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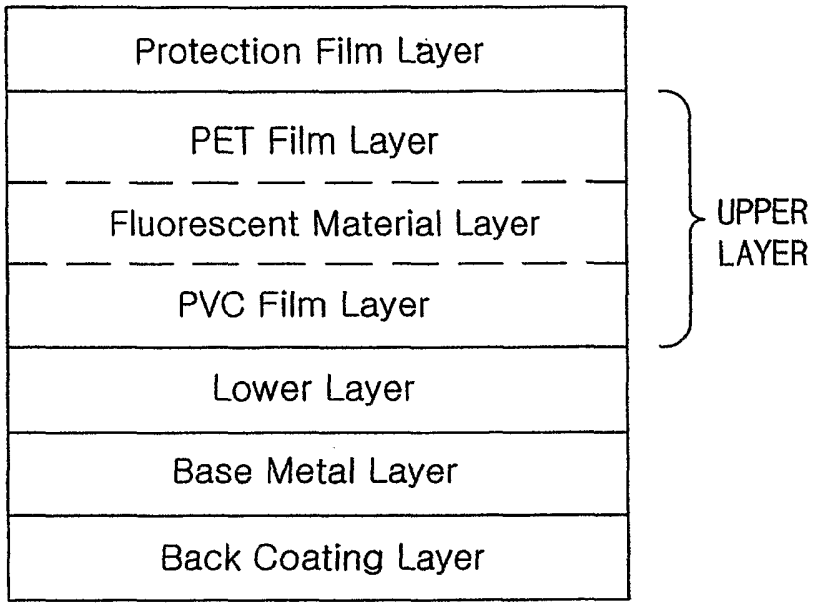
(54) **Title:** STEEL SHEET HAVING FLUORESCENCE AND MEMO FUNCTIONS, AND HOME APPLIANCES USING THE SAME



(57) **Abstract:** The present invention discloses a Pre-Coated Metal (PCM) sheet having fluorescence and memo functions, and a home appliance using the PCM sheet. More specifically, a PCM sheet and a home appliance of the present invention respectively comprising: a base metal layer; a lower layer formed on the base metal layer; an upper layer formed on the lower layer; a protection film layer formed on the upper layer; and a back coating layer formed under the base metal layer. The upper layer comprises a PVC film layer and a PET film layer and is characterized in that a fluorescent material layer or a paint layer being used for a white board is disposed between the fluorescent material layer and the paint layer. A PCM sheet and a home appliance having the characteristic of the present invention accomplishes various effects that it can be easily used even without an illumination system at night time, or can be used for memo or playing purposes, if necessary.

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STEEL SHEET HAVING FLUORESCENCE AND MEMO FUNCTIONS, AND HOME APPLIANCES USING THE SAME

Technical Field

The present invention relates to a steel sheet having fluorescence and memo functions, and home appliances using the same. More specifically, the present invention relates to a steel sheet coated with fluorescent materials and materials capable of functioning a white board, and a home appliance such as refrigerators, air-conditioners, and washing machines, etc. using the same.

Background Art

Generally, a Pre-Coated Metal (PCM) sheet is used for a steel sheet to manufacture a home appliance such as refrigerators, air-conditioners, and washing machines, etc. The OCM sheet is mainly classified into two categories of a Vinyl-Coated Metal (VCM) sheet and a Pre-Painted Metal (PPM) sheet.

Referring to Fig. 1, it is illustrated a structure of a prior art steel sheet.

More specifically, Fig. 1 illustrates a cross-sectional view of a VCM sheet and Fig. 2 illustrates a cross-sectional view of a PPM sheet, respectively.

The PCM sheet, illustrated in Figs. 1 and 2, comprises a base metal layer; a lower layer on which paint for pre-treatment is applied to in order to increase adhesive strength; an upper layer, being disposed on the lower layer, on which high glossy or low glossy PVC film and PET film located on the PVC film are coated with (Fig. 1) or on which high density polymer polyester is coated with (Fig. 2); and a protection film layer applied to on the upper layer. The PCM sheet may additionally comprise a back coating layer coated with epoxy under the base metal layer.

The prior art PCM sheet is currently used as a main material for manufacturing a home appliance. Still, there is required a need for a steel sheet having new functions in order to satisfy various customer's desires. However, it is not yet developed a steel sheet having such functions to satisfy the customer's desires.

Disclosure of Invention

Technical Problem

An object of the present invention is to solve the prior art problems by providing a steel sheet having new functions, i.e., fluorescence and memo functions, and a home appliance using the same.

Technical Solution

To achieve the above object, a PCM sheet according to a first aspect of the present invention comprises a base metal layer; a lower layer formed on the base metal layer; an upper layer, being formed on the lower layer, comprising a PVC film layer, a fluorescent material layer placed on the PVC layer, and a PET film layer placed on the fluorescent material layer; a protection film layer formed on the upper layer; and a back coating layer formed under the base metal layer.

Additionally, a PCM sheet according to a second aspect of the present invention comprises a base metal layer; a lower layer formed on the base metal layer; an upper layer comprising a fluorescent material layer which is formed on the lower layer and high density polymer polyester formed on the fluorescent material layer; a protection film layer formed on the upper layer; and a back coating layer formed under the base metal layer.

Additionally, in the PCM sheet according to the second aspect of the present invention above, the fluorescent material layer is mixed with the high density polymer polyester integrally to form the upper layer.

Additionally, a PCM sheet according to a third aspect of the present invention comprises a base metal layer; a lower layer formed on the base

metal layer; an upper layer comprising a paint layer being used for a white board which is formed on the lower layer and high density polymer polyester formed on the paint layer; a protection film layer formed on the upper layer; and a back coating layer formed under the base metal layer.

Additionally, in the PCM sheet according to the third aspect of the present invention above, the paint layer being used for a white board is mixed with the high density polymer polyester integrally to form the upper layer.

Additionally, according to a fourth aspect of the present invention, a home appliance is disclosed, wherein a housing thereof is manufactured by the PCM sheet in accordance with one of the first, second and third aspects.

Additionally, the home appliance according to the fourth aspect of the present invention is one selected from a refrigerator, an air-conditioner, a washing machine and a microwave oven.

Advantageous Effect

In accordance with a PCM sheet of the present invention having fluorescence and memo functions and a home appliance manufactured by the PCM sheet of the present invention can be used easily in night time even without any separate illumination system, or can be used for a memo use or a play use so that the present invention accomplishes various effects.

Brief Description of the Drawings

Fig. 1 is a cross-sectional view of a Vinyl-Coated Metal (VCM) sheet in accordance with a prior art out of a Pre-Coated Metal (PCM) sheet used for a home appliance.

Fig. 2 is a cross-sectional view of a Pre-Painted Metal (PPM) sheet in accordance with a prior art out of a PCM sheet used for a home appliance.

Fig. 3 is a cross-sectional view of a VCM sheet in accordance with the present invention out of a PCM sheet used for a home appliance.

Fig. 4 is a cross-sectional view of a PPM sheet in accordance with the present invention out of a PCM sheet used for a home appliance.

Best Mode for Carrying Out the Invention

Hereinafter, preferred embodiments of the present invention will be described in more detail with reference to the appended drawings.

Fig. 3 illustrates a cross-sectional view of a VCM sheet in accordance with the present invention out of a PCM sheet used for a home appliance.

More specifically, Fig. 3 illustrates one embodiment of the present invention having a fluorescence function.

As can be seen from Fig. 3, a VCM sheet of the present invention is characterized in that a fluorescent material layer is placed between a PVC film layer and a PET film layer which form an upper layer of the prior art metal sheet structure (Fig. 1).

The fluorescent material being used for the fluorescent material layer of the VCM sheet illustrated in Fig. 3 is a pure fluorescent material and an impure fluorescent material having some activators or activation agents. A pure fluorescent material is comprised of a hydrochloride or a sulfate of the rare-earth elements such as samarium, terbium, europium, gadolinium and dysprosium, etc., and salt of transition element acids such as $CaMoO_2 \cdot 2H_2O$ and $CaWO_4$, etc. An organic material being used for a pure fluorescent material is comprised of aromatic hydrocarbon such as benzene and naphthalene, etc., phthalein dyes such as eosin and fluorescein, etc. Meanwhile, in case of an impure material being used as a fluorescent material, an activator being added as an impure material is comprised of a heavy metal such as Cu, Ag, Au, Ti, Pb and Sb; a transition element such as Cr and Mn; a rare-earth element; and an organic chemical compound having a conjugate double bond.

Fig. 4 illustrates one embodiment of a PPM sheet in accordance with the present invention. More specifically, a PPM sheet of the present invention is characterized in that a fluorescent material layer or a paint layer being used for a white board is placed between a lower layer and an upper layer illustrated in the prior art metal sheet structure (Fig. 2).

The fluorescent material being used for the PPM sheet illustrated in Fig. 4 can be the same as one for the VCM sheet illustrated in Fig. 3, as described above.

In addition, a material for a paint layer being used for a white board in the PPM sheet of the present invention illustrated in Fig. 4 can be high density polymer polyester paint. A clear coating layer, if required, may be used as a protection film layer on the high density polymer polyester paint.

Further, as another embodiment of the present invention, instead of placing the fluorescent material layer or the paint layer being used for a white board between the lower layer and the upper layer, it is possible that the fluorescent material layer or the paint layer may be mixed together with high density polymer polyester forming the upper layer so as to form an integrated upper layer.

Yet another embodiment of the present invention is directed to a home appliance manufactured by using the steel sheet of the present invention illustrated in Figs. 3 and 4. For example, in case of a home appliance such as a refrigerator, an air-conditioner, a washing machine, and a microwave oven, etc.; each having a housing manufactured by a steel sheet having a fluorescent material layer, the a home appliance can be easily used by a user without using an illumination system of a room or space, because they generate fluorescent light even at night time.

Moreover, in case of a home appliance such as a refrigerator, an air-conditioner, a washing machine, and a microwave oven, etc., each having a housing manufactured by a steel sheet having a paint layer being used for a white board, the memos, drawings or graffiti drawn on the surface of the a

home appliance by a marker by housewives or children can be easily erased so that they can be used for memo or children playing purposes.

Industrial Applicability

The PCM sheet in accordance with the present invention has fluorescent and memo functions, and thus when the PCM sheet is applied to a home appliance, the a home appliance can be easily used even without an illumination system at night time, or can be used for memo or playing purposes, if necessary.

What is claimed is:

1. A Pre-Coated Metal (PCM) sheet comprising:

a base metal layer;

a lower layer formed on the base metal layer;

an upper layer, being formed on the lower layer, comprising a PVC film layer, a fluorescent material layer placed on the PVC layer, and a PET film layer placed on the fluorescent material layer;

a protection film layer formed on the upper layer; and

a back coating layer formed under the base metal layer.

2. A Pre-Coated Metal (PCM) sheet comprising:

a base metal layer;

a lower layer formed on the base metal layer;

an upper layer comprising a fluorescent material layer which is formed on the lower layer and high density polymer polyester formed on the fluorescent material layer;

a protection film layer formed on the upper layer; and

a back coating layer formed under the base metal layer.

3. The PCM sheet of claim 2, wherein the fluorescent material layer is mixed with the high density polymer polyester integrally to form the upper layer.

4. A Pre-Coated Metal (PCM) sheet comprising:

a base metal layer;

a lower layer formed on the base metal layer;

an upper layer comprising a paint layer being used for a white board which is formed on the lower layer and high density polymer polyester formed on the paint layer;

a protection film layer formed on the upper layer; and

a back coating layer formed under the base metal layer.

5. The PCM sheet of claim 4, wherein the paint layer being used for a white board is mixed with the high density polymer polyester integrally to form the upper layer.

6. A home appliance, a housing thereof being manufactured by the PCM sheet in accordance with one of claims 1, 2, and 4.

7. The home appliance of claim 6, wherein the home appliance is one selected from a refrigerator, an air-conditioner, a washing machine and a microwave oven.

Fig. 1

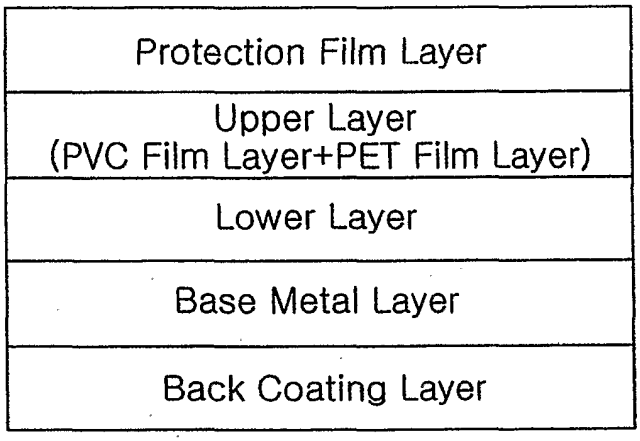

Protection Film Layer
Upper Layer
(PVC Film Layer+PET Film Layer)
Lower Layer
Base Metal Layer
Back Coating Layer

Fig. 2

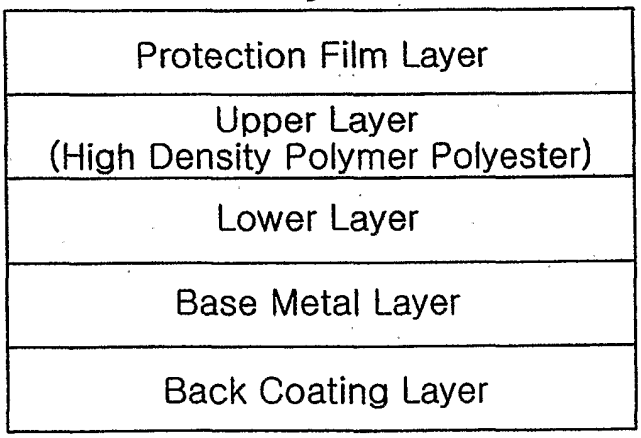

Protection Film Layer
Upper Layer
(High Density Polymer Polyester)
Lower Layer
Base Metal Layer
Back Coating Layer

Fig. 3

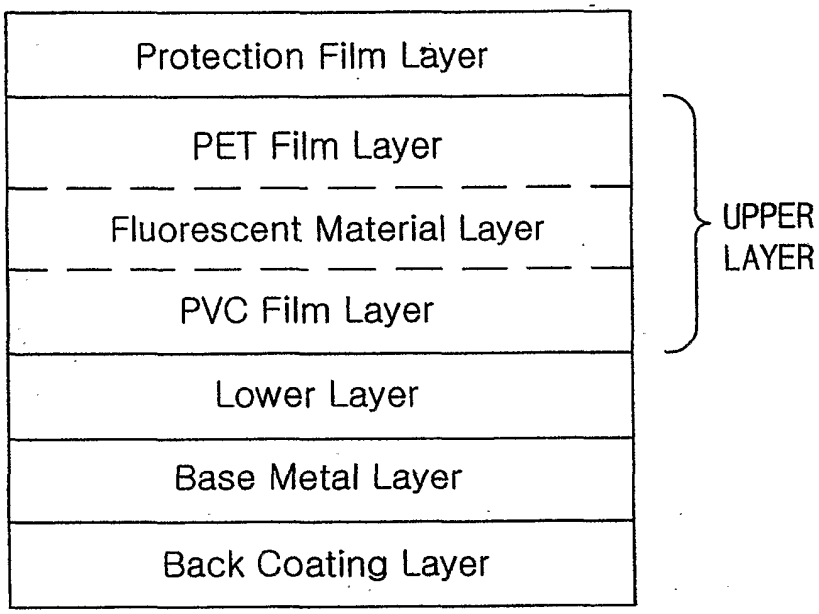
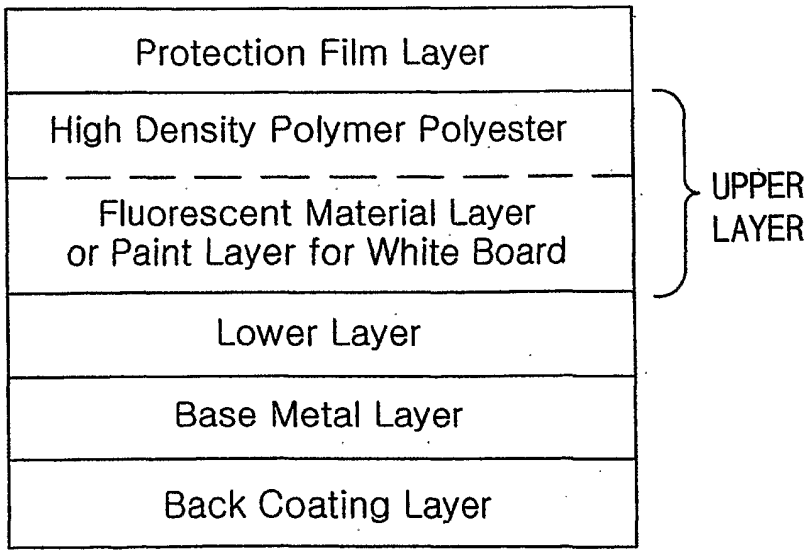

Protection Film Layer
PET Film Layer
Fluorescent Material Layer
PVC Film Layer
UPPER LAYER
Lower Layer
Base Metal Layer
Back Coating Layer

Fig. 4


Protection Film Layer
High Density Polymer Polyester
Fluorescent Material Layer
or Paint Layer for White Board
UPPER LAYER
Lower Layer
Base Metal Layer
Back Coating Layer

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/002950

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 B32B 15/08

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)

B32B, B29C, C09D

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

Korean Patents and applications for inventions since 1975
Korean Utility models and applictions for Utility models since 1975
Japanese Utility models and application for Utility models since 1975

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

KIPONET

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 11-048399 A (SEKISUI JUSHI CO., LTD.) 23 Feb. 1999 See the whole document	1-7
A	KR 10-2004-0071007 A (DAE CHANG STEEL LTD.) 11 Aug 2004 See the whole document	1-7
A	JP 13-239610 A (RAMINEETO KOGYO KK) 4 Sep. 2001 See the whole document	1-7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 NOVEMBER 2005 (24.11.2005)	**25 NOVEMBER 2005 (25.11.2005)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2005/002950

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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