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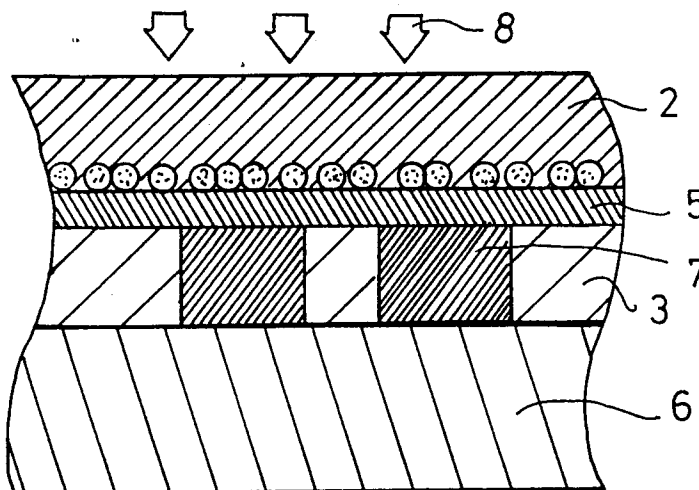
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(54) **Stencil printed method and heat-sensitive stencil sheet**

(57) A stencil printing method in which printing ink is smoothly supplied to perforations formed in a thermoplastic resin film of a stencil sheet, thereby providing clear print images. Also disclosed is a heat-sensitive stencil sheet which is used in such a method. The method comprises forming a perforated image made up of a multiplicity of independent discontinuous perforations in the thermoplastic resin film by a perforated image-forming device, supplying a printing ink capable of dissolving said adhesive from the side of the ink-permeable sheet, so as to dissolve said adhesive and pass through the perforated image of the resin film, thereby effecting stencil printing on the printing medium. The heat-sensitive stencil sheet of the invention has a structure in which an adhesive contained therein is dissolved by the printing ink supplied to the stencil sheet during printing.

FIG. 1B



The present invention relates to a stencil printing method and a heat-sensitive stencil sheet. More particularly, the invention relates to a stencil printing method which easily provides stencil-printed materials exhibiting clear images, and a heat-sensitive stencil sheet which is used in such a method.

Conventionally, heat-sensitive stencil sheets are obtained by joining an ink-permeable sheet and a thermoplastic resin film with an adhesive. The ink-permeable sheet is generally a screen made of synthetic fibers woven into reticulated grids or washi (Japanese paper) made of natural fibers, synthetic fibers, or mixtures thereof. The ink-permeable sheet and thermoplastic resin film are adhered to each other in such a manner that the sheet and film are superposed on each other, after which an adhesive solution is applied on the sheet's side for joining the two. Alternatively, after an adhesive is coated on the surface of an ink-permeable sheet (or a thermoplastic resin film), the sheet (or the film) is superposed on the adhesive side of the film (or the sheet). Subsequently, pressure is applied for adhesion.

In stencil printing, a thermoplastic resin film of a heat-sensitive stencil sheet is heated by a thermal head, laser beams, or similar means to melt and form perforated images, which step will be referred to as stencil-making. Thereafter, printing ink is supplied from the ink-permeable sheet's side to transfer the images onto a print medium such as paper.

Therefore, an ink-permeable sheet has the following very important functions in stencil printing. (1) Due to the presence of an ink-permeable sheet, a thermoplastic resin film which is mechanically weak can be handled easily and transported efficiently. (2) In order to prevent the thermoplastic resin film encircled, for example, by a closed line like "○" from falling off the film and causing the whole inside area of the circle to be painted out by the ink, a thermoplastic resin film supports the inside of the encircled part of the film not to come off. (3) When a thermoplastic resin film is heated to have perforations, an ink-permeable sheet allows the molten film at the heated points to easily move away in directions parallel to the film surface to make perforating of the film efficient.

However, since the above-mentioned ink-permeable sheet is joined to a thermoplastic resin film with an adhesive, transferring of the printing ink in a horizontal direction along the film surface is blocked by portions to which the adhesive is applied, impeding flowing of the printing ink into the perforations of the film. Moreover, since the ink-permeable sheet is composed of natural fibers or synthetic fibers, knotted portions inevitably exist where fibers are entangled. These knotted portions prevent printing ink from transferring in a direction normal to the film surface of the printing ink, i.e., passing through the perforations. This causes a shortage of the supply of printing ink onto a thermoplastic resin film, forming a white portion on the portion of the printing paper to be printed, resulting in incomplete print images.

In order to remove obstructions to smooth ink transfer through the ink-permeable sheet, it has been attempted for a high pressure to be applied to a printing ink to increase the amount of the ink that passes the ink-permeable sheet to solve the shortage of ink supply to the perforation portions. However, this approach has the drawback that the amount of ink that passes through perforated areas with a smaller number of fibrous knots increases as the pressure of the printing ink increases, which causes excessive amounts of ink to be transferred to the printing paper, reducing the clarity of printed images.

In an attempt to prevent a reduction in clarity of printed images causable by the presence of an ink-permeable sheet, Japanese Patent Application Laid-open (kokai) No. 5-318,900 discloses a stencil printing apparatus in which a heat-sensitive stencil sheet undergoes stencil making, after which a porous support and a thermoplastic resin film are peeled off, and subsequently only the thermoplastic resin film is set in the printing apparatus to carry out stencil-printing. With this apparatus, however, a new step is required for peeling off the porous support and the thermoplastic resin film after stencil-making, and in addition, the thermoplastic resin film tends to become creased when it is set in the printing apparatus.

The present inventors made careful studies of the above problems and found that if perforated images are formed with a multiplicity of independent discontinuous perforations, the portions of a thermoplastic resin film which have been encircled with such discontinuous perforations will not fall off and that an ink-permeable sheet is in fact unnecessary in the printing step. Based on these findings, the inventors found that supply of a printing ink to the perforated portions of the thermoplastic resin film can be carried out smoothly without being hindered at adhesive portions or knotted portions of fibers in a stencil printing method in which an ink-permeable sheet and thermoplastic resin film are maintained joined to each other during the step of stencil-making since this step requires ease in handling of heat-sensitive stencil sheets, and that the adhesive which combines the ink-permeable sheet and thermoplastic resin film is dissolved during the printing step of supplying a printing ink to perform a stencil printing in the state where these two are uniformly separated.

Accordingly, it is an aim of the present invention to overcome the drawbacks of the prior art and to provide a stencil printing method which does not hinder a printing ink from passing through an ink-permeable sheet and supplies a printing ink easily into perforated portions of a thermoplastic resin film, thereby producing clear printing images.

It is another aim of the present invention to provide a heat-sensitive stencil sheet which is used for the above method.

In one aspect of the present invention, there is provided a stencil printing method of printing an image on a printing medium using a heat-sensitive stencil sheet comprising an ink-permeable sheet and a thermoplastic resin film adhered to each other by an adhesive, the method comprising forming a perforated image made up of a multiplicity of independent discontinuous perforations in the thermoplastic resin film by a perforated image-forming device, supplying a printing ink capable of dissolving said adhesive from a side of the ink-permeable sheet, so as to dissolve said adhesive and pass through the perforated image of the resin film, thereby effecting stencil printing on the printing medium.

Preferably, the primary component of the adhesive is a water-soluble resin capable of being dissolved by moisture contained in the printing ink (emulsion ink) supplied to the heat-sensitive stencil sheet.

The present invention also provides a heat-sensitive stencil sheet which is used in the method as described above.

Preferably, the heat-sensitive stencil sheet is comprises an ink-permeable sheet and a thermoplastic resin film adhered to each other by an adhesive, said adhesive essentially consisting of a water-soluble resin.

The above and other aims, features and advantages of the present invention will become apparent from the following description.

Preferred embodiments of the present invention will now be described hereinbelow by way of Example only with reference to the accompanying drawings, in which:

Fig. 1A is a sectional view showing the heat-sensitive stencil sheet which is used in the stencil printing method of the present invention;

Fig. 1B is an illustration showing the state of the heat-sensitive stencil sheet which is undergoing a printing operation;

Fig. 2 is a simplified illustration of a microscopic photograph of a perforated heat-sensitive stencil sheet; and

Fig. 3 is a structure of a stencil printing apparatus used for the stencil printing method of the present invention.

In Figs. 1A and 1B, a heat-sensitive stencil sheet 1 is composed of an ink-permeable sheet 2 made of fibers 9 and a thermoplastic resin film 3 which are adhered to each other with an adhesive 4 dissolvable by the printing ink. Perforations 7 are formed in the thermoplastic resin film 3 of stencil sheet 1 when the resin melts by heat generated from a thermal head or laser beams (not illustrated). It should be noted that the perforations 7 are independent discontinuous through holes, and perforated images are a set of a multiplicity of such through holes. If the perforations are made continuous as in the case where light is irradiated on the original image to generate heat for making through holes in the thermoplastic resin film, the portions encircled by the continuous line falls off when the sheet 2 and film 3 are separated at the time of printing, causing poor and unclear printing images.

When printing ink 8 is supplied from the side of ink-permeable sheet 2 of perforated heat-sensitive stencil sheet 1, the adhesive 4 of the sheet 1 is dissolved by the printing ink 8 to separate the ink-permeable sheet 2 and thermoplastic resin film 3. As a result, even when there are knotted portions of fibers 9 in the ink-permeable sheet, the printing ink 8 which has passed through the ink-permeable sheet transfers in a horizontal direction on the surface of the film 3 to form an ink layer 5, allowing the printing ink 8 to be supplied easily to the perforated portions 7 of the film 3. Printing images obtained by transferring the printing ink 8 onto a printing paper 6 do not have blank portions to which the ink has not been transferred. Accordingly, clear and complete images can be obtained. The adhesive 4 which has been dissolved also passes through the perforations 7 together with the printing ink 8 and is transferred to the printing paper 6.

In Figs. 1A and 1B, the stencil sheet 1 is shown on a magnified scale for easy understanding. However, it should be born in mind that the thickness of the thermoplastic resin film 3 and adhesive 4 is very small compared to that of the ink-permeable sheet 2. In addition, the fibers 9 of the ink-permeable sheet are adhered to the film 3 in a manner substantially in contact with the film 3. Moreover, the ink layer 5 shown in Fig. 1 is also very thin like adhesive 4 compared to the ink-permeable sheet 2.

As the ink-permeable sheet 2, conventional porous sheets are used. When washi papers made from natural fibers or synthetic fibers are used, the thickness is preferably from 30 to 50 μm , and when screens of synthetic fibers woven into rectangular grids are used, the thickness is preferably as much as 50 to 100 μm .

Examples of the thermoplastic resin film 3 include conventional polyester films, polyethylene films, and polypropylene films. The thickness is generally from 0.5 to 20 μm , and preferably from 0.5 to 10 μm . As described above, the perforated images formed in the film 3 are constituted by a multiplicity of small point-like through holes which have been formed discretely and discontinuously by a thermal head or laser beams. The size of the perforations 7 is generally not more than 60 μm , and preferably not more than 45 μm , although it

varies depending on the size of the heat generating element.

The adhesive is not particularly limited as long as it is dissolved in the printing ink used for printing. When the printing ink is an emulsion, the adhesive is preferably a water-soluble resin which is capable of dissolving in the presence of moisture contained in the emulsion ink. Water-soluble adhesives are also recommended from the viewpoints of confidentiality and cleanliness because sheets which incorporate them are easily and completely separated into films 3 and sheets 2 by the application of water to the waste or discarded heat-sensitive stencil sheets. The thickness of the adhesive 4 is usually equal to or less than 1.0 μm .

Fig. 2 is a simplified illustration of a micrograph at a magnification of x200 taken from the side of the thermoplastic resin film 3 after a heat-sensitive stencil sheet 1 of the present invention made by joining an ink-permeable sheet 2 to a film 3 to which an adhesive 4 has been applied is perforated using a thermal head to have point-like holes. In the film 3 of heat-sensitive stencil sheet 1 which has been perforated, the ink-permeable sheet 2 can be seen through the perforations 7. The ink-permeable sheet 2 has knotted portions 9a of fibers contained in the sheet 2 which hinder the passage of ink.

In the present invention, printing ink enters between the thermoplastic resin film 3 and the ink-permeable sheet 2 which have been separated, and the ink transfers horizontally on the surface of the film 3 into the perforations 7. Therefore, the presence of the fiber knotted portions 9a does not affect the passage of the printing ink through the perforations.

Fig. 3 shows a structure of a stencil-printing apparatus used for the stencil printing method of the present invention.

The stencil-printing apparatus mainly comprises a thermal head 10 which perforates a heat-sensitive stencil sheet 1, a printing drum 12 which winds up the perforated heat-sensitive stencil sheet 1, an ink-application roller 26 and squeeze roller 25 disposed inside the printing drum 12, paper-feeding roller 20 which supplies printing paper 19 onto the surface of the printing drum 12 corresponding to the rotation of the heat-sensitive stencil sheet 1 wound up on the printing drum 12 and a pair of paper-transferring rollers 23, a press roller 24 which presses the printing paper 19 which has been supplied against the surface of the printing drum 12, a sheet-stripping claw 14 which removes the used stencil sheet which has been used for printing from printing drum 12, a disposing box 15, a separation claw 28 which picks up for removing the leading end of the printing paper 19 which has been printed from the stencil sheet 1, and a paper discharge tray 29 which receives the thus-removed printing paper 19.

In this structure, the heat-sensitive stencil sheet 1 (hereinafter sometimes referred to simply as a master) is wound up into a roll such that in ink-permeable sheet 2 (hereinafter sometimes referred to simply as a sheet) is placed outside and a thermoplastic resin film 3 (hereinafter sometimes referred to simply as a film) is placed inside. The stencil 1 is transferred by a platen roller 11 so that the film 3 is closely in contact with the thermal head 10, and the stencil 1 is perforated by the thermal head 10 to form perforated images composed of many discontinuous holes. The thermal head 10 is a known device with a multiplicity of heat generating elements disposed in lines. Each heat generating element is selectively heated when heat generating electric signals are applied thereto according to the desired images to melt-perforate the corresponding portions. The leading end of stencil 1 which has been perforated by thermal head 10 is supported by a pair of stencil transferring rollers 16, and it waits to be set onto the printing drum 12 in a loose state.

After the completion of printing, a used stencil sheet remaining on the printing drum 12 is picked up at its leading end by a clamp board 13 as the printing drum 12 rotates, stripped off from the printing drum 12 by the stencil stripping claw 14, and discarded in the disposing box 15.

The stencil 1 which has undergone a stencil making-step and is in the waiting position is transferred by the stencil transferring rollers 16. The leading end of the stencil 1 is clipped by a clamp board 13, and one piece of the stencil sheet 1 is cut by a cutter 17 and wound on the printing drum 12 as the printing drum 12 rotates.

When the printing drum 12 rotates counterclockwise (in Fig. 3) for printing, the sheets of the stacked printing paper 19 placed on a paper-feeding table 18 are fed one by one from the top of the stack by the paper feeding roller 20 and the paper friction pad 21. The paper friction pad 21 is in contact with a paper feeding roller 20 under pressure by a spring 22. The printing paper 19 which has been fed is transferred between the press roller 24 and the printing drum 12 according to a predetermined timing.

On the other hand, when the printing drum 12 rotates, the squeeze roller 25 disposed inside the printing drum 12 rotates, and the ink in an ink reservoir 27 formed between the squeeze roller 25 and an ink application roller 26 which is disposed in parallel to the squeeze roller 25 is applied to the surface of the squeeze roller 25. The ink is supplied to the ink reservoir 27 by an ink-supplying mechanism which is not shown. The printing ink applied onto the squeeze roller 25 is supplied, by the pressure of the press roller 24, to the stencil 1 wound on the printing drum 12. When printing ink is supplied to the stencil 1, the ink dissolves the adhesive 4 of the stencil 1 to separate the sheet 2 and the film 3, between which an ink layer 5 is formed. From the ink layer 5,

ink is supplied to the perforations 7 of the film 3. The ink in the perforations 7 is transferred to the printing paper 19 fed between the press roller 24 and the printing drum 12, performing printing. The printing paper 19 which has been printed as a result of the transfer of the printing ink is removed from the printing drum 12 by a separation claw 28 and conveyed to a paper discharge tray 29.

The adhesive 4 dissolved by the printing ink is transferred to the printing paper 19 together with the printing ink which passes the perforations 7. Even if the adhesive 4 of the heat-sensitive stencil sheet 1, not being completely dissolved by the ink, stays in a swollen or softened state, the film 3 and the sheet 2 can be separated by the pressure applied by the press roller 24. The printing drum 12, in a development view, has a laminar structure of a plurality of rectangular ink-permeable sheets. Printing ink is supplied to the approximately central part of the heat-sensitive stencil sheet 1 set onto the printing drum 12 but not to the peripheral edges of the stencil 1. It is preferred that the part of the stencil 1 in which perforated images are formed be smaller than the approximately central part in order that the printing ink sufficiently spreads between the film 3 and sheet 2.

In the present invention, the ink-permeable sheet and the thermoplastic resin film can be separated by the application, to the perforated stencil sheet, of a solvent capable of dissolving the adhesive from the side of the ink-permeable sheet to separate the ink-permeable sheet and the thermoplastic resin film over substantially entire face of the stencil sheet before the ink is supplied to the perforated stencil sheet. Alternatively, a solvent which is capable of dissolving the adhesive is applied through the perforations from the side of the thermoplastic resin film of the stencil sheet to separate the ink-permeable sheet and the thermoplastic resin film including the peripheral portions of the perforations. However, it is more preferred to avoid an additional step that separation be done by dissolving the adhesive with the supplied printing ink which to uniformly separate the sheet and the film.

According to the stencil printing method of the present invention, it is possible to use conventional stencil printing apparatuses and to perform stencil printing by the conventional procedure, that is, to make perforations in the stencil sheet under such conditions that the ink-permeable sheet and thermoplastic resin film are adhered to each other before setting the stencil sheet onto the printing drum. Accordingly, handling and transportation of stencil sheets are not lowered as easy as with conventional stencil sheets, and in addition, the stencil sheets will not be creased when they are set onto the printing drum. During the printing step, when the ink-permeable sheet and the thermoplastic resin film, both of which form the stencil sheet, are separated by the application of printing ink, perforated images do not fall off from the film since the perforated portions are composed of discontinuous and independent through holes, and in addition, the ink can be smoothly supplied to perforations of the film without being blocked by the adhered portions due to the adhesive or by the knotted portion of fibers, providing very clear printed images. Moreover, in the peripheral portions of the stencil sheet to which printing ink is not supplied, the sheet and the film are maintained joined, and used stencil sheets after printing can be easily dealt with.

Preferably, the heat-sensitive stencil sheet of the present invention is manufactured either by applying an adhesive to a thermoplastic resin film, after which an ink-permeable sheet is adhered thereto, or an adhesive is applied to a surface of an ink-permeable sheet, after which a thermoplastic resin film is adhered thereto. When perforations are formed in the film using heat generating elements of a thermal head, known parting agents such as silicone oils may be applied to the contact surface of the film and the heat generating elements in order to prevent fusion of the elements and the film.

Examples:

The present invention will be described in more detail by way of examples, which should not be construed as limiting the invention. Heat-sensitive stencil sheets A and B, and printing inks A, B, and C used in the following Examples and Comparative Examples were prepared as follows:

(1) Manufacture of heat-sensitive stencil sheet A:

A 5 wt% aqueous solution of Paogen EP-15 (product of Daiichi Kogyo Seiyaku K.K.), which is water-soluble, was prepared and used as an adhesive. The aqueous solution was applied onto a polyester film with a thickness of 2 μm using a mayer bar (4 mill). Subsequently, the resulting film was laminated with washi paper having an air-permeability of 100 cc/cm²-sec and a thickness of 35 μm , and dried with hot air applied from the washi paper side, obtaining a heat-sensitive stencil sheet A.

(2) Manufacture of heat-sensitive stencil sheet B:

A 5 wt% methanol solution of a vinyl acetate resin (product of Konishi Co., Ltd.) was prepared and used as an adhesive. A polyester film with a thickness of 2 μm and washi paper having an air-permeability of 100 cc/cm²-sec and a thickness of 35 μm were laminated on each other, after which the methanol solution was applied thereto from the washi paper side using a mayer bar (4 mill) and dried with hot air, ob-

taining a heat-sensitive stencil sheet B.

(3) Manufacture of printing ink A:

A w/o emulsion ink with the following formulation was prepared.

	Furnace carbon black	3 parts by weight
5	Ink solvent 240	14 parts by weight
	Rosin-modified phenolic resin	9.8 parts by weight
	Sorbitan sesquileate	parts by weight
	Dibutylhydroxytoluene	0.1 parts by weight
	Distilled water	65 parts by weight
10	Sodium sulfate	3 parts by weight
	Para-hydroxybenzoic acid	0.1 parts by weight

(4) Manufacture of printing ink B:

An o/w emulsion ink with the following formulation was prepared.

	Color base	20 parts by weight
15	(Micropigmo Black WMBK-5, by Orient Chemical Industries)	
	Acrylic resin emulsion	75 parts by weight
	Distilled water	4 parts by weight
	Polyvinyl alcohol	1 parts by weight

(5) Manufacture of printing ink C:

A solvent-type ink with the following formulation was prepared.

20	Furnace carbon black	4 parts by weight
	Polyester resin	20 parts by weight
	Isophorone	11 parts by weight
	Cyclohexane	11 parts by weight
25	Butyl cellosolve acetate	34 parts by weight
	Barium sulfate	20 parts by weight

Example 1:

30 Stencil printing was carried out using an integral-type stencil printing apparatus (Trademark: Risograph RC115, product of Riso Kagaku Co., Ltd.), a heat-sensitive stencil sheet A, and printing ink A. The adhesive in the stencil sheet was dissolved by the water in the ink, and printing was performed under conditions where the polyester film and washi paper were separated. As a result, very clear printing images were obtained without causing blurring even in solid parts of the printed images.

Example 2:

40 Stencil printing was carried out using an integral-type stencil printing apparatus (Trademark: Risograph RC115, product of Riso Kagaku Co., Ltd.), a heat-sensitive stencil A, and printing ink B. The adhesive in the stencil sheet was dissolved by the water in the ink, and printing was performed under conditions where the polyester film and washi paper were separated. As a result, very clear printing images were obtained without causing blurring even in solid parts of the printed images.

Example 3:

45 Stencil printing was carried out using an integral-type stencil printing apparatus (Trademark: Risograph RC115, product of Riso Kagaku Co., Ltd.), a heat-sensitive stencil sheet B, and printing ink C. The adhesive in the stencil sheet was dissolved by the water in the ink, and printing was performed under conditions where the polyester film and washi paper were separated. As a result, very clear printing images were obtained without causing blurring even in solid parts of the printed images.

Comparative Example 1:

55 Stencil printing was carried out using an integral-type stencil printing apparatus (Trademark: Risograph RC115, product of Riso Kagaku Co., Ltd.), a heat-sensitive stencil sheet B, and printing ink A. Since the printing was performed under conditions where the polyester film and washi paper were not separated, white portions caused by insufficient transfer of ink were formed in solid parts of the printed images. Therefore, the resulting printed images were poor and not clear.

According to the stencil printing method of the present invention, the following advantages are obtained. (1) Conventional stencil printing apparatuses can be used. (2) Stencil sheets can be handled and transported with ease, and in addition, stencil sheets are not creased when they are set onto the printing drum. (3) During printing, ink can be easily supplied to perforations of the film without being blocked by the adhering portions by the adhesive or by knotted portions of fibers, resulting in very clear printed images. (4) The peripheral portions of the stencil sheet to which printing ink is not supplied maintain a state in which the sheet and the film are joined, and the used stencil sheet after printing can be easily discarded.

Moreover, since passage of ink is not blocked by the adhering portions of the sheet and the film or by the knotted portions of fibers, and therefore, obstructed passage of ink is no longer a factor to be considered, ink-permeable sheets can be selected very freely with respect to its ink-permeability. In addition, adhesives can also be selected quite freely. Accordingly, easy manufacture and a reduction in manufacture costs can be ensured.

Claims

1. A stencil printing method of printing an image on a printing medium using a heat-sensitive stencil sheet comprising an ink-permeable sheet and a thermoplastic resin film adhered to each other by an adhesive, the method comprising forming a perforated image made up of a multiplicity of independent discontinuous perforations in the thermoplastic resin film by a perforated image-forming device, supplying a printing ink capable of dissolving said adhesive from a side of the ink-permeable sheet, so as to dissolve said adhesive and pass through the perforated image of the resin film, thereby effecting stencil printing on the printing medium.
2. The stencil printing method according to Claim 1, wherein the adhesive comprises, as its primary component, a water-soluble resin capable of being dissolved by water contained in the printing ink.
3. A heat-sensitive stencil sheet which is used in the method as defined in Claims 1 or 2.
4. A heat-sensitive stencil sheet comprising an ink-permeable sheet and a thermoplastic resin film adhered to each other by an adhesive, said adhesive essentially consisting of a water-soluble resin.

FIG. 1A

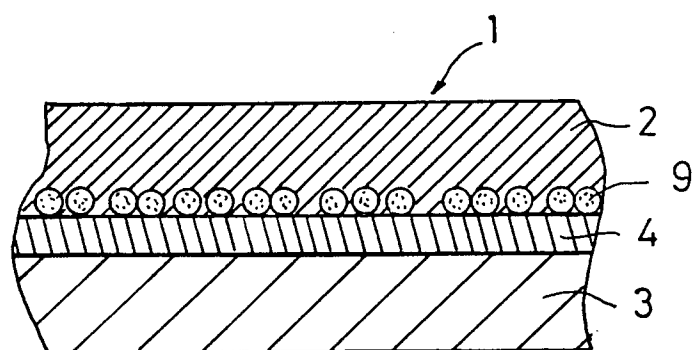


FIG. 1B

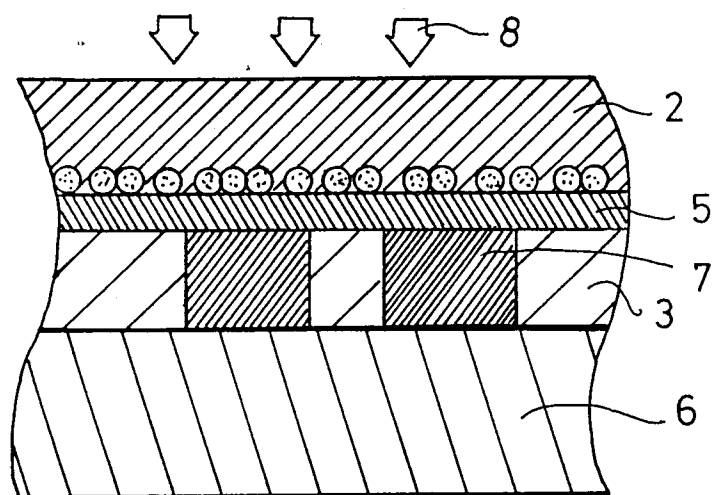


FIG. 2

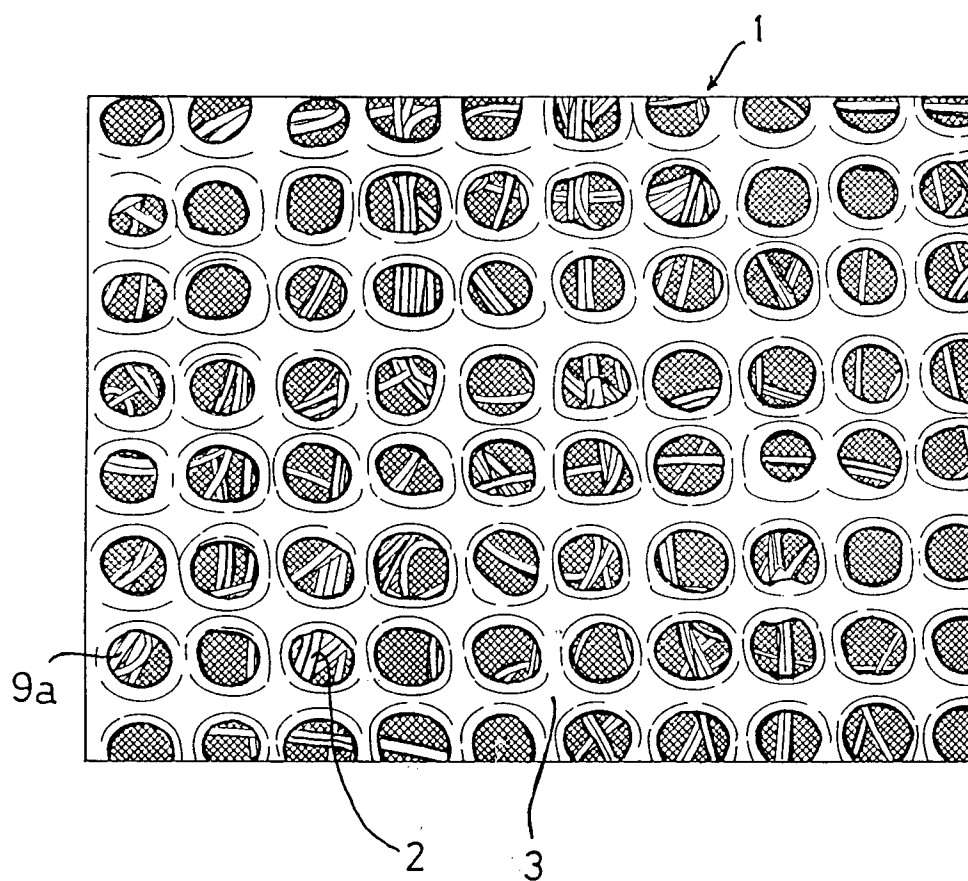
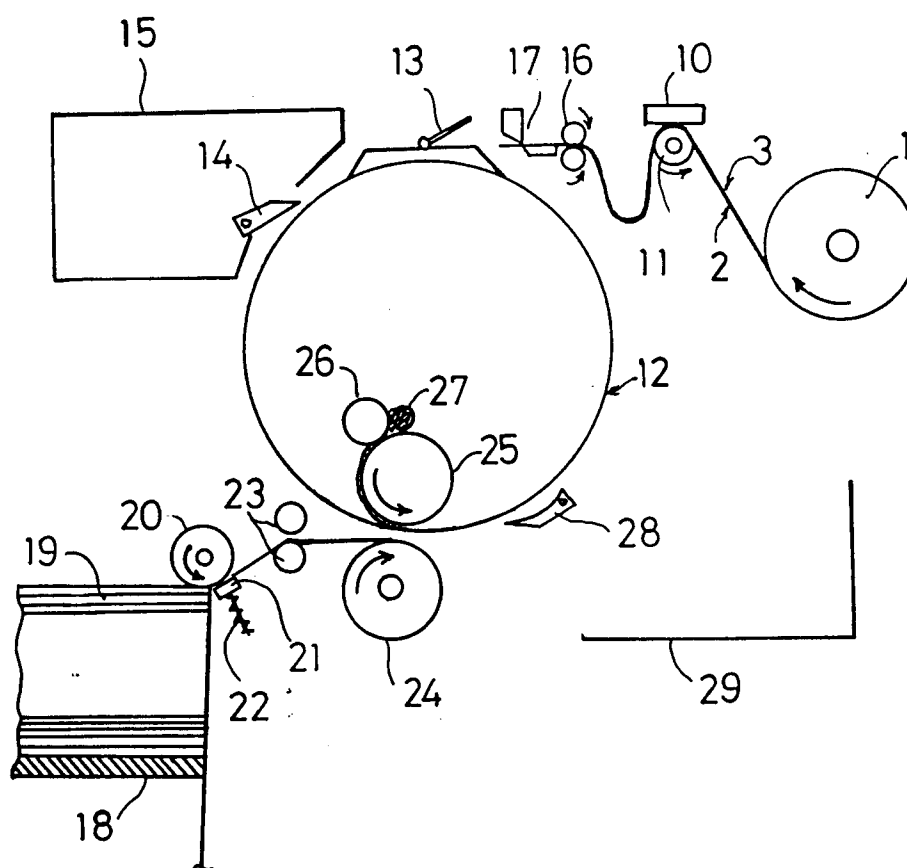


FIG. 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 3415

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)
P,X, L	PATENT ABSTRACTS OF JAPAN vol. 950 no. 001 & JP-A-07 001852 (RISO KAGAKU CORP) 6 January 1995, * abstract *	1-4	B41N1/24 B41M1/12
X	EP-A-0 592 215 (RISO KAGAKU CORP) 13 April 1994	1-4	
Y	* column 1, line 23 - line 26 *	1-4	
Y	PATENT ABSTRACTS OF JAPAN vol. 010 no. 021 (M-449) ,28 January 1986 & JP-A-60 180891 (AJIA GENSHI KK) 14 September 1985, * abstract *	1-4	
A	PATENT ABSTRACTS OF JAPAN vol. 010 no. 021 (M-449) ,28 January 1986 & JP-A-60 180892 (AJIA GENSHI KK) 14 September 1985, * abstract *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 017 no. 226 (M-1405) ,10 May 1993 & JP-A-04 357094 (RICOH CO LTD) 10 December 1992, * abstract *	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 September 1995	Examiner Rasschaert, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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