enabling realization of such process are needed.

25 **OBJECT OF THE INVENTION**

From this position of the related art, the purpose of the invention is to bring the humid level contained in the food and agricultural products to the required use or store level in the shortest time period with consumption of the least energy.

30 Another purpose of the invention is to remove the humid from the food and agricultural products without damaging their cell structure, to prevent exposure to alpha toxin and fungus and to provide that food and agricultural products are hygiene.

Another purpose of the invention is to prevent infection of harmful factors such as bacteria, dust, dirt etc. in the outside air to the dried products and enable the dried products to be resistant against harmful factors occurring in the outside atmosphere.

- 5 Another purpose of the invention is to develop a drying process causing less time and energy consumption with less cost when compared to other drying processes, and to develop a drying oven realizing this process.

REFERENCE NUMBERS

10

1. Drying Oven
2. Shelf
3. Heating Battery
4. Cooling Battery
- 15 5. Thermostat
6. Humidity Control Member
7. Control panel
8. The product to be dried
9. Air circulation fans
- 20 10. Wire mesh

BRIEF DESCRIPTION OF THE FIGURES

Figure-1; shows upper view of the invention.

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DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to the drying ovens (1), which enable the food products to be dried (8) such as vegetables, fruit, and cereals, and the wooden products by removing their moisture content, so that said products may be processed and stored in a hygienic manner.

30

In the drying processes, speed of removal of humid is very important. If temperature and steam pressure determining the speed of humid removal are not measured

carefully, the cell structure of the products to be dried (8) can be damaged. The optimum temperature for each product has been specified by various organizations. During the process, the temperature and steam pressure should be adjustable as desired so as to have the end product at the desired standards.

5

The more the temperature increases the more the steam pressure increases. When the product to be dried (8) is heated, the water molecules contained therein are mixed into the air or gas in the ambient atmosphere. Vaporization from the surface of the product to be dried (8) into the ambient is realized until the humid rate of the ambient air or gas reaches the saturation rate.

10

The rate of temperature increase in drying atmosphere is highly important. Prompt increase of temperature of the product to be dried (8) leads to formation of a resistance layer on the surface of the product to be dried and the said layer prevents the vaporization from surface towards ambience and changes the cellular structure of the internal parts. For that reason, the heat provided for increasing internal steam pressure of the product to be dried (8) should be controlled as per the product to be dried (8).

15

Figure 1 shows the drying oven (1) developed under this present invention. The product to be dried (8) is located on the shelves (2) of the drying oven (1) either in desired cut form or as a whole through the conveyor.

20

In order to dry the product to be dried (8) in any enclosed volume, a gas, preferably air is needed to provide current around the product to be dried (8) is needed. The mutual air circulations provided by means of the air circulation fans (9) shown in Figure 1 is passed over the product to be dried (8). Drying oven (1) has been wrapped with wire mesh (10) in order to protect air circulation fans (9). The heating battery (3) located in the drying oven (1) heats the environment and the circulated air provides removal of the humidity in the product to be dried (8). The humidity removed from the product to be dried (8) is condensed by means of cooling battery (4) and discharged from the system. In order to obtain an end product removed of humidity in desired rate as a result of the drying process, the steam pressure of atmosphere

25

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where circulation is performed should be less than the steam pressure of the product to be dried (8).

5 The conditions in the drying oven (1) are controlled with thermostat (5), humidity control member (6) and a control panel (7) used to determine the air circulation direction. In order to prevent any failures causing damage to the end product, the process is controlled by means of memories of all phases digitally.

10 The temperature control performed with thermostat (5) prevents formation of a waterproof layer preventing vaporization of moisture contained in the product to be dried (8). In addition, the temperature control is also made to prevent vaporization of required fats causing odor to the end product.

15 The condensation is controlled with humidity control member (6) in order to prevent removal of the humidity that can be transferred from internal part of the product to be dried (8) to the surface more than the allowed capacity and to protect homogenous cellular structure.

20 With controlling the humidity rate by means of humidity control member (6) and passing the fixed air circulation through ambient atmosphere the humidity contained in the product to be dried (8) is condensed, removed and thus directed outside. Condensed water is obtained as side-product of the process.

25 Heating can be provided by means of heating, hot water, thermal power, electricity and solar energy. Since the locations through which air passes have cooling battery (4), condensation is provided. If ambient temperature is lower than 15 °C, cooling is provided by use of outside air with help of cooling battery (4) and air circulation fans (9).

30 Analogue and digital control of dehydration process provides control of entire process and digital data store of the process enables working on critical points of the process.

Air circulation is controlled by UV rays against any infection risk that may exist inside and can conduct ozone sterilization before operation of the system. Thus, it enables the end product a hygienic product appropriate for man consumption.

- 5 The internal air re-circulated inside the insulated drying oven (1) only consumes energy for vaporization of the humidity in the desired rate. The said drying oven (1) converts the ordinary drying process into constant drying process regardless of humidity content of the atmospheric air and accelerates it.
- 10 The protection scope of this patent application has been specified under the claims and can never be limited to the descriptions provided for sampling. It is obvious that any person skilled in the related art may suggest the innovation claimed under this invention by use of similar embodiments and/or may apply this embodiment to other arts used for similar purposes in the related art. Therefore, it is obvious that such
- 15 embodiments will lack innovation and particularly exceeding the background of the related art.

CLAIMS

1. A drying oven (1), which enables the food products such as vegetables, fruit, and cereals, and the wooden products to be dried by removing their moisture content consisting of at least one shelf (2) where the product to be dried (8) is located, so that said products may be processed and stored in a hygienic manner, wherein it comprises at least one air circulation fan (9) used to remove the moisture in the product to be dried (8) in desired rate and keeping the steam pressure of the internal air under steam pressure of the product to be dried (8) by means of providing air circulation over the product to be dried (8).
2. A drying oven (1) according to claim 1 wherein it comprises at least one heating battery (3) for removal of moisture of internal air and heating of the drying oven (1).
3. A drying oven (1) according to claim 1 wherein it comprises at least one cooling battery (4) providing condensation of the moisture of the product to be dried (8) and of the internal air.
4. A drying oven (1) according to claim 1 wherein it comprises at least one thermostat (5) providing control of the temperature.
5. A drying oven (1) according to claim 1 wherein it comprises at least one humidity control member (6) providing control of moisture rate.
6. A drying oven (1) according to claim 1 wherein it comprises at least one control panel (7) determining the direction of the internal air circulation.

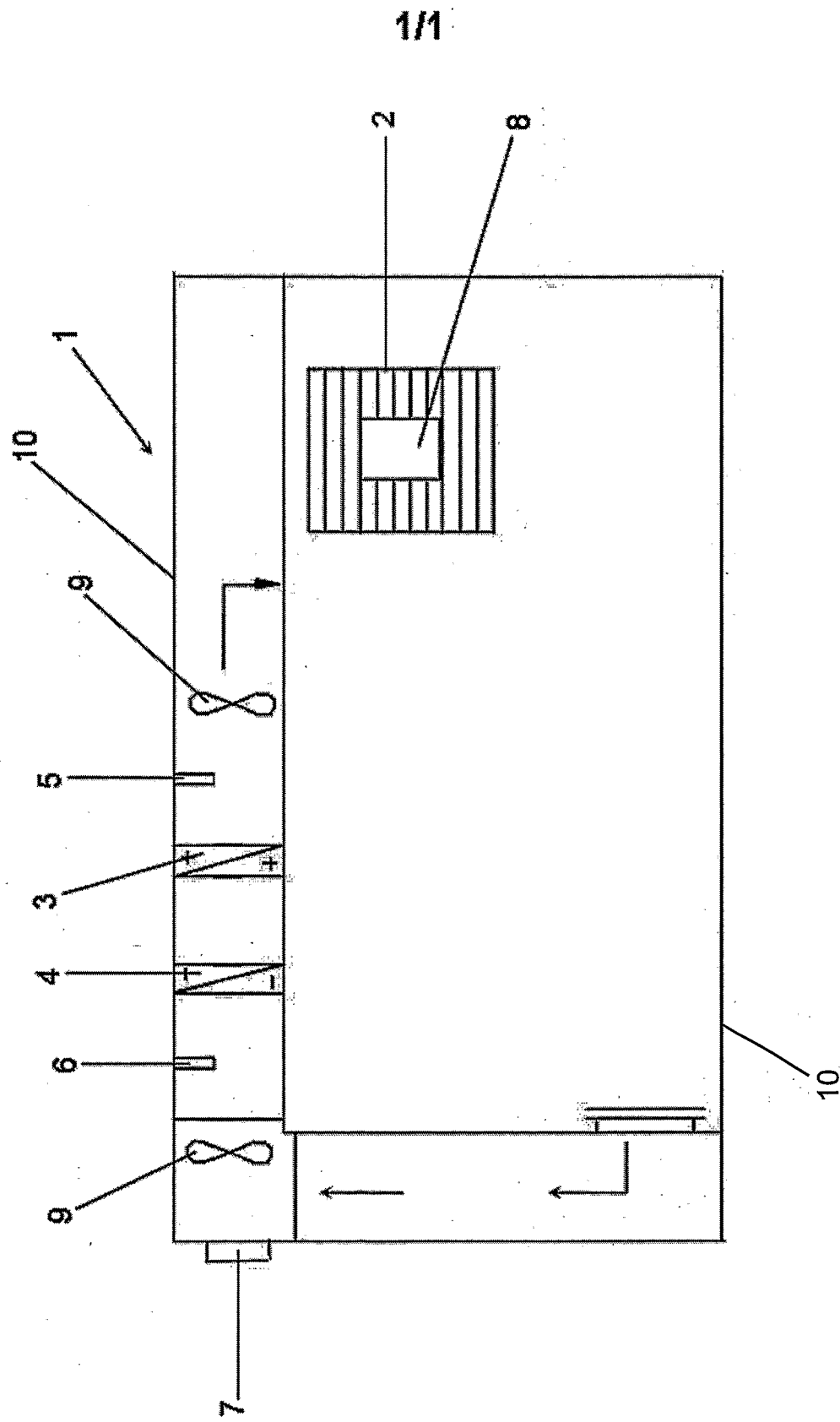


Figure 1