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(54) **Printing sheet for stamp**

(57) A printing sheet used in a stamp includes a porous layer in which ink can be impregnated and a fibrous layer provided to a side of the porous layer opposite to the pattern. The porous layer carries a pattern on a surface thereof, the pattern including a non-print portion

which blocks the permeation of the ink and a print portion which allows the permeation of the ink. The fibrous layer prevents the deformation of the porous layer. The fibrous layer is so constituted that ink can be impregnated therein.

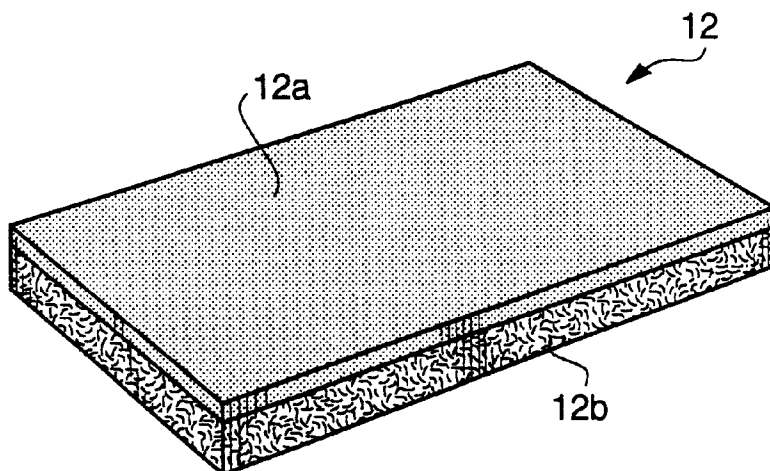


FIG. 1A

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Description

The present invention relates to a printing sheet used in a stamp.

As disclosed in Japanese Provisional Patent Publication Nos. 8-118771 and 8-207409, there is a type of stamp using a porous printing sheet in which ink can be impregnated. A pattern is formed on a surface of the printing sheet, including a print portion which allows the permeation of ink and a non-print portion which block the permeation of ink.

On using the stamp, a user holds the stamp and forces the stamp to a media (such as a paper) so that the surface of the printing sheet is urged against the media. With this, ink impregnated in the printing sheet is permeated through the print portion of the printing sheet and transferred onto the media. Therefore, it is possible to repeatedly print images on the media for several times without supplying ink to the printing sheet.

In order to reduce the cost for producing the printing sheet, the printing sheet is made thin. Thus, when ink is impregnated in the printing sheet, the printing sheet may be swollen. In such case, a surface of the printing sheet may be deformed, which causes the printed image to be blurred.

Further, since the printing sheet is made thin, an amount of ink to be impregnated in the printing sheet is relatively small. Thus, it is necessary to further provide a sponge-like member in the stamp. Accordingly, the number of parts of the stamp is increased and the producing cost thereof is also increased. In order to increase an amount of ink to be impregnated in the printing sheet, it is alternatively possible to make the printing sheet thicker. However, since the pores of the printing sheet are generally minute, the time required to fully impregnate ink in the printing sheet becomes longer as the printing sheet becomes thicker.

Furthermore, if the printing sheet is made thin, the elasticity thereof is relatively small. Accordingly, when the printing sheet is urged onto the media, a pressure distribution of the printing sheet may not be uniform. In order to solve this problem, it is necessary to further provide a cushion member in the stamp. Thus, the number of parts is increased and the producing cost thereof is also increased.

Summary of the Invention

Therefore, the first object of the present invention is to prevent a deformation of a surface of a printing sheet. The second object of the present invention is to increase an amount of ink impregnated in the printing sheet without increasing the number of parts. The third object of the present invention is to make a pressure distribution of the printing sheet uniform.

According to one aspect of the present invention, there is provided a printing sheet including (1) a porous layer in which ink can be impregnated and (2) a fibrous

layer made of fibers. The fibrous layer is provided to one side of the porous layer. The porous layer carries a pattern on a surface thereof. The pattern includes a non-print portion which blocks the permeation of the ink and a print portion which allows the permeation of the ink.

When such printing sheet is used to form image, the printing sheet is mounted to a stamp. The user holds the stamp and forces the stamp to a media (such as a paper) so that the surface of the porous layer is urged against the surface of the media. Ink (impregnated at least in the porous layer) permeates the printing portion of the porous layer, and is transferred onto the media. Thus, image is formed on the media.

In order to accomplish the first object of the present invention, the fibrous layer is so constructed as to prevent a deformation of the porous layer. With such an arrangement, even if the printing sheet is swollen, a surface of the printing sheet is not deformed. Thus, it is prevented that the printed image (on a media) is blurred.

In order to accomplish the second object of the present invention, the fibrous layer is so constituted that ink can be impregnated therein. With such an arrangement, an amount of ink to be impregnated in the printing sheet can be increased, without providing a sponge-like member or the like. Further, since it is no longer necessary to make the printing sheet thicker (for increasing the amount of impregnated ink), the time required to fully impregnate ink throughout the printing sheet does not become long.

In order to accomplish the third object of the present invention, the fibrous layer has a certain elasticity. With such an arrangement, a pressure distribution of the printing sheet (when the printing sheet is urged onto the media) is uniform, even if the porous layer is relatively thin.

Preferably, the fibrous layer includes one of a non-woven fabric and a textile having raised fabrics. In case where the porous layer includes a formed resin, it is preferred that the formed resin of the porous layer and the fabric of the fibrous layer entangle with each other.

According to another aspect of the present invention, there is provided a base sheet (used to produce the printing sheet) including a porous layer in which ink can be impregnated and a fibrous layer made of fibers. A pattern can be formed on a surface of the porous layer, by heating the surface according to desired image.

The present invention will be more clearly understood from the following description, given by way of example only, with reference to the accompanying drawings in which:

Figs. 1A and 1B are a perspective view and a sectional view of a base sheet of a printing sheet according to an embodiment of the present invention; Figs. 2A and 2B are a plan view and a sectional view of a stamp producing device for producing the printing sheet; Fig. 3 is a perspective view of a tray of the stamp

producing device of Figs. 2A and 2B;
 Fig. 4 is a perspective view of the stamp producing device of Figs. 2A and 2B;
 Figs. 5A, 5B and 5C are sectional views illustrating the producing process of the printing sheet;
 Fig. 6 is a perspective view of the printing sheet;
 Fig. 7 is a sectional view of a stamp; and
 Figs. 8A and 8B are an enlarged sectional view of a fibrous portion of the stamp.

Description of the Embodiment

An embodiment of the present invention is described with reference to the accompanying drawings.

Figs. 1A and 1B are a perspective view and a sectional view of a base sheet 12 of a printing sheet of the embodiment. The base sheet 12 includes a porous layer 12a and a fibrous layer 12b integrally provided to the lower side of the porous layer 12a. The porous layer 12a is made of a porous material in which ink can be impregnate. For example, the porous layer 12a is made of foamed resin such as polyolefin-based resin, polyvinyl chloride-based resin or polyurethane-based resin. The porous layer 12a has a certain flexibility and softness, and has a substantially uniform thickness of approximately 0.2 mm to 0.8 mm.

The porous layer 12a contains carbon grains uniformly dispersed therein. When the surface of the base sheet 12 is heated, the heated surface melts such that pores near the surface thereof are sealed. Thus, when the porous layer 12a is selectively exposed to the electromagnetic waves (such as infrared rays) according to desired image, the heated surface of the porous layer 12a becomes a non-print portion which blocks the permeation of ink, while the other portion becomes a print portion which allows the permeation of ink. The content of the carbon grains in the porous layer 12a is from 0.01 to 15 wt%. With such an arrangement, the porous layer 12a is gray and, when heated, turns black. Accordingly, it can be confirmed which of various colors of ink has been impregnated in the porous layer 12a. Further, since the carbon is greater than or equal to 0.01 wt%, the porous layer 12a is easily heated (such that the pores at the surface thereof are sealed) by a standard flash bulb.

The fibrous layer 12b is made of a non-woven fabric that is made by adhering or entangling fibers mechanically, chemically, or thermally. For example, the fibrous layer 12b is made of a felt that is made from nylon fibers, polyester fibers, or polyolefin fibers. Alternatively, the fibrous layer 12b can be made of a raised fabric that is made by raising nap on textile. The porous layer 12a and the fibrous layer 12b are fixed with each other in such a manner that the formed resin material (of the porous layer 12a) is entangled with the fabrics of the fibrous layer 12b. With this, the porous layer 12a and the fibrous layer 12b integrally constitute the base sheet 12.

A method for producing a printing sheet is de-

scribed. Figs. 2A and 2B are a plan view and a sectional view of a stamp producing device 1 used for producing the printing sheet. The stamp producing device 1 includes a unit body 3 accommodating a flash bulb 6 and a tray 2 detachably provided to the unit body 3.

Fig. 3 is a perspective view of the tray 2. Fig. 4 is a perspective view separately showing the unit body 3 and the tray 2. The tray 2 includes a tray body 2a and a transparent cover 2b swingably provided to the tray body 2a. A rectangular concave 2d is provided at the center portion of the tray body 2a, for placing the base sheet 12 and other two sheets (an original sheet 11 and an intermediate sheet 13) thereon. The transparent cover 2b is pivoted by a pin 2g disposed at one side of the tray body 2a so that the transparent cover 2b can be opened or closed. In order to lock the transparent cover 2b in a closed state, a lock lever 2c is provided to the side (of the tray body 2a) opposite to the pin 2g. An engaging portion 2f provided at the tip of the transparent cover 2b. When the lock lever 2c is swing to an erected position (as shown in Fig. 4), the lock lever 2c holds the engaging portion 2f of the transparent cover 2b. When the lock lever 2c is swung to a laid position (as shown in Fig. 3), the lock lever 2c releases the engaging portion 2f so that the transparent cover 2b can be opened. The transparent cover 2b is made of a transparent acrylic resin or the like. The transparent cover 2b is provided with a transparent pressing portion 2e at the bottom thereof, which urges the base sheet 12, the original sheet 11 and the intermediate sheet 13 against the bottom of the concave 2d.

As shown in Fig. 4, the unit body 3 includes a box-shaped case 4. An insertion opening 4a is formed on the lower portion of the front wall of the case 4. The tray 2 can be inserted into the unit body 3 through the insertion opening 4a. A truncated-pyramid-shaped chamber 6 is formed in the upper portion of the case 4. The inner surfaces of the chamber 6 is covered with a film such as aluminum foil, which has a large reflectivity. As shown in Fig. 2A, the flash bulb 6 is detachably mounted to a mounting portion 5a formed on one side wall of the chamber 6. Batteries 8 are provided in the case 4, for supplying power to the flash bulb 6. The batteries 8 are connected to the flash bulb 6 via a contact member 7 provided therebetween. A switch 9 is provided in the vicinity of an internal wall of the case 4. When the tray 2 is inserted through the insertion opening 4a and is accommodated in the unit body 3, the switch 9 is urged by the tray 2 to be turned ON. Then, power is supplied (from the batteries 8) to the flash bulb 6, so that the flash bulb 6 flashes.

The method for producing the printing sheet is described. Figs. 5A, 5B and 5C are schematic views illustrating the method for producing the printing sheet.

First, the original sheet 11 carrying a desired image is described. As shown in Fig. 5A, the original sheet 11 includes a transparent sheet 11a and a photochromic layer 11b formed on the lower surface of the transparent

base sheet 11a. The transparent sheet 11a has substantially uniform thickness and is made of synthetic resin such as polyethylene terephthalate (PET), polyvinyl chloride, or acrylonitrile-butadiene-styrene (ABS) resin. The melting point of the transparent sheet 11a is higher than the melting point of the base sheet 12. In particular, if the transparent sheet 11a is made of PET, the melting point thereof is approximately 230°C. Comparatively, the melting point of the base sheet 12 is approximately 120°C (in case the base sheet 12 is made of plasticized polyurethane-based resin) or approximately 70°C (in case the base sheet 12 is made of plasticized polyolefin-based resin). Thus, when the original sheet 11 and the base sheet 12 are laminated and heated, and when the base sheet 12 melts, the original sheet 11 does not melt.

The photochromic layer 11b has substantially uniform thickness. A shielding portion 11c is formed on the photochromic layer 11b, according to a desired image.

Although the shielding portion 11c has already been formed before the producing of the printing sheet 14, the producing process of the shielding portion 11c is shortly described. The photochromic layer 11b is formed by means of applying (or impregnating) an organic photochromic ink (manufactured by Teikoku Ink Kabushiki Kaisha) on the surface of the transparent sheet 11a. The photochromic layer 11b is normally colorless and transparent but turns blue and non-transparent when exposed to electromagnetic waves including ultraviolet rays. The photochromic layer 11b is selectively exposed to electromagnetic waves including ultraviolet rays, with a negative film placed thereon. With this, the exposed portion of the photochromic layer 11b turns blue and non-transparent. Thus, a shielding portion 11c is formed on the photochromic layer 11b according to desired image. Further, the photochromic layer 11b has a characteristics that the photochromic layer 11b returns colorless and transparent when the photochromic layer 11b is shielded from the radiation of ultraviolet rays for a predetermined time. Therefore, the original sheet 11 can be used as a new original sheet, enabling a user to form new image thereon. The original sheet 11 can be reused many times as long as the photochromic ink is not deteriorated.

The intermediate sheet 13 is placed between the base sheet 12 and the original sheet 11. The intermediate sheet 13 is transparent and its thickness is approximately 0.025 mm to 0.2 mm. The intermediate sheet 13 is made of PET and the melting point thereof is approximately 230°C, which is higher than that of the base sheet 12. Therefore, when the intermediate sheet 13 and the base sheet 12 are laminated and heated, and when the base sheet 12 melts due to heating, the intermediate sheet 13 does not melt.

Before producing the printing sheet, the tray 2 is removed from the unit body 3. Then, the transparent cover 2b of the tray 2 is opened (as shown in Fig. 3), by operating the lock lever 2c to release the engaging portion 2f. Then, the base sheet 12, the intermediate sheet 13

and the original sheet 11 are placed in the concave 2d of the tray 2. In this state, as shown in Fig. 5A, the base sheet 12 is placed so that the fibrous layer 12b is faced downward and that the intermediate sheet 13 is overlaid on the porous layer 12a of the base sheet 12. The original sheet 11 is overlaid on the intermediate sheet 13 so that the photochromic layer 11b of the original sheet 11 contacts the intermediate sheet 13.

After the base sheet 12, the intermediate sheet 13 and the original sheet 11 are placed in the tray 2, the transparent cover 2b is closed. The transparent cover 2b is locked by the engagement of the lock lever 2c and the engaging portion 2f. In this state, the pressing portion 2e of the transparent cover 2b urges the original sheet 11 against the base sheet 12. Then, the tray 2 is inserted into the unit body 3 through the insertion opening 4a (Fig. 2B). When the tray 2 is inserted into the unit body 3, the switch 9 is turned on, so that power is supplied from the batteries 8 to the flash bulb 6. With this, the flash bulb irradiates electromagnetic waves including infrared rays R.

As shown in Fig. 5B, when the flash bulbs 6 flashes, the infrared rays R pass through the transparent cover 2b, the pressing portion 2e and the transparent sheet 11a of the original sheet 11, and irradiated on the photochromic layer 11b. The shielding portion 11c of the photochromic layer 11b blocks the infrared rays (R1 in Fig. 5B) and other portion of the photochromic layer 11b allows the infrared rays (R2 in Fig. 5B) to pass. The infrared rays passing through the photochromic layer 11b reach the porous layer 12a, which heats the porous layer 12 to cause pores thereof to melt and be sealed. Accordingly, a non-print portion 12c is formed on the porous layer 12a, which blocks the permeation of ink. On the other hand, since the infrared rays R1 blocked by the shielding portion 11c do not reach the porous layer 12a, a print portion 12d is formed on the porous resin payer 12a, which allows the permeation of ink. As shown in Fig. 5C, the porous layer 12a (including the print portion 12d and the non-print portion 12c) and the fibrous layer 12b constitute a printing sheet 14. Fig. 6 is a perspective view of the printing sheet 14. The print portion 12d and the non-print portion 12c are formed on the porous layer 12a according to a desired pattern, for example, "E".

Accordingly, the printing sheet 14 including a porous layer 12a carrying a pattern (the print portion 12d and the non-print portion 12c) and the fibrous layer 12b is formed by the above described process.

In the above described process, although the shielding portion 11c of the photochromic layer 11 is heated by the irradiation of the infrared rays, the heat is released via the intermediate sheet 13 (which is in contact with the surface of the photochromic layer 11). Thus, it is prevented that a part of the porous layer 12a which is to be the print portion 12c (corresponding to the shielding portion 11c) is unintentionally heated.

The structure of a stamp 20 using the printing sheet

14 is described. Fig. 7 is a sectional view showing a stamp 20. The stamp 20 includes a handle 24 held by the user and a stamp body 21 provided to the lower end of the grip 24. The stamp body 21 has a recess 22 which opens at the bottom end of the stamp body 21, so that the printing sheet 14 is fit into the recess 22. The stamp body 21 is made of plastic, metal or the like. A fibrous portion 23 is provided in the upper portion of the recess 22, for holding the printing sheet 14. Fig. 8A is a schematically enlarged view showing the fibrous portion 23. As shown in Fig. 8A, the fibrous portion 23 includes a large number of fibers 23a planted on the upper wall of the recess 22 and extending downward therefrom. The fibers 23a are made of synthetic resin or the like. Each fiber 23a has hook-shaped curved portion 23b at the lower end thereof. Alternatively, as shown in Fig. 8B, it is possible that each fiber 23a has an arrowhead-shaped tip.

The handle 24 is detachably provided to the stamp body 21. The stamp body 21 is provided with an ink supply port 25 beneath the handle 24, extends downward to the upper wall of the recess 22. When the handle 24 is detached from the stamp body 21, the ink supply port 25 is opened. In this state, the user can supply ink to the ink sheet 14 through the ink supply port 25.

As shown in Fig. 7, the printing sheet 14 is mounted to the recess 22 in such a manner that the non-woven fabric (or the raised fabric) of the fibrous layer 12b of the printing sheet 14 is entangled with the hook-shaped (or arrowhead-shaped) lower end of the fibers 23a of the fibrous portion 23. Thus, the printing sheet 14 can be mounted to the stamp body 21, by simply urging the printing sheet 14 against the fibrous portion 23.

On using the stamp 20, the user holds the handle 24 and forces the stamp 20 to a not-shown media such as a paper so that the lower surface (printing surface) of the printing sheet 14 is urged against the media. With this, ink impregnated in the fibrous layer 12b is permeated through the print portion 12c of the printing sheet 12 and transferred onto the media. Due to the elasticity of the fibrous layer 12b, a pressure distribution of the printing sheet 14 is uniform, even if the porous layer 12a is swollen.

On replacing the printing sheet 14, the printing sheet 14 can be easily removed from the recess 22 by simply peeling the printing sheet 14 from the fibrous portion 23. With this, the non-woven fabric (or the raised fabric) of the fibrous layer 12b of the printing sheet 14 is released from the fibers 23a of the fibrous portion 23. Therefore, a various kind of printing sheets 14 can be mounted to the stamp body 21, to form various kinds of images on the media.

The fibrous layer 12b has a characteristics such that the fibrous layer 12b is not swollen even if ink is impregnated therein. Since the porous layer 12a is integrally formed with the fibrous layer 12b, the deformation of the surface of the porous layer 12a is prevented, even if the porous layer 12a is swollen.

The amount of ink impregnated in the fibrous layer 12b is larger than that of the porous layer 12a. Thus, it is not necessary to provide a separate ink impregnating member (sponge-like mat or the like) other than the printing sheet 14. Further, since spaces between fabrics of the fibrous layer 12b is larger than pores of the porous layer 12b, the ink can be impregnated into the printing sheet 14 in a short time.

Furthermore, since the fibrous layer 12b has an elasticity, the printing sheet 14 also has an elasticity. Due to the elasticity of the printing sheet 14, it is possible to apply a uniform pressure throughout the printing surface without providing a separate cushion member. Thus, a clear image is formed on a media.

Although the structure of a present invention is described herein with respect to the preferred embodiment, many modifications and changes can be made without departing from the spirit and scope of the invention.

For example, in the above-described embodiment, the flash bulb 6 is used as a heat source for melting the porous layer 12a of the base sheet 12. However, the flash bulb 6 can be replaced by a xenon tube or other light source which emits infrared rays. Also, the flash bulb 6 can be replaced by a heat generator such as a thermal head.

Further, the original sheet 11 can be replaced by a tracing paper or other paper which allows the electromagnetic waves to pass and which carries an image with shielding ink of a desired color (such as, black, white, gold, and silver). Still further, the porous layer 12a of the base sheet 12 can be made of any foamed material which has flexibility when formed into a porous sheet. Furthermore, carbon grains dispersed in the porous layer 12a can be replaced by any substance which generates heat due to heating when irradiated by electromagnetic waves (for example, a high-molecular substance such as silver chloride and silver bromide, or a light energy absorbing substance).

Claims

1. A printing sheet used in a stamp, said printing sheet comprising:
 - a porous layer in which ink can be impregnated; and
 - a fibrous layer made of fibres, said fibrous layer being provided to one side of said porous layer; wherein said porous layer carries a pattern on a surface thereof, said pattern including a non-print portion which blocks the permeation of said ink and a print portion which allows the permeation of said ink.
2. A base sheet used to produce a printing sheet used in a stamp, said base sheet comprising:

a porous layer in which ink can be impregnated;
and
a fibrous layer made of fibres,
wherein a pattern can be formed on a surface
of said porous layer by heating said surface ac-
cording to desired image, said pattern including
a non-print portion which blocks the permeation
of said ink and a print portion which allows the
permeation of said ink.

3. The sheet according to claim 1 or 2, wherein said
fibrous layer prevents a deformation of said porous
layer.

4. A base sheet used to produce a printing sheet used
in a stamp, said base sheet comprising:

a porous layer in which ink can be impregnated;
and
a deformation preventing material which pre-
vents a deformation of said porous layer,
wherein a pattern can be formed on a surface
of said porous layer by heating said surface ac-
cording to desired image, said pattern including
a non-print portion which blocks the permeation
of said ink and a print portion which allows the
permeation of said ink.

5. The sheet according to claim 4 wherein the defor-
mation preventing material comprises a fibrous lay-
er made of fibres.

6. The sheet according to any one of claims 1 to 3 and
5, wherein said fibrous layer is so constituted that
ink can be impregnated therein.

7. The sheet according to any one of claims 1 to 3, 5
and 6 wherein said fibrous layer has a certain elas-
ticity.

8. The sheet according to any one of claims 1 to 3 and
5 to 7, wherein said fibrous layer comprises one of
a non-woven fabric and a textile having raised fab-
rics.

9. The sheet according to any one of claims 1 to 3 and
5 to 8, wherein said porous layer comprises a
formed resin, and

wherein said formed resin of said porous layer
and said fabric of said fibrous layer entangle with
each other..

10. The sheet according to any one of claims 1 to 3 and
5 to 9, wherein said porous layer includes a heat-
generating material which generates heat when ex-
posed to electromagnetic waves.

11. The sheet according to claim 10, wherein said po-

rous layer includes carbon grains, and said carbon
grains generate heat when exposed to infrared
rays.

5 12. A stamp comprising:

a stamp body; and
a sheet according to any preceding claim
mounted to said stamp body;
wherein said porous layer carries a pattern on
a surface thereof, said pattern including a non-
print portion which blocks the permeation of
said ink and a print portion which allows the per-
meation of said ink.

13. The stamp according to claim 12, further comprising
a fibrous portion provided to said stamp body, said
fibrous layer being fixed to said fibrous portion.

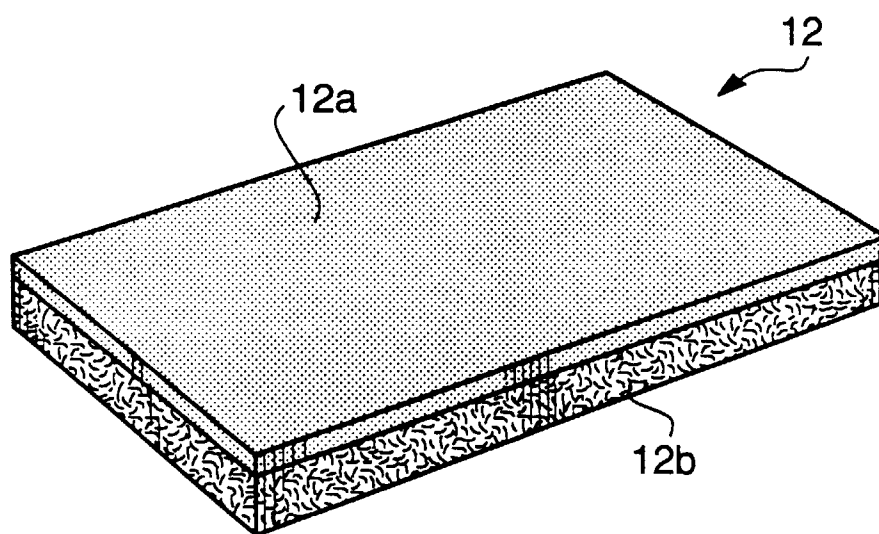


FIG. 1A

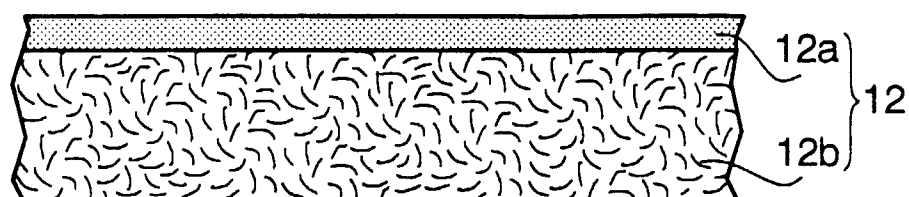


FIG. 1B

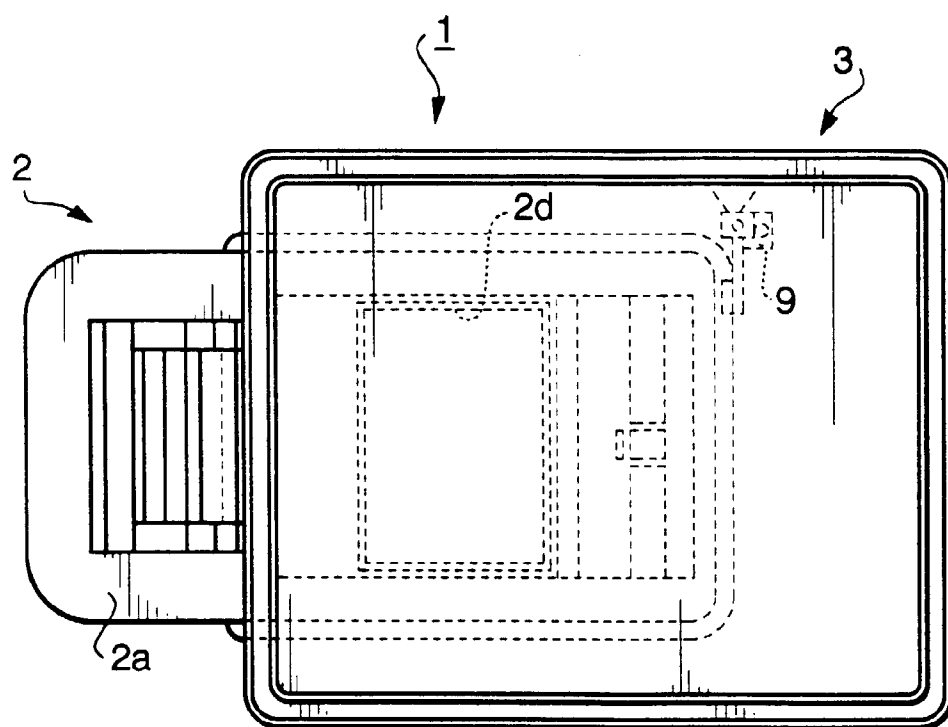


FIG. 2A

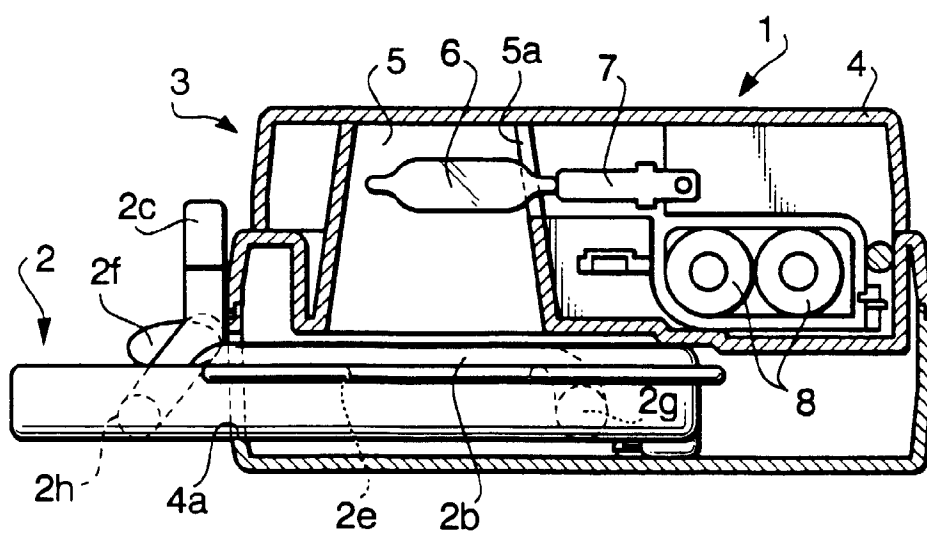


FIG. 2B

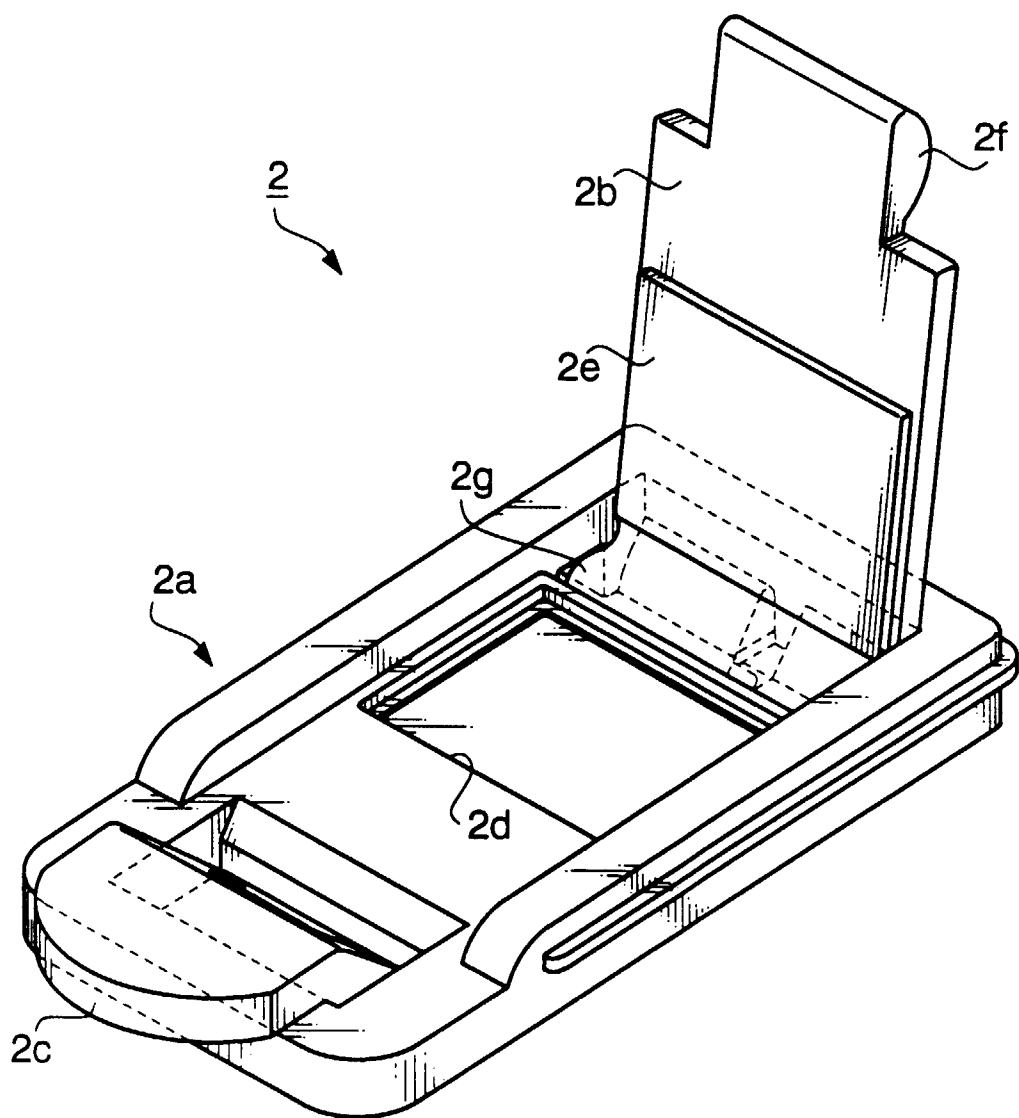
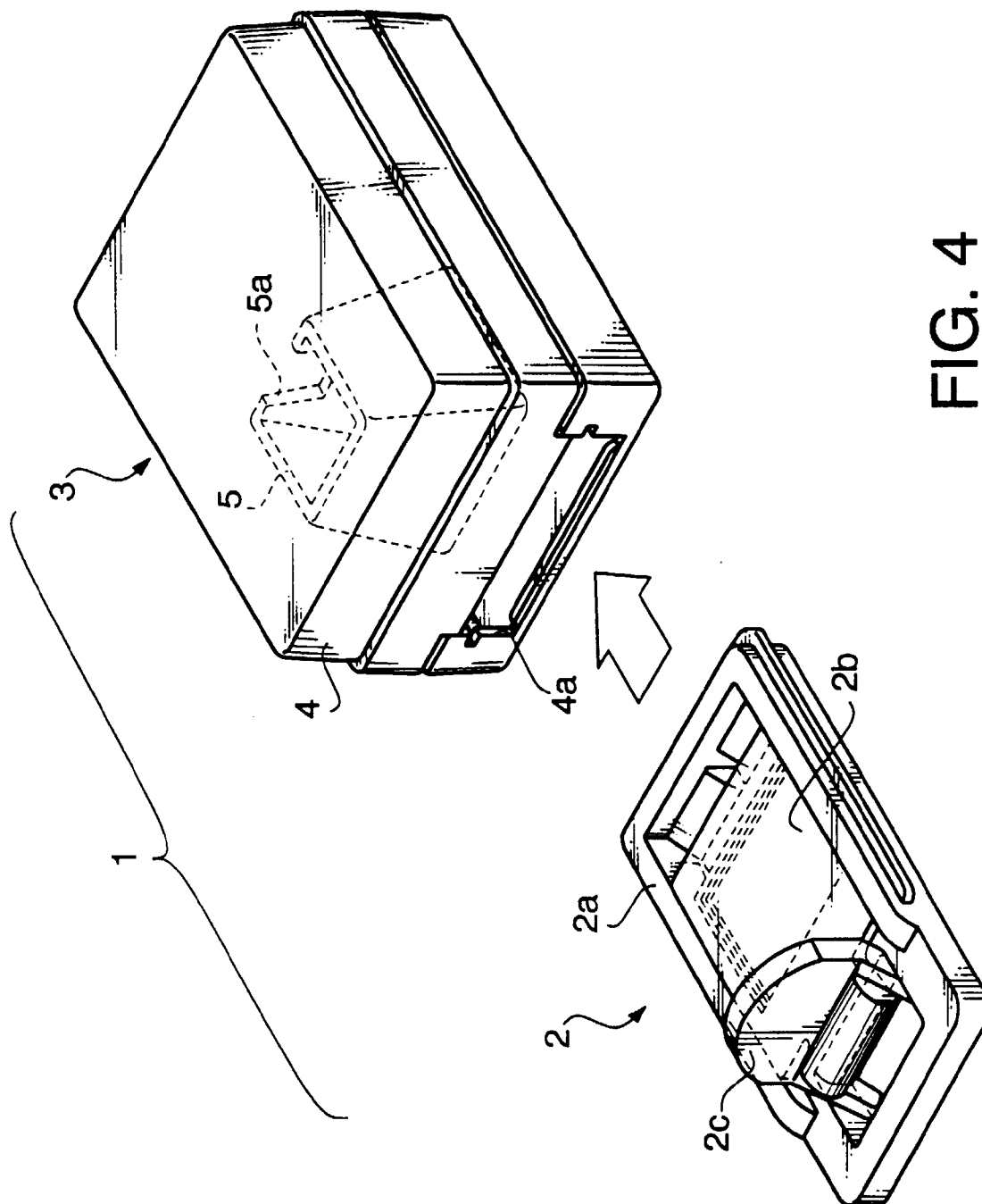


FIG. 3



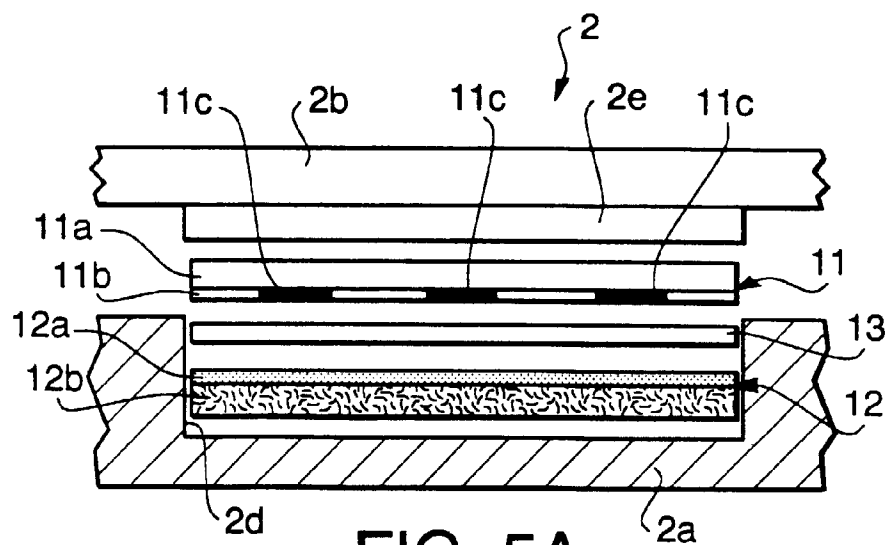


FIG. 5A

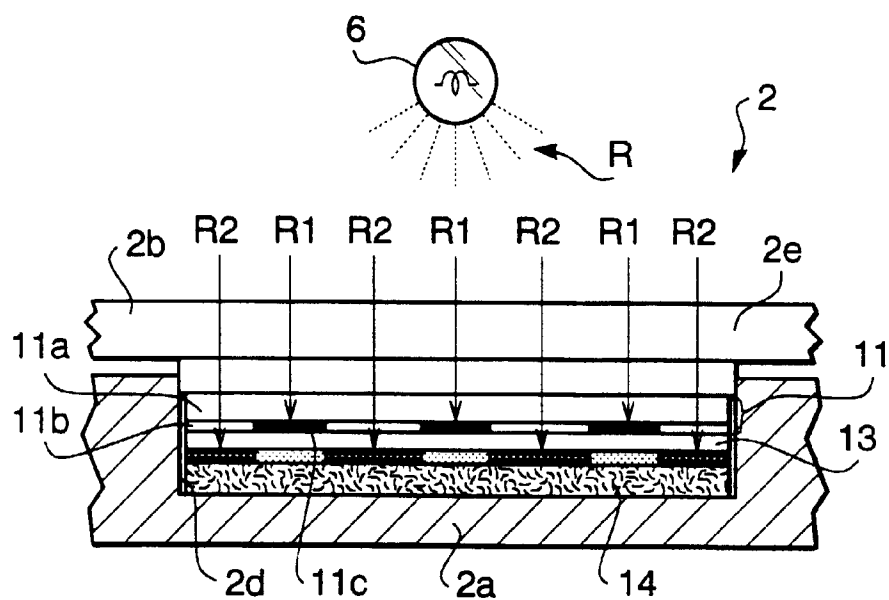


FIG. 5B

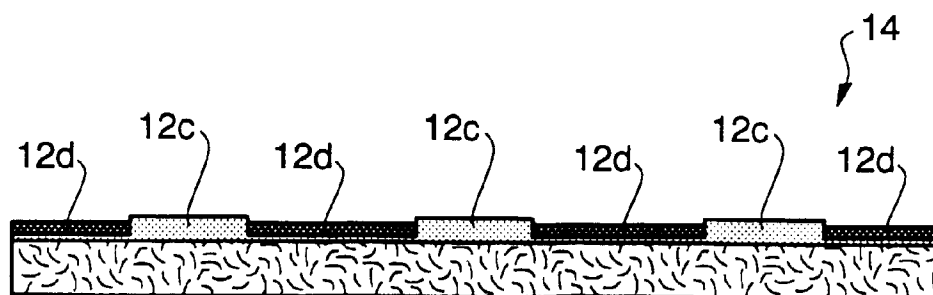


FIG. 5C

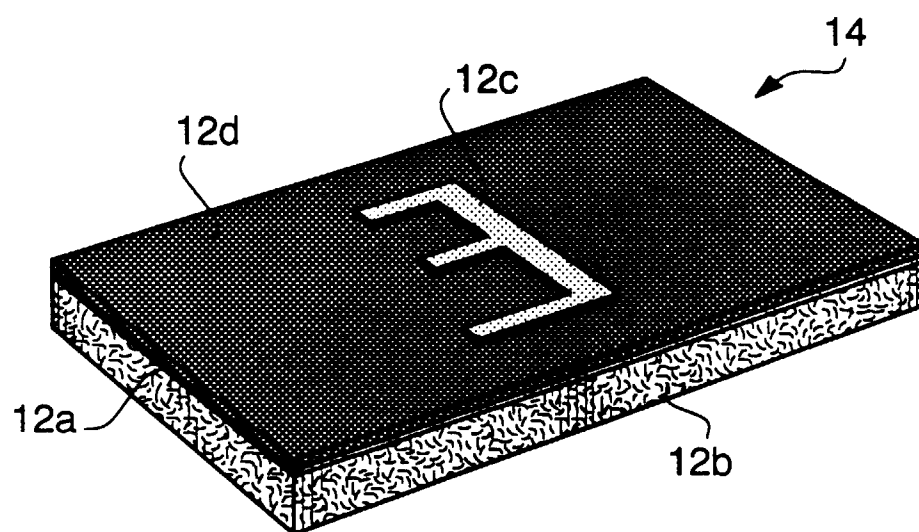


FIG. 6

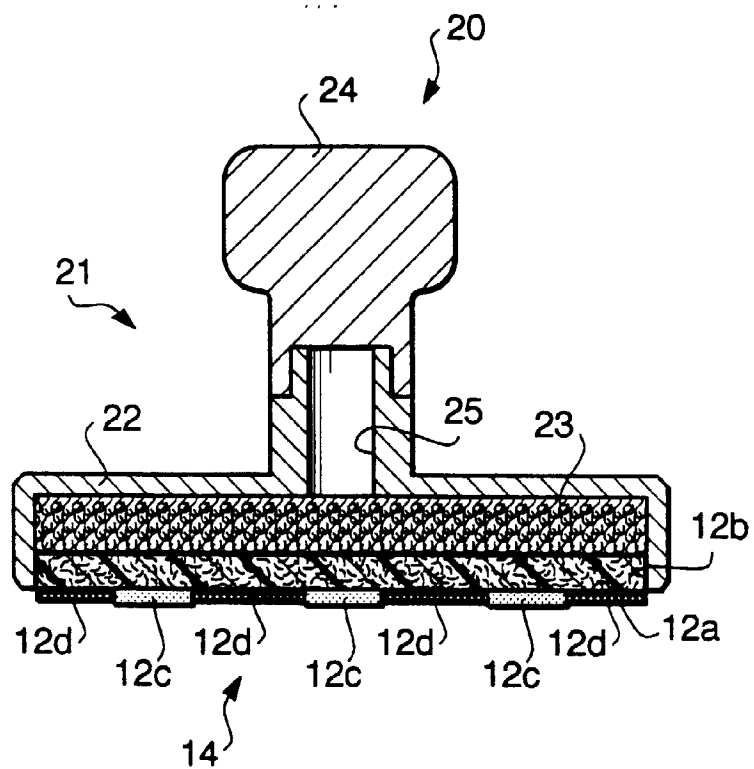


FIG. 7

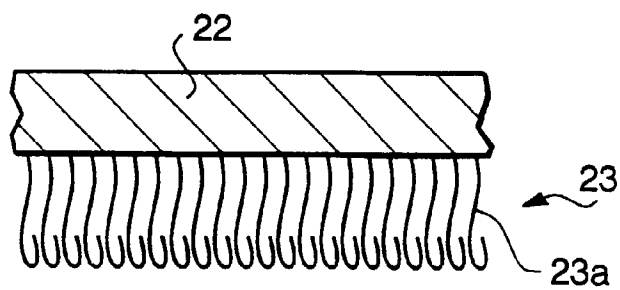


FIG. 8A

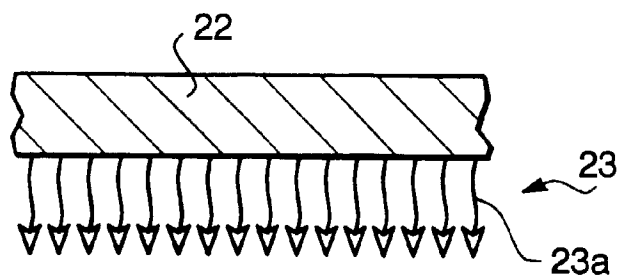


FIG. 8B



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 2291

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.6)
X	US 5 392 711 A (KAINUMA) 28 February 1995	1	B41M5/36
Y	* column 1, line 53 - line 68 *	2-13	B41C1/055
	* column 2, line 22 - column 3, line 19; figures 1,2 *		

Y	WO 96 22874 A (HUMAL) 1 August 1996	2-13	
	* page 1, line 8 - line 16 *		
	* page 10, line 21 - page 12, line 37; claims 1-4 *		

Y	US 5 611 279 A (ANDO ET AL.) 18 March 1997	2-13	
	* column 9, line 1 - line 26; claims 1-22; figures 2-8 *		

Y	GB 2 297 717 A (GENERAL) 14 August 1996	2-13	
	* page 7, line 6 - line 17; claims 1-7 *		

			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B41M B41C B41K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 July 1998	Examiner Magrizos, S
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