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- with amended claims (Art. 19(1))

(54) Title: MAGNETISED COATING EFFECT

(57) Abstract: A method of producing an image 5 in a coating applied to an article, the method including the steps of - applying one or more magnets 2 to a ferrous substrate 1 to form a magnetic image, - removing the one or more magnets 2, - applying a coating containing magnetic particles, which align with the magnetic image to form the image 5, and - curing the coating to fix the image. The method may include a delay or dwell period between the formation of the magnetic image and the application of the coating containing magnetic particles. Despite the delay or dwell period, the substrate retains the magnetic image and the intensity / clarity of the image will be maintained.



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Description

MAGNETISED COATING EFFECT

Technical Field

[0001] The present invention relates to a method for decorating a ferrous substrate using a coating containing magnetic particles, which may be aligned to form an image on the substrate. A magnetic field is applied to the ferrous substrate to form a “magnetic image” on the substrate. When the coating is subsequently applied, the metallic particles in the coating are aligned to the “magnetic image”, which may then be ‘fixed’ using conventional techniques, such as thermal drying or UV curing (anionic, cationic or a hybrid technology).

Background Art

[0002] Magnetic Ink Character Recognition (MICR) is well known for security marking of notes, cheques, credit cards etc. MICR technology is dependant on the use of specially formulated magnetic inks to print and is designed to allow electronic equipment to quickly read the encoded data. However, such data is invisible to the human eye.

[0003] Using magnetic particles to provide a metallic “flake” effect using iron compounds is also known from the prior art.

[0004] **US 3791864 B** (MAGNETFABRIK BONN GMBH) 12.02.1974 discusses production of a patterned effect in coatings applied to any surface, by applying a preliminary coating consisting of a liquid carrier into which permanent magnetic particles are suspended. This preliminary coating is hardened and the particles are subjected to a magnetic field in a predetermined pattern. Another coating containing magnetically orientable particles is then applied and these particles become orientated by the magnetic field produced by the particles in the preliminary coating. After hardening the coating displays the desired pattern.

[0005] Whilst this process allows the preliminary coating or primer to be applied to any surface and the process is described as being particularly suitable for objects made of ferro-magnetic material e.g. steel plate, the method described in this patent requires at least 2 coating layers (a special primer + a coating containing magnetically orientable particles).

Disclosure of Invention

[0006] However, the inventor/s have found that when using a material capable of being magnetised e.g. tinplate (sheet steel covered with a thin layer of tin) or TFS Tin Free Steel (ECCS), a magnetic field (having the desired pattern or image) may be applied to the material, which retains this magnetic image and may be stored for a period of time prior to application of a coating containing magnetisable particles.

[0007] This "dwell period", is particularly useful when the material is being used on a production line, because stacks of material having a "magnetic memory" of a desired image may be stored prior to coating and drying. The inventor/s have also found that in a stack of material to which a magnetic image has been applied, the formed magnetic image does not transfer to adjacent sheets of material.

Brief Description of Drawings

[0008] The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a simplified, orthographic view of a printing line, in which the present invention is implemented as part of a production line; and
Figure 2 is a schematic, orthographic view of an alternative printing method according to the invention, this time implemented off-line.

[0009] The method according to the invention may be implemented in-line on a production line, as illustrated in Figure 1. In Figure 1, a magnet 2 having a required image is mounted onto a roller and a sheet of steel 1 is transported past the magnet 2. The steel sheet having a "magnetic memory" 12 (of the required image) is then transported past a printing roller 3, which applies an ink or coating containing magnetically orientable particles, which align themselves to the "magnetic image" 5 previously applied to the steel sheet 1. The steel sheet 1 is then transported to a drying station 4, where the image 5 is "fixed".

[0010] In an alternative arrangement, an off-line process is used as illustrated in Figure 2, in which a magnet 2 is applied to a sheet of steel 1. The sheet or sheets 1 may then be stored for a "dwell period" (indicated by the letter "t") of up to several months before being printed.

[0011] This off-line process has the advantage that the magnet 2 may be applied to a plurality of sheets 1, thereby providing sheets with a “magnetic memory” 12 and this process may be carried out completely separately from the printing of the sheets 1 on a production line. Thus the speed of the production process remains unaffected by the time taken to apply the magnet 2 to the sheet or sheets 1. The inventor has found that such sheets with a “magnetic memory” 12 may be stored for up to several months and the “magnetic image” will not be transferred to adjacent sheets in the stack.

[0012] One or more sheets having a “magnetic memory” 12 may then be printed with an ink or coating containing magnetically orientable particles (as previously described) and the image 5 is fixed in a drying station 4. The time that the magnet 2 is placed in contact with the steel sheet does not influence the intensity or clarity of the image 5.

[0013] The magnet 2 may be provided by a permanent magnet such as ferrite neobymium, magnetic matting of all grades or electromagnets. Additionally, the “magnetic image” can be produced successfully regardless of on which side of the steel sheet the magnet is applied i.e. the side that you are printing or on the reverse side, as the final “image” will still be visible.

Claims

1. A method of producing an image in a coating applied to an article, the method including the steps of
 - applying one or more magnets to a ferrous substrate to form a magnetic image,
 - removing the one or more magnets,
 - applying a coating containing magnetically orientable particles, which align with the magnetic image to form the image, and
 - curing the coating to fix the image.
2. A method of producing an image in a coating applied to an article according to claim 1, wherein the ferrous substrate is left for at least 7 days after forming a magnetic image, but prior to applying the coating containing magnetic particles.
3. A method of producing an image in a coating applied to an article according to claim 2, wherein the ferrous substrate is left in proximity to other ferrous substrates but the magnetic image does not transfer to the other ferrous substrates.
4. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the coating includes a pigment containing magnetically orientable particles.
5. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the film weight for the coating is 18 – 20gsm wet or 6gsm dry.
6. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein conventional magnetic matting is used to form the magnetic image on the ferrous substrate.
7. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the ferrous substrate is tin plate.

AMENDED CLAIMS
received by the International Bureau on 22 Mars 2010 (22.03.2010)

Claims

1. A method of producing an image in a coating applied to an article, the method including the steps of
 - applying one or more magnets to a ferrous substrate to form a magnetic image,
 - removing the one or more magnets,
 - applying a coating containing magnetically orientable particles, which align with the magnetic image to form the image, and
 - curing the coating to fix the image.
2. A method of producing an image in a coating applied to an article according to claim 1, wherein the ferrous substrate is stored for a dwell period (t) after forming a magnetic image, but prior to applying the coating containing magnetic particles.
3. A method of producing an image in a coating applied to an article according to claim 2, wherein the ferrous substrate is left in proximity to other ferrous substrates but the magnetic image does not transfer to the other ferrous substrates.
4. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the coating includes a pigment containing magnetically orientable particles.
5. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the film weight for the coating is 18 – 20gsm wet or 6gsm dry.
6. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein conventional magnetic matting is used to form the magnetic image on the ferrous substrate.
7. A method of producing an image in a coating applied to an article according to any of the preceding claims, wherein the ferrous substrate is tin plate.

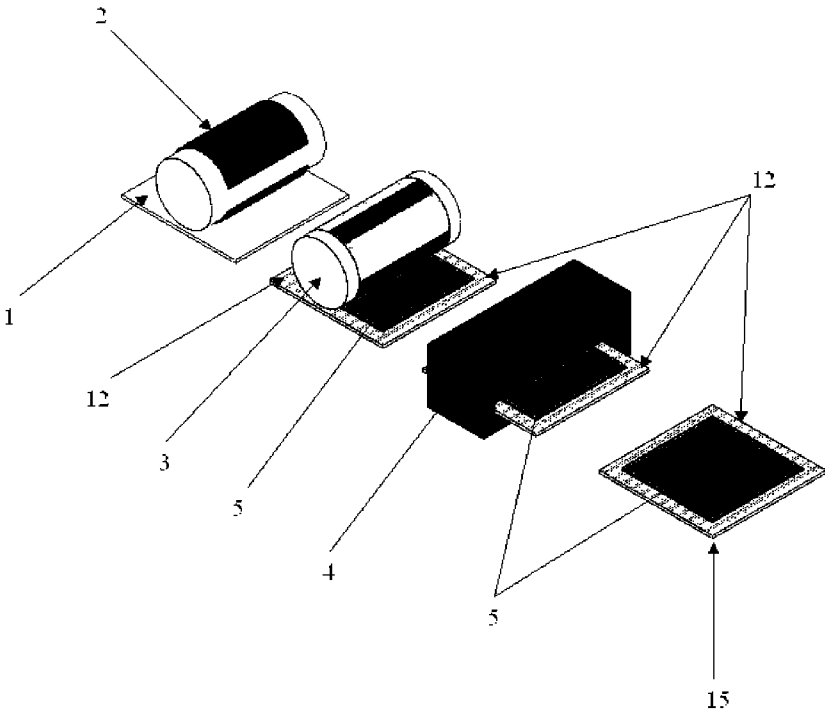


Fig. 1

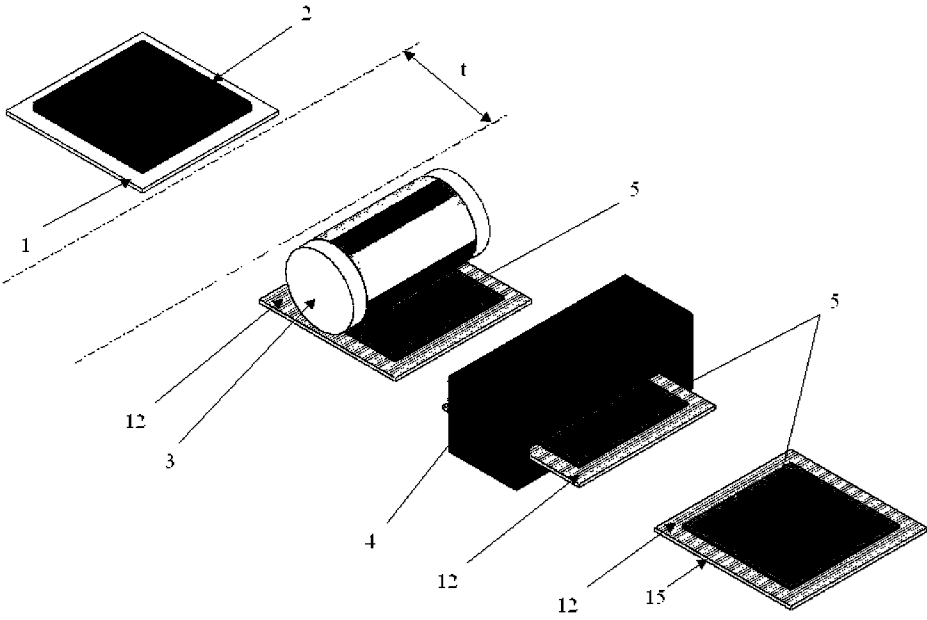


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2009/064822

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B05D3/14 B05D5/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 B05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	EP 2 087 943 A1 (GM GLOBAL TECH OPERATIONS INC [US]) 12 August 2009 (2009-08-12) the whole document	1,4,6
X	US 3 791 864 A (STEINGROEVER E) 12 February 1974 (1974-02-12) cited in the application the whole document	1-2,4-7
A	WO 2007/065998 A1 (PIVAUDRAN TECH ET INNOVATIONS [FR]; PIVAUDRAN MATHIEU [FR]; PIVAUDRAN) 14 June 2007 (2007-06-14) the whole document	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

19 February 2010

Date of mailing of the international search report

26/02/2010

Name and mailing address of the ISA/

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 3

Present claim 3 relates to a method which has a given desired property or effect, namely "the ferrous substrate is left in proximity to other ferrous substrates but the magnetic image does not transfer to the other ferrous substrates". However, the description does not provide support and disclosure in the sense of Article 6 and 5 PCT for any such method having the said property or effect and there is no common general knowledge of this kind available to the person skilled in the art. This non-compliance with the substantive provisions is to such an extent, that the search was not performed taking into consideration the non-compliance in determining the extent of the search of the claim (PCT Guidelines 9.19 and 9.20). The search of claim 3 was therefore not carried out.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2009/064822

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 3
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2009/064822

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2087943	A1	12-08-2009	NONE
US 3791864	A	12-02-1974	BE 774930 A1 01-03-1972 DE 2054934 A1 24-08-1972 FR 2113650 A5 23-06-1972 IT 938725 B 10-02-1973 NL 7115172 A 09-05-1972
WO 2007065998	A1	14-06-2007	FR 2894508 A1 15-06-2007