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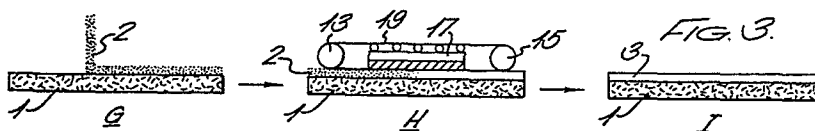
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54 **Process for powder coating substrates.**

57 A process for painting by powder coating a substrate comprises applying a dry curable coating powder to a dry uncoated substrate which is either a self-supporting panel or can be divided into such a panel, confining the coating by applying firmly thereto a treatment surface which does not adhere to the coating and is heat-stable up to the curing temperature of the coating powder, and heat-curing the coating whilst so confined. The process allows a smooth or suitably surfaced layer to be directly applied to a substrate such as man-made fibre or particle boards, such as chip-board or hardboard.



Process for powder coating substrates

The present invention relates to a process for painting by powder coating substrates and to substrates when so coated.

5 Continuing increases in the cost of raw materials, and in particular oil-based solvents, have increased the importance of powder coating processes (which dispense with carriers and solvents) relative to conventional paint coating (in which a considerable proportion of solvent is
10 merely evaporated-off and lost during drying).

Where the substrate is a poor electrostatic conductor; such as wood, powder coating has been difficult to apply electrostatically without the presence of an extra conductive layer of resin base. Further, extensive heat-
15 ing of wood, as in an oven, dries out the wood and can give rise to an 'orange peel' effect which consumers may find unappealing in certain contexts. If the substrate is metallic and flat, powder coating again has tended to produce an 'orange peel' effect.

20 According to the present invention we provide a process for painting by powder coating a substrate comprising applying a dry curable coating powder to a dry uncoated substrate which is either a self-supporting panel or can be divided into such a panel, confining the coating
25 by applying firmly thereto a treatment surface which does not adhere to the coating and is heat-stable up to the curing temperature of the coating powder, and heat-curing the coating whilst so confined. Depending on the nature of the treatment surface gloss or satin finish, a specifically textured finish, or other finish, may be applied to
30 be substrate.

The treatment surface may be a roller or heated band of platen having a non-stick surface but is preferably

a heat-resistant release film applied by the platen of a press. Mylar has been found to be particularly suitable as a release film. As indicated previously, an appropriate surface of the release film gives a corresponding surface to the final coating; thus satin finish Mylar would give a satin final finish and gloss finish Mylar would give a gloss final finish. Further a suitable treatment surface on the release film or platen, roller or heated band could be used to apply texture, such as wood-grain or cloth weave texture, to the final coating.

The substrate may be any material which is in the form of a self-supporting panel or can be divided into such a panel and to which a powder coating would be applied as a surface coating layer, but it is particularly preferred to apply the process of the present invention to the coating of man made fibre or particle boards such as chipboard or hardboard.

Examples of suitable heating cycles would be 3 minutes at 180°C where the coating powder is an epoxy-polyester and 10 minutes at 180°C where the coating is a polyester/polyurethane; although shorter heating times are desirably used. Although a wide range of pressures may be used, the pressure employed would normally only be light and just sufficient pressure to slightly squash the coating surface during fusing is generally adequate.

A thickness of powder coating in the region of 35 to 75 μ has been found to be satisfactory, although a somewhat thicker or thinner coating may be used if desired.

The process of the present invention will now be illustrated with reference to the accompanying drawings, in which:

Figure 1 shows diagrammatically one embodiment of a process according to the present invention,

Figure 2 shows diagrammatically an alternative embodiment of a process according to the present invention, and

Figure 3 shows diagrammatically a further embodiment of a process according to the present invention.

A substrate 1, which is in this instance a chipboard panel, has applied thereto powder coating 2 by a spray or blade curtain coating apparatus, at station A, D or G.

As shown in Figure 1, the coated board 1 is then transported to station B where it is supported between the upper and lower portions 9 and 8 of a platen press. A surface of heat resistant release film 5, which is of Mylar, is interposed between the upper portion 9 of the platen press, and the powder 2 previously applied to board 1. Pressure and heat is then applied by the platen press; the time and temperature being determined by the powder type used. When the powder has cured, the board 1 having a smooth or suitably textured surface 3 is transported to station C.

In the embodiment of Figure 2, the coated board from station D is transported to station E and is passed through a heated roller press comprising rollers 11 and 12. Roller 11 is heated and has its surface covered with a Mylar release film 5. The pressure, temperature and speed of transport through the roller press are again adjusted to be appropriate to the powder type used. The finished board 1 having the desired surface 3 is thereafter transported to station F.

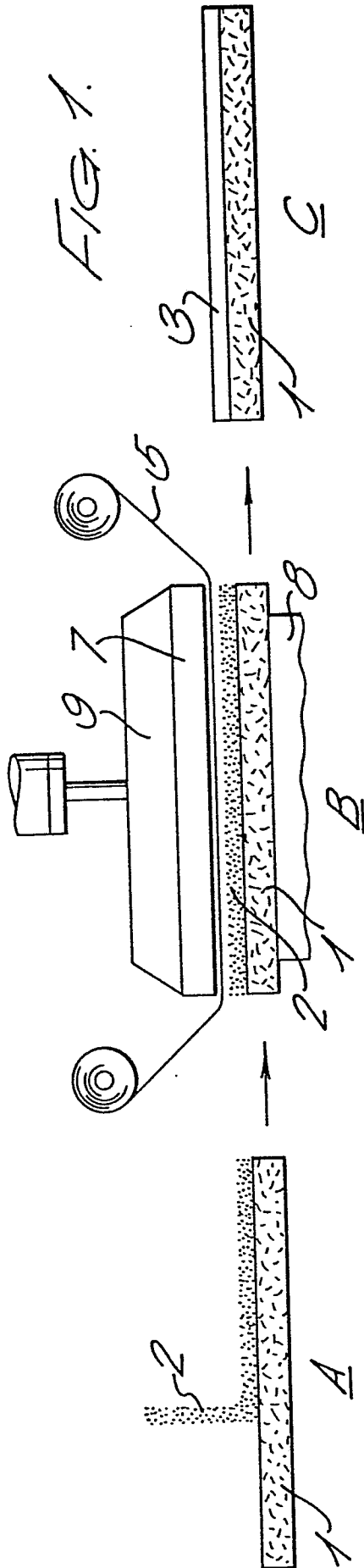
In the process shown in Figure 3, the so-called hot-band system, the coated board from station G is transported to station H where it is passed beneath a conventional heated band apparatus, comprising a heated band 19 passing around rollers 13 and 15. The heated band 19 may carry a layer of heat-resistant release film on its outer surface

or may have an appropriate non-stick outer surface coating. An appropriate heat source 17 within heated band 19 is provided for curing powder 2. As in the embodiment of Figure 2, the pressure, temperature and speed of transport
5 are adjusted to be appropriate to the powder type used. The finished board 1 having the desired surface 3 is thereafter transported to station I.

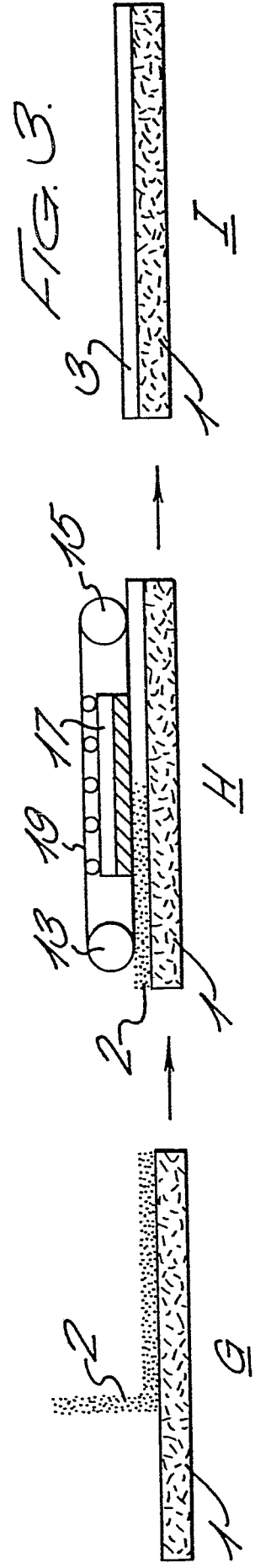
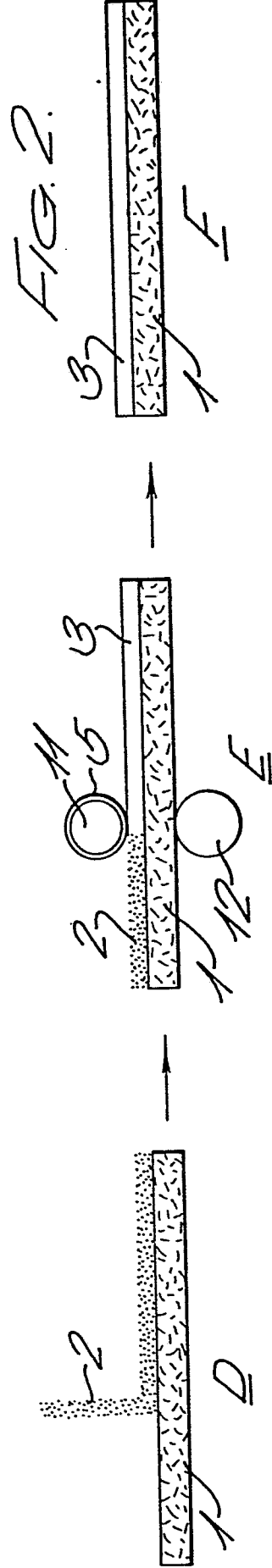
The hot band system has the greatest potential for large production quantities and is therefore preferred
10 where coated boards are to be mass produced.

Claims

1. A process for painting by powder coating a substrate comprising applying a dry curable coating powder to a dry uncoated substrate which is either a self-supporting panel or can be divided into such a panel, confining the coating by applying firmly thereto a treatment surface which does not adhere to the coating and is heat-stable up to the curing temperature of the coating powder, and heat-curing the coating whilst so confined.
2. A process according to claim 1 in which the uncoated substrate is chipboard or hardboard.
3. A process according to claim 1 or 2 in which the treatment surface is provided by a layer of heat-resistant release film.
4. A process according to any of the foregoing claims in which heat and pressure are applied for curing by a platen press.
5. A process according to any of claims 1 to 3 in which heat and pressure are applied for curing by a heated band.
6. A process according to any of the foregoing claims in which the treatment surface carries a texture.
7. A process according to claim 2 substantially as hereinbefore described with reference to Figure 1 of the drawings.
8. A process according to claim 1 substantially as hereinbefore described with reference to Figure 2 of the drawings.
9. A process according to claim 1 substantially as hereinbefore described with reference to Figure 3 of the drawings.
10. A substrate when coated by the process of any of the foregoing claims.



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