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(54) Insulated container, particularly for powders.

(57) Insulated container, particularly for feeding powders to a spray coating apparatus, including a box (1) containing the powder and having border walls (2), a bottom (3) and a cover (4), which are insulated to mantain a set temperature inside said box; means (5,6,7,7a) for injecting previously conditioned air into the box, and injected air having a flow rate sufficient to replace the entire volume of the box several times per hour; vent means (9) to exhaust said air to the outside of said box.

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INSULATED CONTAINER, PARTICULARLY FOR POWDERS

The present invention relates to an insulated feeder-container, particularly for powders used for spray coating articles, provided with means for thermally and hygrometrically conditioning the powder.

It is known that the powders used for spray coating articles are normally constituted by synthetic resins, enamels, organic compounds and others with particular characteristics, which all require to be kept in thermically and hygrometrically controlled containers, in order to prevent any defect during pneumatic feeding to the coating apparatuses.

These powders are now kept in containers and fluidified, vibrated or continuosly stirred by means of various types of electropneumatic devices.

The aim of these systems is obviously that of preventing the powder from forming clots or from separating into its various conponents, of different characteristics, shapes and specific weight, which would create problems during feeding to the coating apparatuses.

In practice, the most commonly used method is that of suspending the powders by means of a fluidized bed, fed by compressed air and by other dehydrated air sources, to prevent humidity from entering the container.

In certain cases, for particular powders, it is necessary to keep the container, or sometimes the entire coating apparatus, in a thermically controlled room with a disproportionately high energy consumption since it is necessary to condition a very large volume to thermically control a small volume.

To overcome these incoveniences, it has been suggested to separately inject thermally controlled conpressed air and steam in the container; this practice though was found to be industrially unacceptable because the powder is deteriorated by direct contact with the steam and it is impossible to obtain a reliable reading from the hygrothermal probe; moreover, being the container thermically conductive, it is phisically impossible to achieve the intended aim.

The aim of the present invention is to provide a feeder-container, for powders used for coating, structured so as to constantly control the temperature and humidity of the powder, thus preventing all the inconveniences of the containers of the known art.

Within this aim, an object of the invention is to provide a highly reliable feeder container adapted to hygrothermally control all the types of powders industrially used for coating articles, such as enameling powders, low temperature melting powders, powders which can be contaminated by bacteria if not kept at suitable hygrothermal conditions and others of particular chemical and physical characteristics.

Not a least object is that of providing a very compact and vibration free container such as to give the best quality and reliability to the conditioning process.

The above aim, as well as these and other objects that will be more apparent later, are achieved by an insulated container, particularly for feeding powders to a spray coating apparatus, characterized in that it comprises:
a box having border walls, a bottom and a cover, said walls, bottom and cover being insulated to mantain a set temperature inside said box, said powder being contained in said box, means for injecting previously conditioned air into said box, said air having a flow rate sufficient to replace the entire volume of said box several times per hour, vent means to exhaust said air to the outside of said box.

Further characteristics and advantages of the invention will be more apparent by the following description of an embodiment of the invention, illustrated, by way of example in the enclosed drawings in which:

Fig.1 is an aside section view of a container according to the invention;

Fig. 2 is an isometric view of a container mounted on a base together with a compressed air conditioning assembly.

With particular reference to figure 1, a prismatic box or container 1 has border walls 2, a bottom 3 and a cover 4 made of a thermally insulating material (and possibly provided with inner conduits for a thermostatic fluid), such as to ensure a high resistance to heat pumping by conduction.

The structure and the insulating materials of the container are designed to keep a constant internal temperature, much lower or higher than the external temperature, i.e. to create an environment for a powder 15, thermically isolated relatively to the external environment.

Inside the container 1, a porous separators structure 5 is disposed such as to form a cavity 6 with the bottom 3 and to support the powder 15.

Thermically controlled compressed air is sent to the cavity 6 by means of conduits 7-7a; through the porous separators structure 5 the compressed air forms a fluidized bed that suspends the powder.

The flow rate of the compressed air is selected such as to replace the air volume of the container several times per hour, in order to ensure the best

performance.

A powder suction device 8 is provided above the container 1; the suction device is substantially a venturi tube that feeds the powder to the coating apparatus.

The container is furthermore provided with an air vent device 9 having a powder blocking filter.

In case, besides controlling the temperature, it is necessary to control the humidity of the powder inside the container, according to the invention the injected compressed air is also hygrometrically controlled.

To this purpose the inlet conduit of the thermoregulated air is provided with a hygrometric probe 10 adapted to control the hygrometric state of the injected air relatively to the desired humidity values.

In order to provide a hygrothermically controlled apparatus with a compact structure, since the hygrothermal status is controlled by conditioning the injected compressed air feeding the fluidized bed, both the container 1 and the compressed air conditioning assembly 12 are mounted on one base 11.

This structure ensures a greater quality and efficiency of operation and allows the temperature and humidity transducers linked to the probe, to be directly mounted on the outlet conduit of the conditioning assembly 12.

With particular reference to figure 2, the operation of the feeder-container is as follows:
ambient air, i.e. unconditioned air, enters the conditioning assembly 12 through inlet 13 by means of a compressor or of a fan (not illustrated); the conditioning assembly takes the inlet air to the selected hygrothermal conditions controlling them by means of the probe 10; the conditioned air flows into the cavity 6 and, through the porous separators structure 5, into the container 1, keeping in contact with the powder 15 until it flows out through the vent 9.

The container according to the invention may have numerous modifications and variations, all within the inventive concept; furthermore, all the details may be substituted with technically equivalent elements.

The materials employed, as well as the dimensions, may be any according to the specific needs and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Insulated container, particularly for feeding powders to a spray coating apparatus, characterized in that it comprises:
a box (1) having border walls (2), a bottom (3) and a cover (4), said walls, bottom and cover being insulated to mantain a set temperature inside said box, said powder being contained in said box,
means (5,6,7,7a) for injecting previously conditioned air into said box, said air having a flow rate sufficient to replace the entire volume of said box several times per hour, vent means (9) to exhaust said air to the outside of said box.

2. Container, according to claim 1, characterized in that said means for injecting air comprises a porous separators structure (5) disposed such as to form a cavity (6)with said bottom (3)and adapted to support the powder.

3. Container, according to claim 1 or 2, characterized in that said means for injecting air further comprises conduits (7,7a) connected to said cavity (6).

4. Container, according to one or more of the preceeding claims, characterized in that said means for injecting air further comprises a compressed air conditioning assembly (12).

5. Container, according to one or more of the preceeding claims, characterized in that said box (1) is mounted on one base (11) together with said compressed air conditioning assembly (12).

6. Container, according to one or more of the preceeding claims, characterized in that at least one of said inlet conduits (7a) of the injected air is provided with a hygrometric probe (10) adapted to control the hygrometric state of the injected air.

7. Container, according to one or more of the preceeding claims, characterized in that it comprises a powder suction device (8) connected to said box (1), said suction device being adapted to feed said powder to said coating apparatus.

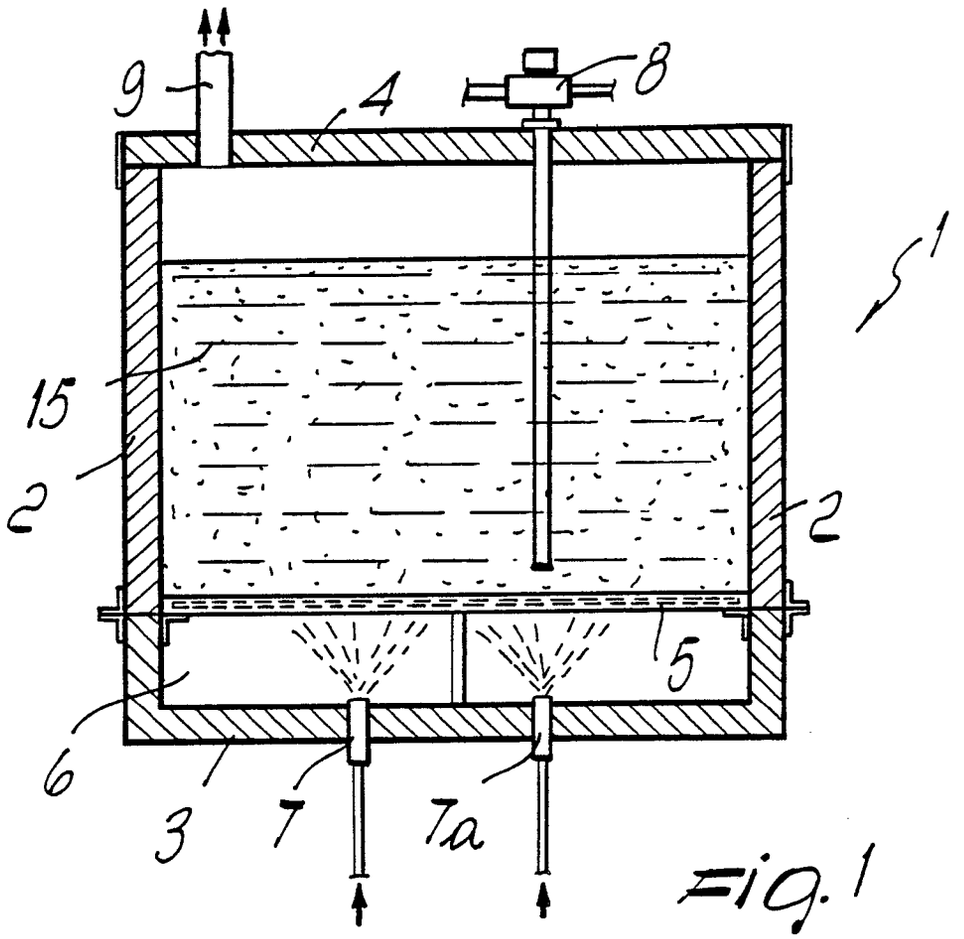

Fig. 1

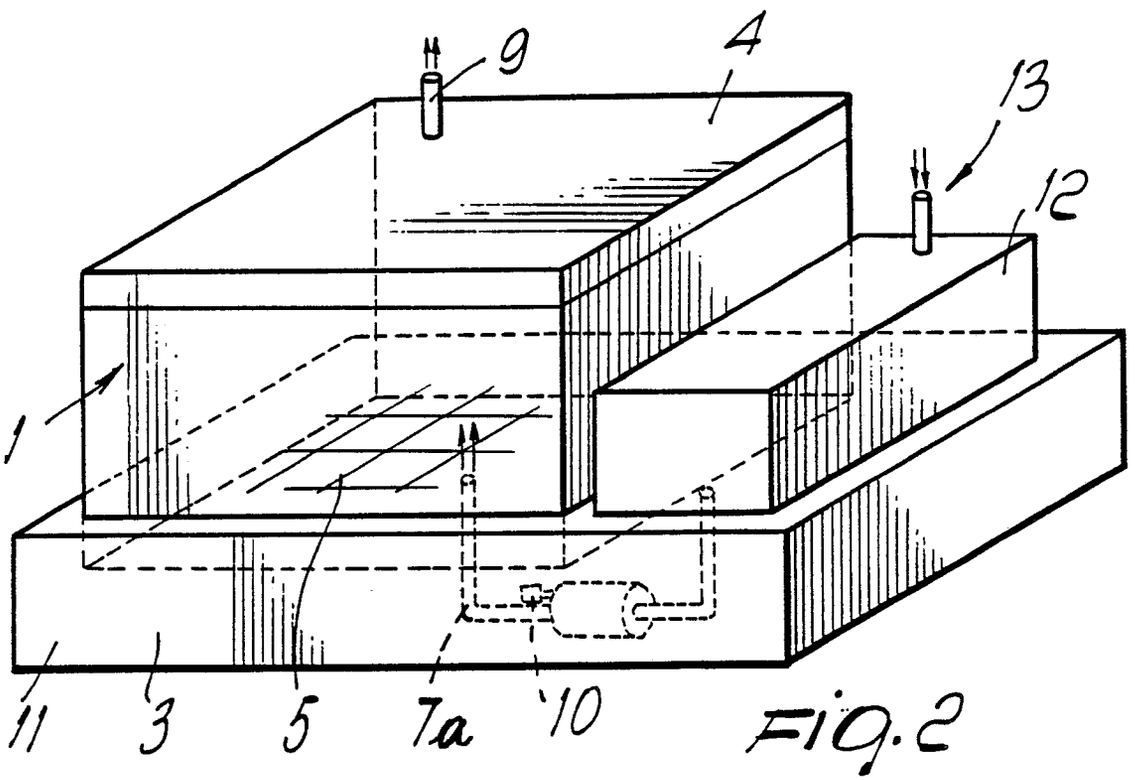

Fig. 2