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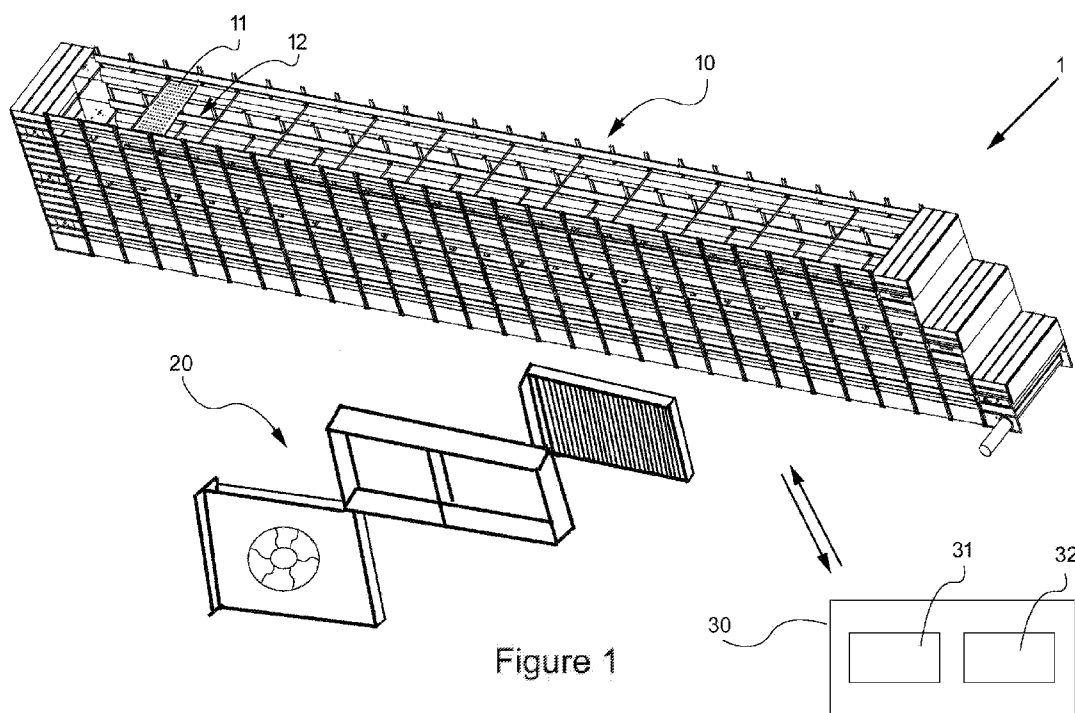


Figure 1

(57) Abstract: The present invention relates to a fertilizer drying system (1) having at least one drying furnace (10) wherein humid fertilizer is provided and at least one air transfer unit (20) which transfers air to the drying furnace (10) in order to decrease humidity proportion on the humid fertilizer of the poultry and in order to dry the humid fertilizer.

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FERTILIZER DRYING SYSTEM AND THE PROCESS THEREOF

5 TECHNICAL FIELD

The present invention relates to a fertilizer drying system having at least one drying furnace where humid fertilizer is provided and at least one air transfer unit which transfers air to the drying furnace, in order to decrease humidity proportion on the humid fertilizer of the poultry
10 and in order to dry the humid fertilizer.

PRIOR ART

Usage of humid fertilizer of poultry seriously pollutes the environment because of reasons
15 like bacteria production, decaying, dirty smell, emission of nitrogen and ammonium. Therefore, drying of fertilizers of poultry in an efficient manner has an important place for making use of fertilizers without damaging the environment. Chicken companies make various studies for drying fertilizers with the desired proportion.

20 Drying process is essentially realized by means of separators, pool system, tunnel-band systems, vertical furnaces and horizontal furnaces. Separators are one of the mostly used drying systems in Turkey, however, their capacity is low and efficiency can only be obtained in summer conditions.

25 In another drying system, driers, having pans, are essentially set up near chicken-houses. In summer, the air, heated by the animal in the chicken-house, is applied onto the drier and the fertilizers are dried in this manner. In winter, fan is operated sufficiently for providing oxygen taking of animals inside the chicken-house for preventing decrease of the heat of the animals. Therefore, the fertilizer cannot be dried by means of transferring the air, existing inside the
30 chicken-house, onto the drier. Moreover, in case the fans inside the chicken-house are placed in an irregular manner, air transfer to the drier becomes a difficult process. One of the disadvantages of this system is that the system shall be provided near each chicken-house.

As a result, because of all of the abovementioned problems, an improvement is required in
35 the related technical field.

BRIEF DESCRIPTION OF THE INVENTION

The present invention relates to a fertilizer drying system and a fertilizer drying process, for eliminating the above mentioned disadvantages and for bringing new advantages to the related technical field.

An object of the present invention is to provide a fertilizer drying system and a fertilizer drying process which function both at hot and cold weather conditions and of which the drying efficiency is increased in order to provide drying of the humid fertilizer of the poultry.

Another object of the present invention is to provide a fertilizer drying system and a fertilizer drying process where there remains no need to separately dry the humid fertilizer, existing in chicken-houses, in each chicken-house.

In order to realize all of the abovementioned objects and the objects which are to be deducted from the detailed description below, the present invention is a fertilizer drying system having at least one drying furnace wherein humid fertilizer is provided and at least one air transfer unit which transfers air to the drying furnace in order to decrease humidity proportion on the humid fertilizer of the poultry and in order to dry the humid fertilizer.

Accordingly, said improvement comprises at least one drying tray provided in the drying furnace and whereon the humid fertilizer is laid; the air transfer unit comprises at least one high pressure fan provided in the vicinity of the drying furnace and which pressurizes the outer medium air and which blows said air onto the humid fertilizer existing on the drying tray; at least one radiator which can move between a first position where the air, blown by the high pressure fan, is prevented from directly reaching the fertilizer and where said air heats the medium and a second position where the pressurized air is permitted to directly reach the fertilizer.

In a preferred embodiment of the present invention, pluralities of drying trays are provided horizontally one above the other at specific intervals inside the drying furnace.

In a preferred embodiment of the present invention, on the drying tray, pluralities of holes are provided with size where fertilizer cannot be poured from.

In a preferred embodiment of the present invention, at least one casing is provided which has a guide mechanism in a manner positioning on the ceiling and on the base and whereon the radiator and the high-pressure fan are positioned.

In another preferred embodiment of the present invention, the air transfer unit is provided in the vicinity of the drying furnace in the width part.

In another preferred embodiment of the present invention, at least one temperature sensor is provided which measures the air temperature in the outer medium, in the air transfer unit and in the drying furnace; and at least one humidity sensor is provided which measures the humidity in the air transfer unit and in the drying furnace outlet; and a control unit which controls operation of high pressure fan according to the temperature and humidity values obtained and which controls flow rate of water sent to the radiator.

The present invention is moreover a fertilizer drying process where air is transferred to at least one drying furnace by means of at least one air transfer unit in order to decrease humidity proportion on the humid fertilizer of the poultry and in order to dry the humid fertilizer. Accordingly, said improvement comprises the steps of: a) laying the humid fertilizer onto at least one drying tray provided in the drying furnace; b) pressurizing the outer medium air by means of at least one high pressure fan provided in the vicinity of the drying furnace and blowing said air onto the humid fertilizer existing on the drying tray and c) in case the outer medium air is not at a temperature which is sufficient for drying the humid fertilizer, moving at least one radiator to a first position from a second position where the pressurized air is permitted to reach the fertilizer directly and preventing the air, blown by the high pressure fan, from reaching the fertilizer directly and heating the air and transferring the heated air to the humid fertilizer.

In another preferred embodiment of the present invention, before step (a), the step of transferring the humid fertilizer from chicken-houses to one or more than one drying furnace provided side by side mutually.

In another preferred embodiment of the present invention, the following steps are provided: measuring air temperature in the outer medium, in the air transfer unit and in the drying furnace by means of at least one temperature sensor of a control unit; measuring the humidity at the outlet of the drying furnace and in the air transfer unit of at least one humidity sensor; controlling operation of high pressure fan according to the temperature and humidity values obtained by the control unit and controlling the water flow rate sent to the radiator.

In another preferred embodiment of the present invention, the radiator is heated with hot water.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a representative general view of the subject matter fertilizer drying system.

5 Figure 2 is a view of drying trays provided in the fertilizer drying system.

Figure 3 is a representative view of the air transfer unit.

REFERENCE NUMBERS

10

1 Fertilizer drying system

10 Drying furnace

11 Drying tray

15

111 Hole

12 Drying area

20 Air transfer unit

21 Casing

20

211 Guide mechanism

212 Side wall

22 High pressure fan

23 Radiator

25

30 Control unit

31 Temperature sensor

32 Humidity sensor

DETAILED DESCRIPTION OF THE INVENTION

30

In this detailed description, the subject matter fertilizer drying system (1) and process are explained with references to examples without forming any restrictive effect only in order to make the subject more understandable.

35

With reference to Figure 1, the fertilizer drying system (1) has at least one drying furnace (10) wherein the fertilizer is positioned and at least one air transfer unit (20) provided in the vicinity of the drying furnace (10). Inside the drying furnace (10), at least one drying tray (11)

is provided horizontally. Pluralities of drying trays (11) are provided one above the other horizontally at specific intervals and multi-layer drying areas (12) are formed. With reference to Figure 2, holes (111) are provided on the drying trays (11) at specific intervals. The holes (111) have a size where the fertilizer does not pour out. The drying furnace (10) is embodied in a cage-like form. The regions of the drying furnace (10) and the drying trays (11) which contact the fertilizer are made of material which is resistant to corrosion. The drying furnaces (10) are positioned at a separate region from the chicken-houses and at a central area where humid fertilizer can be carried from the chicken-houses. In other words, one or pluralities of drying furnaces (10) are provided for the humid fertilizers collected from all chicken-houses. Pluralities of drying furnaces (10) can be positioned side by side.

With reference to Figure 3, the air transfer unit (20) has at least one casing (21), a radiator (23) placed to the casing (21) and a high-pressure fan (22). A guide mechanism (211) is provided on the ceiling and the base of the casing (21). The radiator (23) moves inside the casing (21) in the guide mechanism (211). There is a first position where the radiator (23) rests onto a side wall (212) of the casing (21) and where the radiator (23) and the high pressure fan (22) arrive at a position in a manner facing each other. In other words, the radiator (23) is provided between the high-pressure fan (22) and the drying furnace (10). Moreover, there is a second position where the radiator (23) rests onto the other side wall (212) of the casing (21) and where the radiator (23) opens the front of the high pressure fan (22). Pluralities of air transfer units (20) are placed to the vicinity of the drying furnace (10) at specific intervals. The air transfer units (20) are provided in the vicinity of the width part of the drying furnaces (10).

The fertilizer drying system (1) moreover has a control unit (30). The control unit (30) comprises at least one temperature sensor (31) and at least one humidity sensor (32). The temperature sensors (31) measure the air temperature of the outer medium, the temperature in the air transfer unit (20) and the temperatures in the drying furnace (10). The humidity sensors (32) measure the humidity in the air transfer unit (20) and the humidity in the drying furnace outlet. The control unit (30) controls the elements of the fertilizer drying system (1) in accordance with the data received from the temperature sensors (31) and the humidity sensors (32) and makes the required adjustments.

The operation of the fertilizer drying system (1) and the fertilizer drying process of which the details are given above is realized as follows. First of all, the humid fertilizers of the poultry are carried from the chicken-houses to the drying furnace (10). The humid fertilizer carried to the drying furnace (10) is transferred onto the drying trays (11). For a homogeneous drying,

the humid fertilizer shall be distributed onto the drying trays (11) in a homogeneous manner. The fertilizer drying process is based on the principle that the outer medium air is transferred onto the humid fertilizer, positioned on the drying trays (11), by means of high pressure fans (22). There are some differences between the operation process of the fertilizer drying system (1) in hot air in summer and spring seasons and the operation process of the fertilizer drying system (1) in cold air in winter season. In more details, in cold air in winter season, in other words, in temperatures which are not sufficient for drying the humid fertilizer, the cold air in the outer medium is heated in the radiator (23) provided in the first position and the high pressure fans (22) transfer the air, heated meanwhile, to the humid fertilizer existing on the drying trays (11). The radiator (23) is heated with hot water. In the preferred application, the temperature of water is provided between 75 and 85 C. In accordance with the values obtained from the measurements made by the temperature sensors (31) and the humidity sensors (32), the control unit (30) makes the required adjustments and it controls the operation of the high pressure fan (22) and the water flow rate sent to the radiator (23). Thus, the temperature of air arriving at the humid fertilizer is adjusted and thus, the humidity in the final form of the dried fertilizer is adjusted.

In hot weathers which will be sufficient for drying the humid fertilizer with sufficient proportion in summer and in spring seasons, the hot air in the outer medium passes through the high pressure fans (22) provided in the vicinity of the drying furnace (10) and it reaches high pressure and it is directly blown onto the drying tray (11). The radiator (23) is provided at the second position in hot weather conditions and the unnecessary decrease of pressure of air coming from the high pressure fans (22) already in a hot manner is prevented. Thus, decrease of energy efficiency is prevented. The holes (111) provided on the drying furnaces (11) facilitates passage of hot air through the drying furnaces (11) inside the drying furnace (10) and provides homogeneous distribution thereof. Moreover, since pluralities of air transfer units are provided at specific intervals in the vicinity of the drying furnace (10), hot air is transferred to the drying furnaces (10) in a homogeneous manner.

The poultry fertilizer, transferred from the chicken-house to the drying furnaces (10) so as to have humidity between 70-80%, has humidity between approximately 30-40% at the end of the fertilizer drying process described above. Thus, this fertilizer can be used in various fields without giving any damage to the environment. Since the fertilizer drying system (1) is positioned centrally in an independent manner from the chicken-houses, there remains no need to reserve place for the drying furnaces (10) in the vicinity of each chicken-house. Moreover, the disadvantages of realizing drying with the air in chicken-house can be avoided.

The protection scope of the present invention is set forth in the annexed claims and cannot be restricted to the illustrative disclosures given above, under the detailed description. It is because a person skilled in the relevant art can obviously produce similar embodiments under the light of the foregoing disclosures, without departing from the main principles of the present invention.

CLAIMS

1. A fertilizer drying system (1) having at least one drying furnace (10) wherein humid
fertilizer is provided and at least one air transfer unit (20) which transfers air to the
drying furnace (10) in order to decrease humidity proportion on the humid fertilizer of
the poultry and in order to dry the humid fertilizer, **characterized** by comprising at
least one drying tray (11) provided in the drying furnace (10) and whereon the humid
fertilizer is laid;
the air transfer unit (20) comprises at least one high pressure fan (22) provided in the
vicinity of the drying furnace (10) and which pressurizes the outer medium air and
which blows said air onto the humid fertilizer existing on the drying tray (11); at least
one radiator (23) which can move between a first position where the air, blown by the
high pressure fan (22), is prevented from directly reaching the fertilizer and where
said air heats the medium and a second position where the pressurized air is
permitted to directly reach the fertilizer.
2. A fertilizer drying system according to claim 1, wherein pluralities of drying trays (11)
are provided horizontally one above the other at specific intervals inside the drying
furnace (10).
3. A fertilizer drying system according to claim 1, wherein on the drying tray (11),
pluralities of holes (111) are provided with size where fertilizer cannot be poured from.
4. A fertilizer drying system according to claim 1, wherein at least one casing (21) is
provided which has a guide mechanism (211) in a manner positioning on the ceiling
and on the base and whereon the radiator (23) and the high-pressure fan (22) are
positioned.
5. A fertilizer drying system according to claim 1, wherein the air transfer unit (20) is
provided in the vicinity of the drying furnace (10) in the width part.
6. A fertilizer drying system according to claim 1, wherein at least one temperature
sensor (31) is provided which measures the air temperature in the outer medium, in
the air transfer unit (20) and in the drying furnace (10); and at least one humidity
sensor (32) is provided which measures the humidity in the air transfer unit (20) and
in the drying furnace outlet; and a control unit (30) which controls operation of high

pressure fan (22) according to the temperature and humidity values obtained and which controls flow rate of water sent to the radiator (23).

- 5 7. A fertilizer drying process where air is transferred to at least one drying furnace (10) by means of at least one air transfer unit (20) in order to decrease humidity proportion on the humid fertilizer of the poultry and in order to dry the humid fertilizer; **characterized** by comprising the steps of: a) laying the humid fertilizer onto at least one drying tray (11) provided in the drying furnace (10); b) pressurizing the outer medium air by means of at least one high pressure fan (22) provided in the vicinity of
- 10 the drying furnace (10) and blowing said air onto the humid fertilizer existing on the drying tray (11) and c) in case the outer medium air is not at a temperature which is sufficient for drying the humid fertilizer, moving at least one radiator (23) to a first position from a second position where the pressurized air is permitted to reach the fertilizer directly and preventing the air, blown by the high pressure fan (22), from
- 15 reaching the fertilizer directly and heating the air and transferring the heated air to the humid fertilizer.
8. A fertilizer drying process according to claim 7, wherein before step (a), the step of transferring the humid fertilizer from chicken-houses to one or more than one drying
- 20 furnace (10) provided side by side mutually.
9. A fertilizer drying process according to claim 7, wherein the following steps are provided: measuring air temperature in the outer medium, in the air transfer unit (20) and in the drying furnace (10) by means of at least one temperature sensor (31) of a
- 25 control unit (30); measuring the humidity at the outlet of the drying furnace (10) and in the air transfer unit (20) of at least one humidity sensor (32); controlling operation of high pressure fan (22) according to the temperature and humidity values obtained by the control unit (30) and controlling the water flow rate sent to the radiator (23).
- 30 10. A fertilizer drying process according to claim 7, wherein the radiator (23) is heated with hot water.

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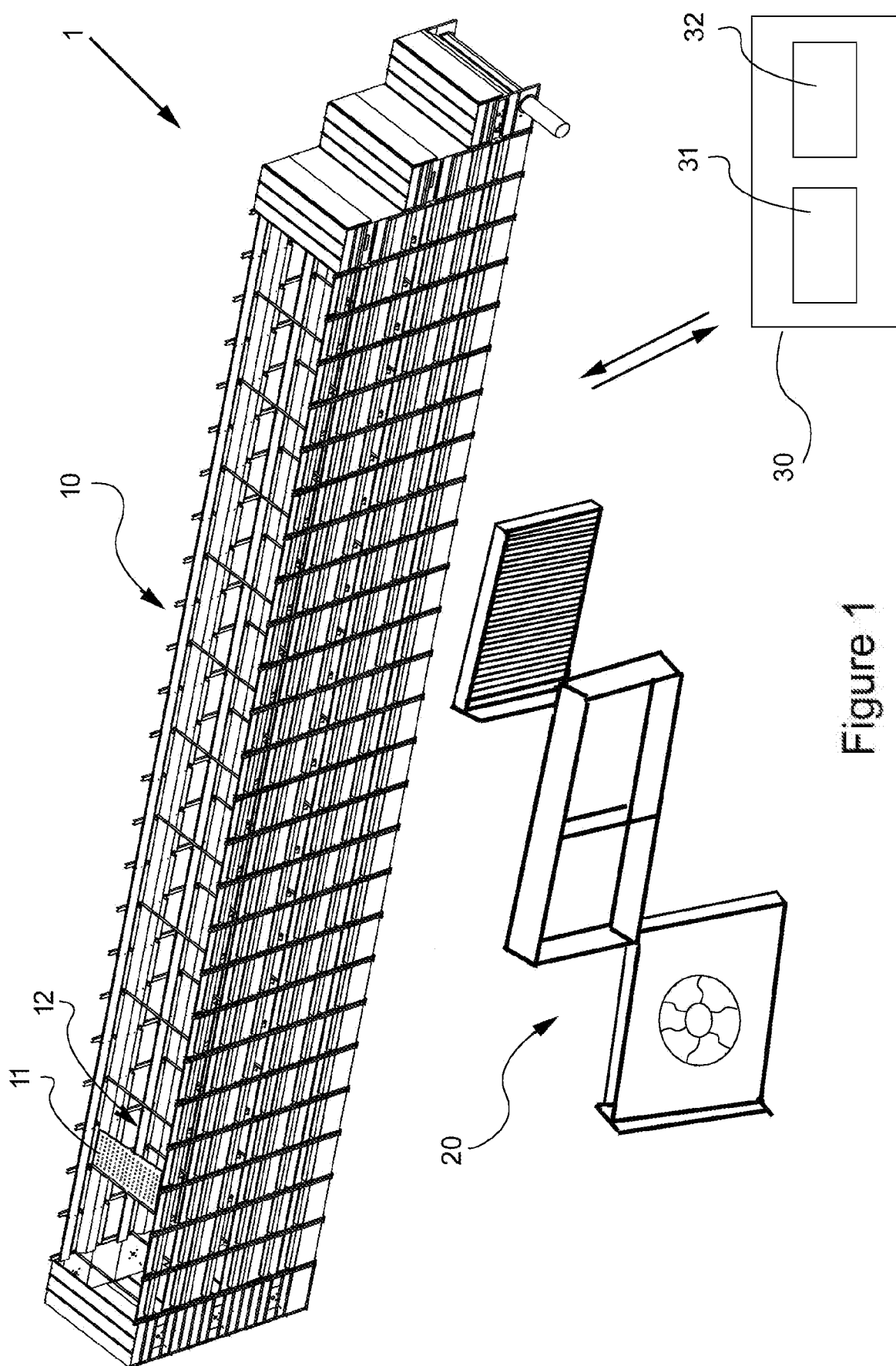


Figure 1

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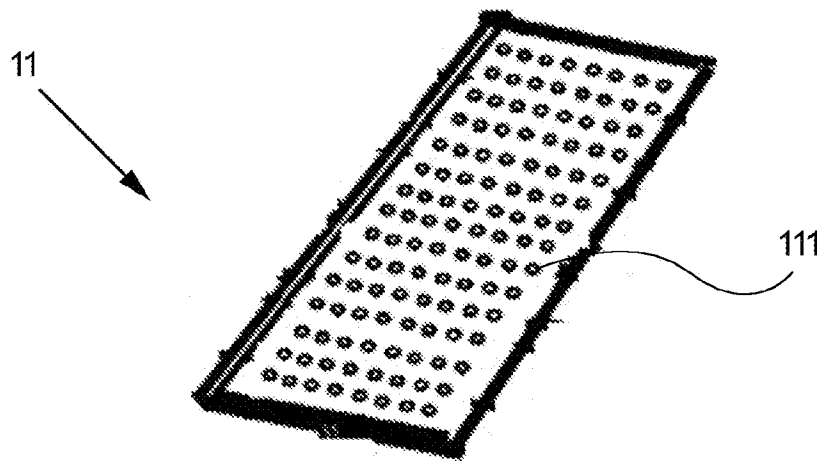


Figure 2

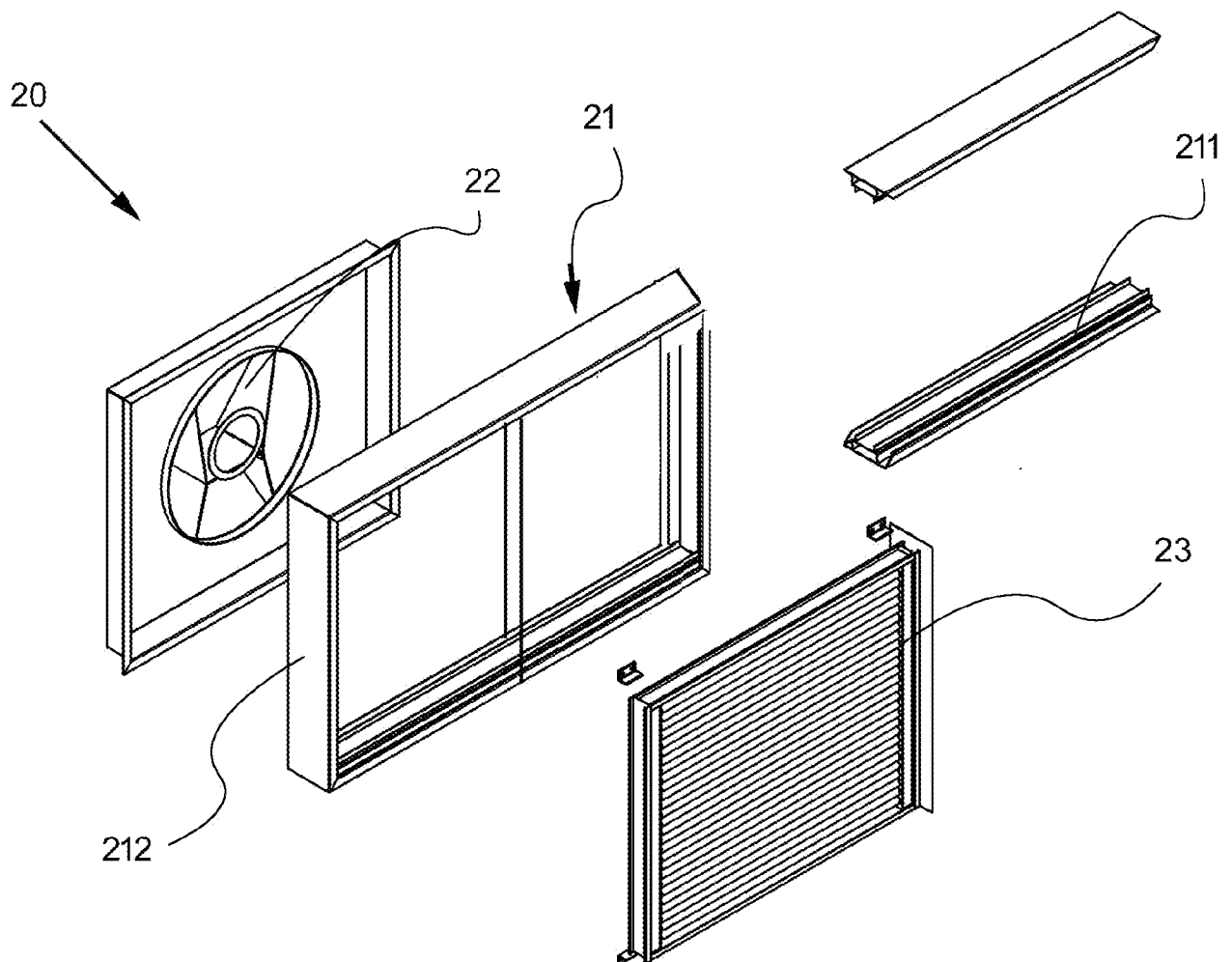


Figure 3