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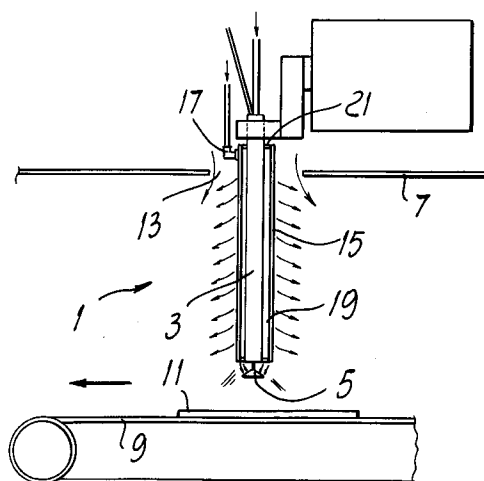
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I-20121 Milano(IT)(54) **Device for applying electrostatically charged powders for the spray-coating of objects.**

(57) The device includes an electrostatic gun which is essentially constituted by a first tubular body (3) contained in a second outer tubular body (15) made of a material which is porous with regard to air. The interspace (19) defined between the first body and the second outer body is kept at a pressure higher than the ambient pressure, so as to prevent powder from depositing on the outer body.

*Fig. 1***EP 0 498 155 A1**

The present invention relates to a device for applying electrostatically charged powders for the spray-coating of objects.

The electrostatic application of products in powder form on various manufactured items is known; said products in powder form can be enamels or resins for painting, or food products such as sugar, flour, etc.

According to this type of method, the powder contained in a feeder is drawn by pumps, usually of the Venturi-tube type operated by compressed air, and is sent to the guns by means of flexible plastic tubes.

The guns expel the powder onto the items, simultaneously charging the particles with an electrostatic field generated by one or more high-voltage electrodes (30-100 kV) located in the terminal portion of the gun or inside it.

Since the dust thus charged has high resistivity, it clings to the items until subsequent treatment.

The items are generally suspended from an overhead conveyor and enter a containment chamber, or booth, where the application process occurs; the booth is kept at a negative pressure by an aspiration system so that dangerous concentrations are not reached.

Not all the powder ejected by the guns deposits on the items being treated, and the part which does not deposit, known as "overspray", must be recycled, sieved and mixed with fresh powder.

Said overspray furthermore remains in suspension in the spray booth, with the problem that it deposits on the walls or on devices such as guns, robot arms etc., and occasionally on items which must then be rejected, at the quality control.

This occurs mostly in facilities in which the items, due to their particular treatment process, cannot be suspended and are conveyed horizontally, for example in the painting of continuous metal plates (coils) or of flat metal plate portions (blanks), such as the side panels of refrigerators, or in the glazing of tiles.

In such facilities, the items, which must be coated only on one side, are placed on the conveyor belt and, inside the booth, are located below the guns instead of laterally thereto, so that the powder deposited on the guns, nozzles and any robot arms falls onto said items.

This problem, which already occurs in facilities in which the items are suspended from an overhead conveyor, becomes particularly severe in the case of facilities in which the items are placed on a conveyor belt.

Various nozzle cleaning systems have been proposed, but they do not solve the problem because, although the terminal part of the gun is clean, the powder in any case clings to the body

and supports of the gun and, by accumulating after a certain time, falls in chunks onto the items, which must therefore be rejected.

The aim of the present invention is to overcome the disadvantages of the known art by providing a device for applying products in powder form which prevents said powder from accumulating on the gun body.

Within the scope of this aim, an object of the invention is to provide a device which is simple from the constructive point of view and can be adapted to the various types of gun.

This aim, this object and others which will become apparent hereinafter are achieved by a device for applying electrostatically charged powders for the spray-coating of objects, comprising at least one first tubular body which has a first end for the inflow of the powder and a second end for the outflow of the electrostatically charged powder, characterized in that it comprises a second tubular body which is porous to air and contains said first tubular body, an interspace being defined between said first body, and said second body, said interspace being kept at a pressure higher than the ambient pressure in order to prevent said powder from depositing on the outer surface of said second body.

Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic sectional lateral elevation view of the device according to the invention;

Figure 2 is a view, similar to the preceding one, of a device according to another aspect of the invention;

Figure 3 is another view, similar to Figure 1, of a device according to a third aspect of the invention;

Figure 4 is a lateral elevation view of a device according to a further aspect of the invention; and

Figure 5 is an enlarged sectional view of the device of Figure 4.

With reference to the above figures, the device according to the invention, generally designated by the reference numeral 1, comprises a first body 3 which, in the case illustrated in Figure 1, constitutes the actual electrostatic gun and substantially comprises a nozzle, provided with ionization electrodes 5, from which the electrostatically charged powder escapes in a per se known manner.

The gun 3 is normally at least partially contained within a booth 7; the conveyor belt 9, on which the item 11 to be sprayed is arranged,

advances inside said booth. In the case illustrated in Figure 1, the gun 3 partially protrudes outside the booth through the opening 13.

According to the invention, the first body 3 is contained in a second tubular body 15 which is made of a material which is porous with regard to air and has a lower base which is open at the nozzle and at the electrodes 5 in order to allow the powder to escape.

The upper base 21 of the second body 15 is instead located outside the booth 7 and closes around the first body 3; an inflow duct 17 is connected to the second body 15 at the upper base and is suitable for feeding compressed air to the interspace 19 defined between the first body 3 and the second body 15.

The inflow duct 17 is advantageously connected to adapted electric valves so as to feed compressed air to the interspace 19, in a continuous or programmed manner, until the internal pressure reaches such a value as to exceed the resistance of the porous walls of the body 15, so as to create a uniform air current, indicated by the arrows in the drawings, which prevents the powder from clinging to the entire outer surface of the body 15.

Figure 2 is a view of a device 101 which is fully similar to the preceding one, except for the fact that the first body 3, which corresponds to the actual electrostatic gun in this case as well, is completely inside the booth 7 and is connected to an extension support or duct 103 which protrudes from the opening 13 of the booth. In this case, the upper base 21 of the second body 15 closes around the support 103 but is in any case outside the booth 7.

The construction of device 101 is necessary when, for example, the length of the gun body is not sufficient to allow the unit to protrude outside the booth.

Figure 3 is a view of another embodiment of the invention, wherein the device 201 substantially comprises a gun body 3 which is external to the booth 7 and is connected to a first body constituted by an extension 203. Accordingly, the second body 15 contains the extension 203 but, in a manner fully similar to what has been described above, the upper base is in any case located outside the booth 7 and is located at the connection to the gun body.

Figures 4 and 5 are views of a device 301 according to another aspect of the invention, wherein the second body 15 contains the first body 3, constituted by the actual gun; the device 301 can in any case be executed by means of guns of the types shown in Figures 2 and 3.

The device 301 comprises a lower base 203 which has an annular chamber 25 connected to the outside by means of small holes 27 directed to-

ward the nozzle and the electrodes 5.

A second inflow duct 29, which passes in the interspace 19, conveys compressed air to the annular chamber 25 so that pulses of compressed air clean the region of the nozzle and of the electrodes 5 through the holes 27.

In practice it has been observed that the invention achieves the intended aim and objects by providing a completely self-cleaning device which can prevent the powder from depositing on the gun body.

The device according to the invention is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with technically equivalent elements.

The materials employed, as well as the dimensions, may naturally be any according to the requirements and to 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. Device for applying electrostatically charged powders for the spray-coating of objects, comprising at least one first tubular body (3) which has a first end for the inflow of the powder and a second end for the outflow of the electrostatically charged powder, characterized in that it comprises a second tubular body (15) which is porous to air and contains said first tubular body, an interspace (19) being defined between said first body and said second body, said interspace being kept at a pressure higher than the ambient pressure in order to prevent said powder from depositing on the outer surface of said second body.
2. Device according to claim 1, characterized in that said spray-coating occurs inside a containment chamber (7), said first body being arranged at least partially inside said containment chamber, said second body extending outside said containment chamber.
3. Device according to claim 1 or 2, characterized in that it comprises at least one compressed-air inflow tube (17) connected to said interspace in order to generate said pressure higher than the ambient pressure, said at least one tube being connected to said interspace in a

region of said body which is located outside said chamber.

4. Device according to one or more of the preceding claims, characterized in that said first body substantially comprises the electrostatic gun body suitable for electrostatically charging said powder. 5
5. Device according to one or more of the preceding claims, characterized in that said first body comprises said electrostatic gun body and at least part of an extension member (203) which connects said gun body to means for feeding said powder. 10 15
6. Device according to one or more of the preceding claims, characterized in that said first body comprises said extension element, said electrostatic gun body being external to said second body. 20

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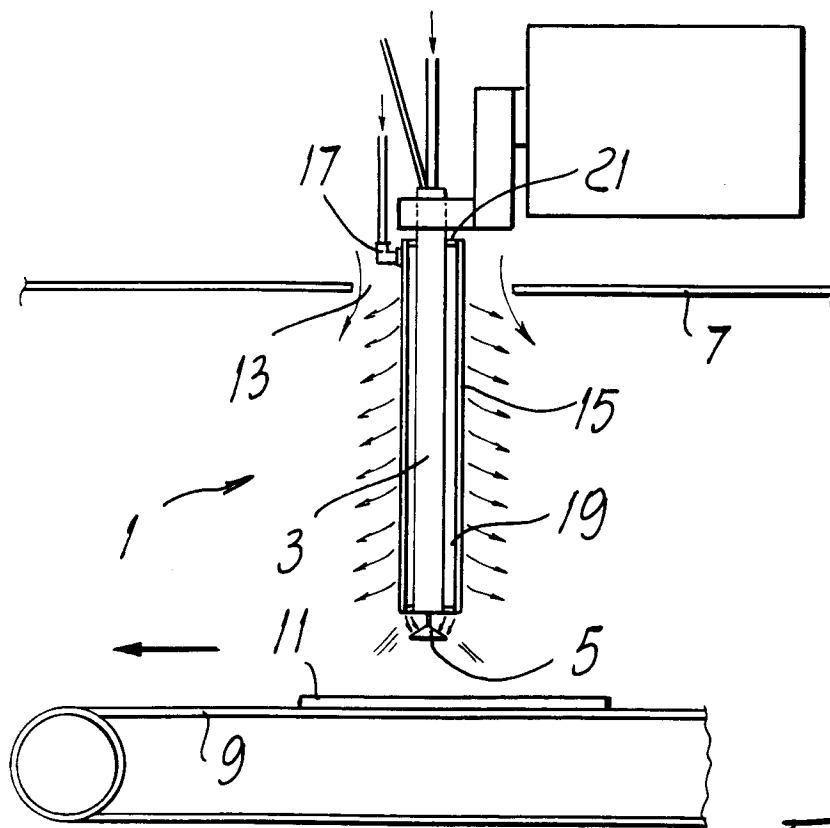


Fig. 1

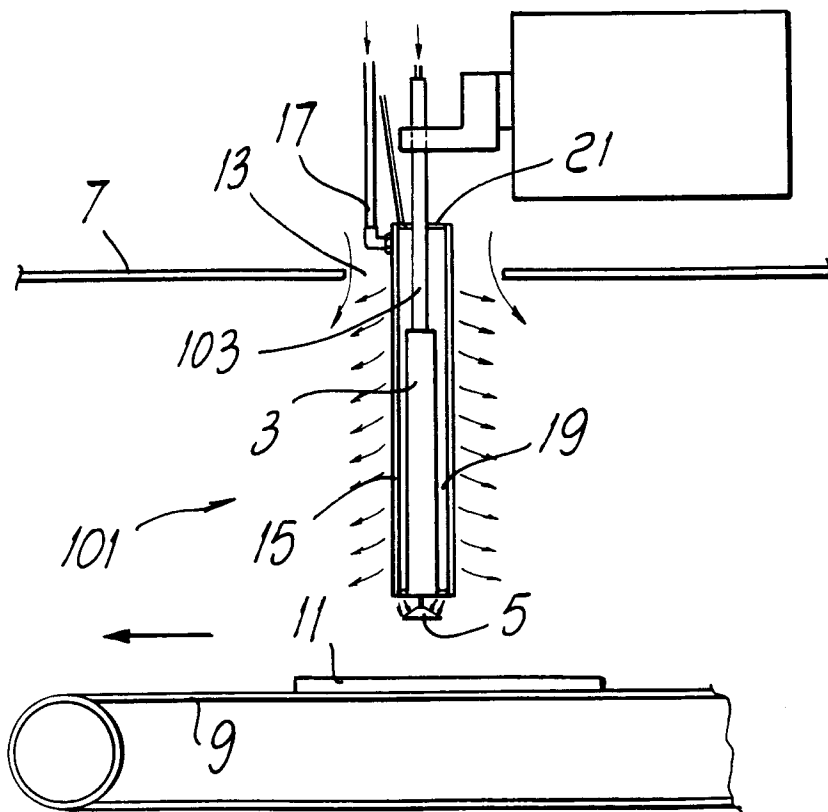


Fig. 2

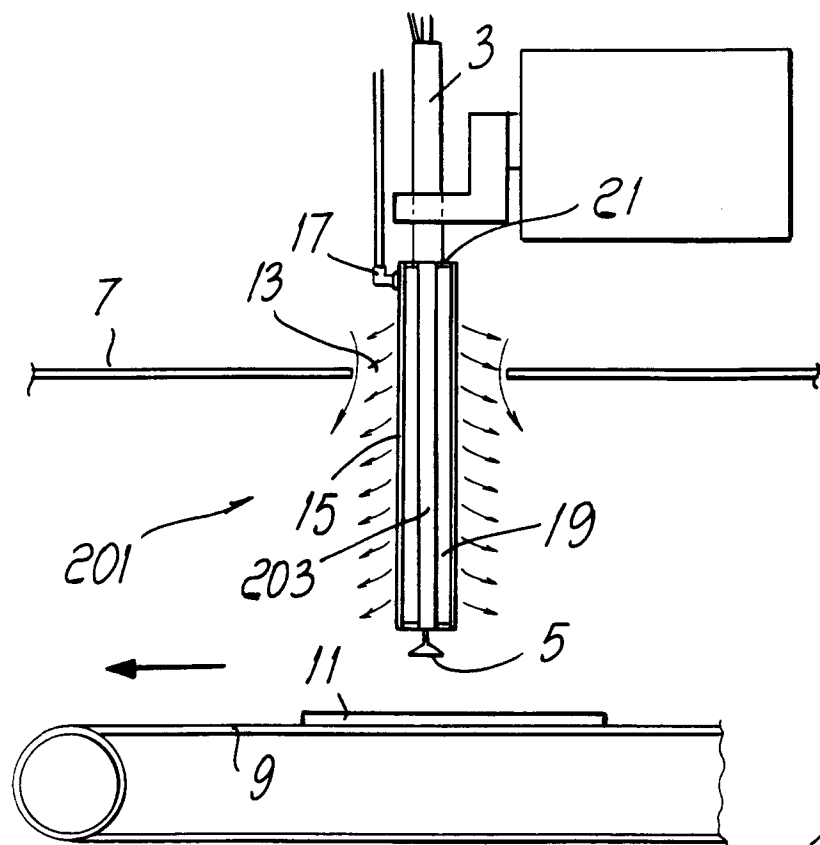


Fig. 3

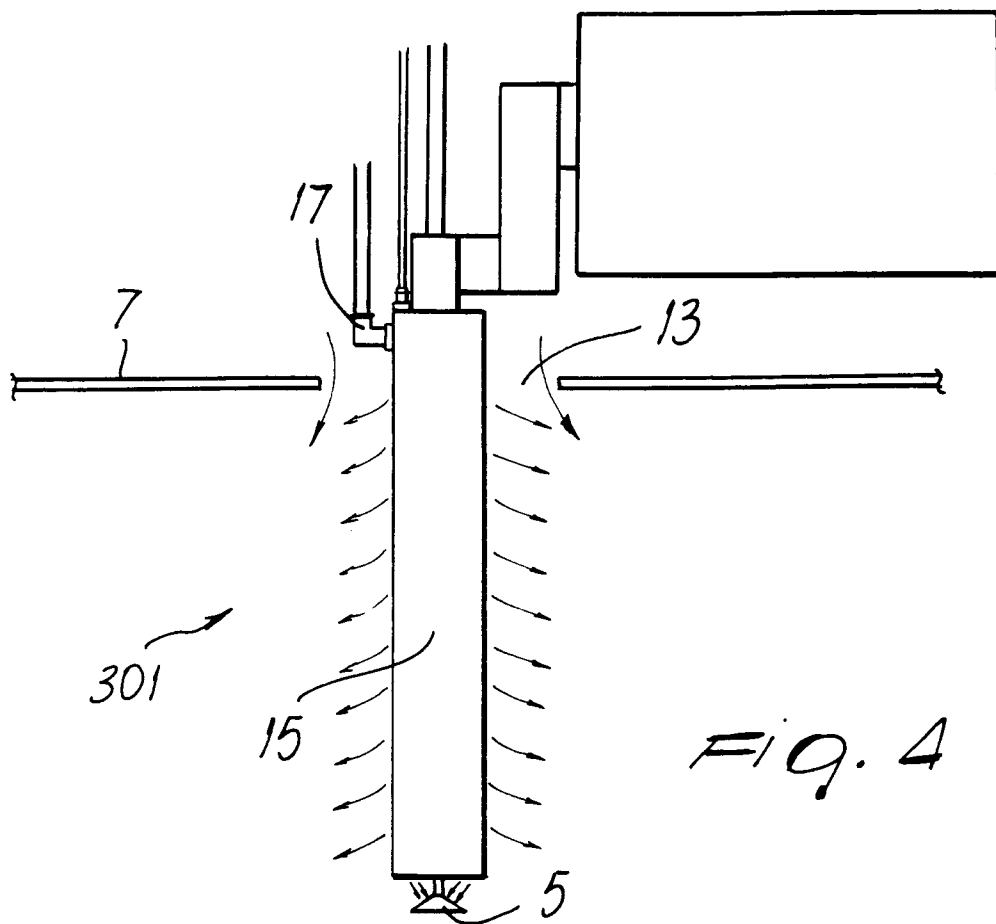
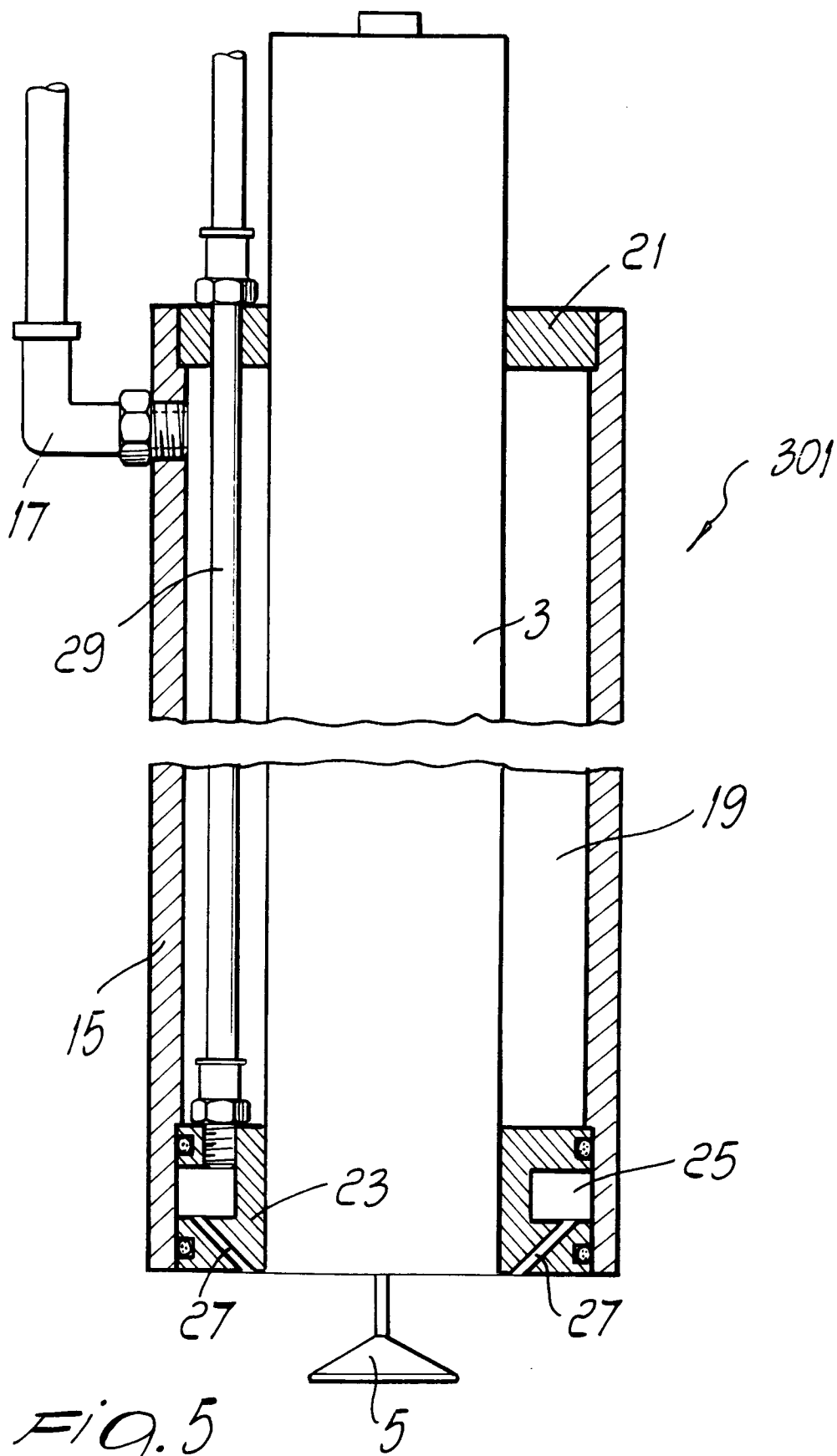


Fig. 4





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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 0232

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	PATENT ABSTRACTS OF JAPAN vol. 3, no. 138 (C-64)16 November 1979 & JP-A-54 118 446 (KANSAI PAINT CO. LTD.) 13 September 1979 * abstract *	1, 3, 4	B05B5/03
X	FR-A-2 421 683 (RANSBURG SA) * the whole document *	1, 3, 4	
A	PATENT ABSTRACTS OF JAPAN vol. 5, no. 28 (C-44)20 February 1981 & JP-A-55 152 564 (KANSAI PAINT CO. LTD.) 27 November 1980 * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 MARCH 1992	Examiner GINO C. P. G.
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			