United States Patent [19]

Fabre

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[45] **Dec. 10, 1974**

[54] **METHOD OF COATING ARTICLES WITH ELECTROSTATICALLY CHARGED PARTICLES**

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[52] **U.S. Cl.** ..... **117/17**, 98/115 SP, 117/19, 117/21, 117/102 A, 117/DIG. 6, 118/309, 118/634

[51] **Int. Cl.** **B05b 5/02**, B44d 1/095

[58] **Field of Search** ..... 117/17, 18, 19, 102 A, 117/DIG. 6, 21; 118/309, 634; 98/115 SP

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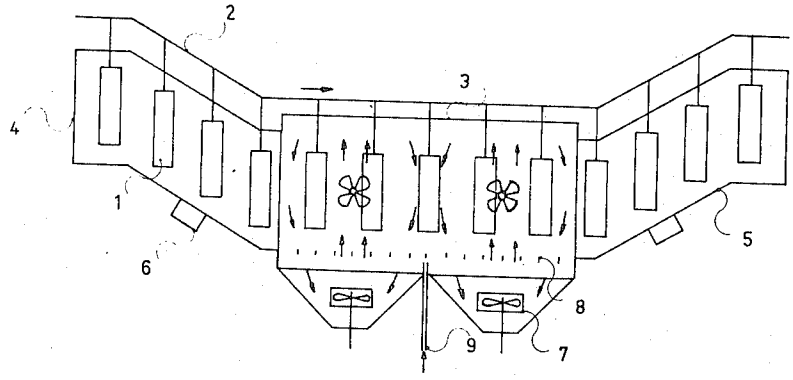
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[57] **ABSTRACT**

A method of coating articles with electrostatically charged particles by passing said articles through a chamber while supplying the chamber with solid organic particles as rapidly as the particles leave the chamber on said articles, while maintaining an inert gaseous atmosphere within the chamber, using means within the chamber to fluidize said particles, and then melting the particles deposited upon the articles.

4 Claims, 2 Drawing Figures



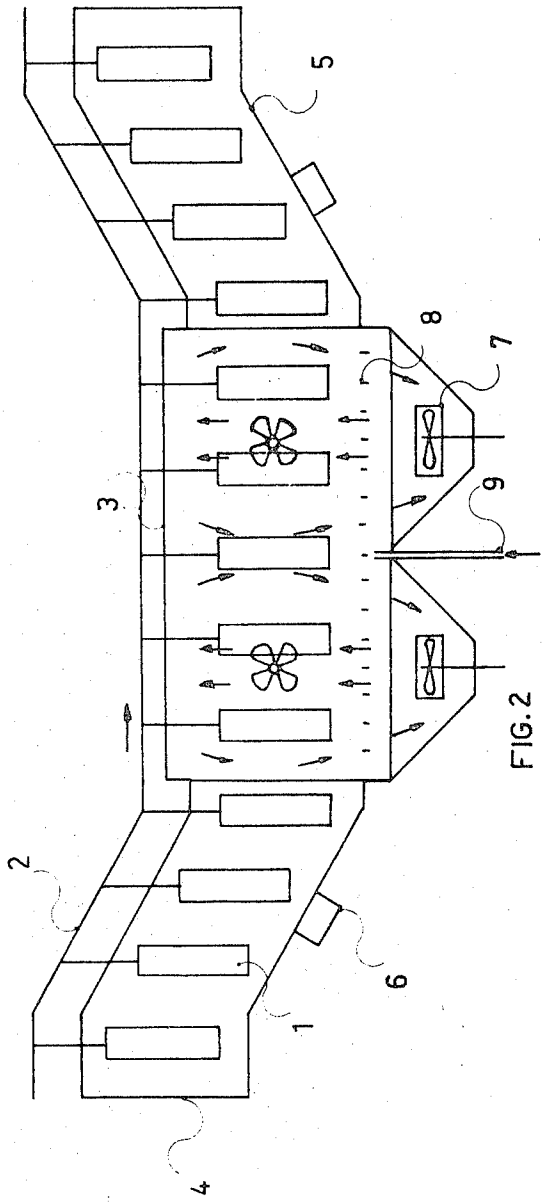


FIG.1

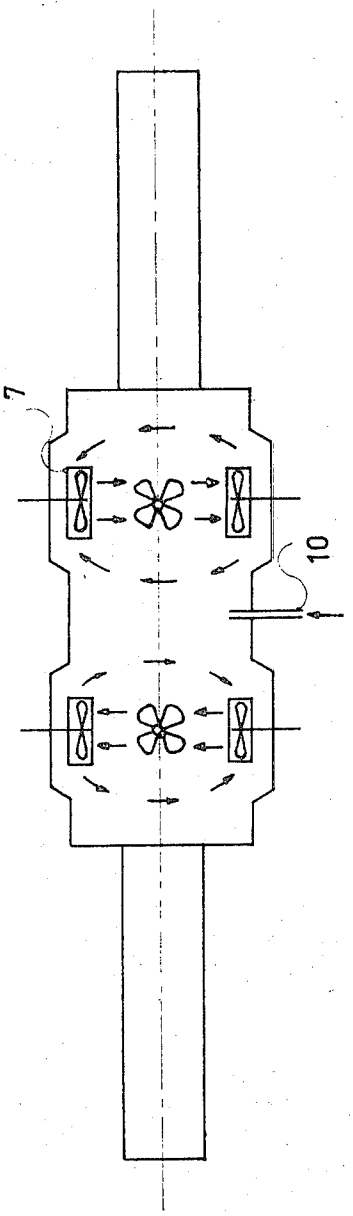


FIG.2

METHOD OF COATING ARTICLES WITH ELECTROSTATICALLY CHARGED PARTICLES

The present invention relates to a method and a device for electrostatic powdering, intended for the coating of objects, of the kind in which a layer of powder is deposited on the objects to be coated and this layer is then melted by baking so as to form a relatively thin coating layer.

The known devices of this kind are derived from electrostatic painting processes. The powder is brought in by a current of air up to a projection nozzle which is brought up to a high voltage, and projected in the direction of the object to be coated, this latter being generally connected to earth. Automatic installations utilize a number of projection nozzles located on each side of the object to be coated and all the nozzles and the object to be coated are located in a powdering cabin.

Devices of this kind have certain disadvantages. A first disadvantage is the necessity of providing a recovery and re-cycling device for the unused powder. In fact, in spite of the electrostatic attraction forces, a large portion of this powder is not used for coating the object and falls into the bottom of the cabin. This unused powder must be recovered and re-cycled in order to obtain an acceptable production cost. For this purpose, powder-recovery devices are employed which comprise a cyclone, one or a number of filters, and a re-injection device.

With the rates of flow of powder necessary in present-day industrial installations, it becomes necessary to build powder-recovery devices of this kind which have enormous dimensions. On the other hand, experience shows that the recovered and re-cycled powder is soiled by the air employed in the recovery system, so that this does not give a coating of the same colour as the original powder. The use of air filters in the recovery of powder must be excluded as being much too costly.

A second disadvantage is the danger of explosion existing in such powdering cabins, in the event of accidental sparks. The powders employed are organic powders and when they come into contact with the oxygen of the air, a spark readily starts and explosive chain reaction. Now, if the average concentration of powder is held, according to safety standards, at a value definitely below the threshold of an explosive concentration, this is not always the case for the local concentration, in the vicinity of one of the projection nozzles, for example.

A last disadvantage of the present automatic installations is the complexity of these latter, due to the compulsory use of a number of projection nozzles, which necessitates either a number of separate powder-distributing tanks or one or a number of powder-distributing tanks, each provided with a plurality of outlets.

The method according to the invention makes it possible to avoid the disadvantages referred to above, and to obtain a coating of objects by electrostatic powdering, utilizing an installation which is simple, of moderate cost and acceptable dimensions, and free from any danger of explosion.

The invention is characterized in that the electrostatic powdering is effected in a chamber containing an atmosphere constituted, at least in part, by an inert gas, the powder being continuously stirred in such manner as to form a turbulent cloud in the said chamber, and being injected into the said chamber in such manner as to be wholly used, the quantity of powder passing out per minute from the said chamber to the objects to be coated being equal to that which is injected during the same period of time.

The characteristic features and advantages of the invention will further be brought out in the description which follows below, given by way of example, reference being made to the accompanying drawings which show diagrammatically an electrostatic powdering cabin according to the invention.

In the drawings:

FIG. 1 is a diagrammatic side view of the powdering cabin;

FIG. 2 is a diagrammatic plan view of the cabin shown in FIG. 1.

The objects 1 to be treated pass along a conveyor 2 into and out of the electrostatic powdering cabin 3, by an entry lock-chamber 4 and an outlet lock-chamber 5. Each of the entry and outlet lock-chambers 4 and 5 comprises a bottom formed by an inclined plane which can be set into vibration by means of a vibrating device 6.

The central part of the cabin 3 itself comprises fans 7, ionizing points or wires connected to a high-tension electric generator (not shown), an inlet 9 for inert gas and an inlet 10 for the conveyor gas-powder mixture. The operation of this device is as follows:

By the intake of inert gas 9, for example nitrogen, the cabin 3 is maintained under a partly inert atmosphere at a slight over-pressure. The powder injected in a variable manner through the inlet 10 is charged by the ionizing wires or points 8, and is precipitated on to the objects to be coated, by the electrostatic field created between the points 8 connected to the high tension and the objects 1 connected to earth through the intermediary of the conveyor 3. The fans 7 create a continuous cloud of powder in the cabin and thus prevent the accumulation of powder in the bottom of this latter. The vibrating devices 6 enable the powder which would fall into the bottom of the inlet and outlet lock-chambers 5, 6 to fall towards the central portion of the cabin. The injection of powder through the inlet 10 is effected by means of the conveyor gas which may preferably have the same constitution as the inert gas injected at 9.

By way of a simplified alternative form, it is possible in this case to eliminate the gas inlet 9, the inert gas reaching the cabin through the powder inlet 10. In this case, before the installation is put into service, care will be taken to inject into the cabin a sufficient quantity of inert gas only through the inlet 10. The thickness of powder deposited on the objects depends on the concentration of powder in the cabin, on the value of the high tension, and on the speed of travel of the objects. The powder is wholly utilized, the quantity of powder passing out of the cabin per minute on to the coated objects being equal to that injected into the cabin. The presence of the inert atmosphere removes all danger of explosion. The single inlet of powder is sufficient to ensure the complete covering of the objects.

After covering, the objects are passed in a conventional manner into an oven which melts the layer of powder deposited.

The installation forming the subject of the present invention may be utilized as an industrial installation for the coating of objects of all kinds by the electrostatic

powdering method.

What I claim is:

1. A method of coating articles with electrostatically charged particles comprising the steps of

maintaining an inert gaseous atmosphere within a chamber, said atmosphere being under a pressure at least as great as the ambient atmospheric pressure,

introducing solid organic particles into said chamber,

forming a suspension of said particles within said chamber by continuously circulating and agitating said gaseous atmosphere and said particles,

electrostatically charging said particles in said suspension,

passing articles through said chamber,

depositing said charged particles upon said articles to form a layer of charged particles on said articles,

withdrawing said particle-coated articles from said chamber while supplying additional solid organic particles to said chamber at a rate equal to that at which the coated articles leave said chamber, and

heating the particle-coated articles to melt said particle layer to form a thin continuous coating on said articles.

2. A method as claimed in claim 1 comprising the further step of introducing said articles into said chamber and removing them from said chamber through locks designed to inhibit the escape of gas-borne particles from said chamber.

3. A method as claimed in claim 1 in which said chamber is maintained at a pressure greater than the ambient atmospheric pressure.

4. A method as claimed in claim 1 which further comprises the steps of providing a plurality of spaced electrically charged points in said chamber for electrostatically charging said particles and maintaining said articles in electrical contact with an oppositely charged conductor as they pass through said chamber.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,853,581 Dated December 10, 1974

Inventor(s) PIERRE FABRE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[30] Foreign Application Priority Data

June 14, 1971 France . . . 71/21953

Signed and sealed this 15th day of April 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

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