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(72) Inventors:
• **Gardner, Richard James Ernle
Dinas Powys, Cardiff, CF64 4HE (GB)**
• **Perry, Nigel Jon
Tintern, Gwent, NP16 6ST (GB)**

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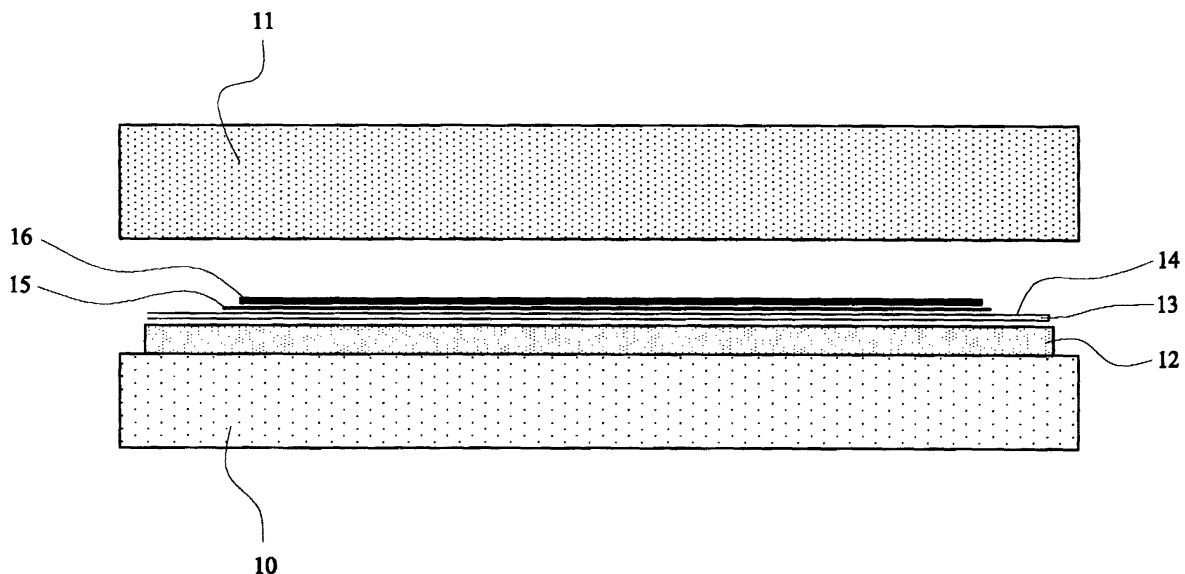
(74) Representative: **Evans, Huw David Duncan
Urquhart-Dykes & Lord,
Three Trinity Court,
21-27 Newport Road
Cardiff CF24 OAA (GB)**

(71) Applicant: **Gardners Digital Limited
Cardiff CF1 8AQ (GB)**

(54) **Method for Making Printed Metal Panels**

(57) A method of forming image-bearing panel members comprises providing a plurality of sheets 16 of metal coated on one side thereof with a layer of plastics material. The sheets 16 are then printed in a piecewise manner, by at least partially covering the plastics

coating of the sheet 16 to be printed with a transfer on which a reverse of the image is printed with a sublimation inks, and subjecting the transfer to conditions which cause the sublimation inks to migrate from the transfer to the plastics coating whilst the sheet remains stationary.



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Description

[0001] This invention relates to a method of forming printed metal panels and to an apparatus for forming the same.

[0002] It is well known to print paper signs, posters and advertisements etc. Such signs etc. are prone to degradation and discolouration. Furthermore such signs etc. are not waterproof and can sometimes present a fire hazard.

[0003] It has been proposed to solve the above-mentioned problems by providing a metal sign which is either painted or enameled with the relevant image.

[0004] A disadvantage of painted or enameled signs is that they are time consuming and expensive to produce and are limited in the amount of detail which they can carry.

[0005] We have now devised a method of forming printed metal panels which alleviates the above-mentioned problems.

[0006] In accordance with this invention, there is provided a method of forming image-bearing panel members comprising providing a plurality of sheets of metal coated on one side thereof with a plastics material and printing the sheets in a piece-wise manner by at least partially covering the plastics coating of the sheet to be printed with a printed transfer carrying the image and subjecting the transfer to conditions which cause the transfer material to migrate from the transfer to the plastics coating whilst the sheet remains stationary.

[0007] In this manner, an extremely detailed image can be applied to a metal panel. It will be appreciated that the metal panel is waterproof and is less prone to degradation and discolouration than conventional paper signs etc.

[0008] Preferably the image is transferred by heating the transfer to a high temperature in the order of 200°C.

[0009] Preferably the transfer is pressed onto the sheet during transfer. Preferably the force applied to the transfer is in the order of 1200 psi.

[0010] Preferably the transfer is printed with sublimation ink which changes directly from the solid to the gaseous phase when it is heated: the resultant coloured gas cross-links with the plastics coating of the metal.

[0011] Preferably the sheets of metal are coated on one side thereof with a polymer material such as polyester.

[0012] A disadvantage of sublimation printing onto metal is that excess coloured gases cannot escape through the metal or through the press which is applying heat and pressure to the reverse side of the transfer. Hence, excess gases tend to flow laterally, thereby causing the adjacent colours to bleed or blow into each other.

[0013] We have overcome this problem by covering the reverse side of the transfer with a sheet of permeable material through which excess gases can dissipate.

[0014] Preferably, the reverse side of the transfer is

covered with a sheet of foamed plastics material.

[0015] Preferably, a layer of a woven material is disposed between the foamed plastics material and the transfer.

5 **[0016]** Also in accordance with this invention, there is provided an apparatus for forming an image-bearing panel member, the apparatus comprising first and second members having substantially flat opposed surfaces spaced apart from each other, a layer of foamed plastics material covering at least a portion of the surface of the first member, heating means in said second member, and means for urging the first and second members together, so as to press a sheet of metal coated on one side thereof with a plastics material against a printed transfer carrying the image, said transfer lying between the panel member and said foamed plastics material.

[0017] In use, the heat and pressure transfers the image from the transfer to the plastics coating of the metal.

10 **[0018]** Any excess gases generated permeate back through the transfer and dissipate through the foamed plastics material. The foamed plastics material also helps to provide resilient support as the panel and transfer are pressed together.

[0019] Preferably the foamed plastics material comprises silicone.

15 **[0020]** Preferably a layer of woven polyester material covers said foamed plastics material. We have found that this improves the dissipation of excess gases.

20 **[0021]** An embodiment of this invention will now be described by way of example only and with reference to the accompanying drawing, the single figure of which is a sectional view through an apparatus in accordance with this invention for forming an image-bearing panel member.

25 **[0022]** The apparatus comprises a large flat metal bed 10, supported above the ground on legs (not shown). A press 11 is suspended above the bed 10, the bed and press 10,11 having opposed faces lying in parallel planes.

30 **[0023]** The upper surface of the bed 10 is covered by a layer 12 of foamed silicone plastics.

[0024] A heater (not shown) is provided in the press 11 for heating the under surface thereof and means (not shown) are provided for lowering the press 11 into face-to-face contact with the bed 10 and for subsequently exerting a substantial downwards force on the bed 10.

35 **[0025]** In use, in order to form an image-bearing panel member, at least part of the silicone layer 12 is covered by two layers 13,14 of a woven polyester material.

40 **[0026]** Next, a transfer sheet of paper 15 onto which the reverse of the image to be formed has been printed using inks carrying sublimation dyes, is placed on the uppermost woven layer 14 with the printed side facing upwardly. Then, a sheet 16 of metal, coated on one side thereof with a plastics polymer material such as polyester, is placed on the transfer sheet 15 with its plastics coating facing downwardly i.e. towards the transfer sheet 15.

[0027] The press 11 is then lowered onto the bed 10 and pressure and heat applied for about 5 minutes. We have found that the heater should be set to about 200°C and that a pressure of 1200 psi should be applied.

[0028] The pressure and heat causes the inks in the transfer 15 to sublime to gaseous phase, whereupon the resultant coloured gas cross-links with the polymer coating on the metal sheet 16, thereby forming a corresponding image on the coating.

[0029] Any excess gas that is generated has a tendency to flow laterally, thereby causing adjacent colours to bleed or blow into each other. However, in the present invention, any excess gas permeates back through the transfer 15 and through the woven polyester layers 13,14 and into the foamed silicone layer 12 which dissipated the gases, thereby avoiding the problem of colours bleeding or blowing into each other.

[0030] The printed metal panel member which is produced can be extremely detailed and is yet waterproof and durable.

Claims

1. A method of forming image-bearing panel members comprising providing a plurality of sheets of metal coated on one side thereof with a plastics material and printing the sheets in a piece-wise manner by at least partially covering the plastics coating of the sheet to be printed with a printed transfer carrying the image, and subjecting the transfer to conditions which cause the transfer material to migrate from the transfer to the plastics coating whilst the sheet remains stationary.
2. A method as claimed in claim 1, in which the image is transferred by heating the transfer.
3. A method as claimed in claims 1 or 2, in which the transfer is pressed onto the sheet during transfer.
4. A method as claimed in claim 3, in which the force applied to the transfer is in the order of 1200 psi.
5. A method as claimed in claim 2, in which the transfer is printed with a sublimation ink which changes directly from the solid to the gaseous phase when it is heated.
6. A method as claimed in any preceding claim, in which the sheets of metal are coated on one side thereof with a polymer material.
7. A method as claimed in any preceding claim, in which the reverse side of the transfer is covered with a sheet of permeable material.
8. A method as claimed in claim 7, in which the reverse side of the transfer is covered with a sheet of foamed plastics material.
9. A method as claimed in claim 8, in which a layer of a woven material is disposed between the foamed plastics material and the transfer.
10. An apparatus for forming an image-bearing panel member, the apparatus comprising first and second members having substantially flat opposed surfaces spaced apart from each other, a layer of foamed plastics material covering at least a portion of the surface of the first member, heating means in said second member, and means for urging the first and second members together, so as to press a sheet of metal coated on one side thereof with a plastics material against a printed transfer carrying the image, said transfer lying between the panel member and said foamed plastics material.
11. An apparatus as claimed in any claim 10, in which the foamed plastics material comprises silicone.
12. An apparatus as claimed in any claim 11, a layer of woven polyester material covers said foamed plastics material.

