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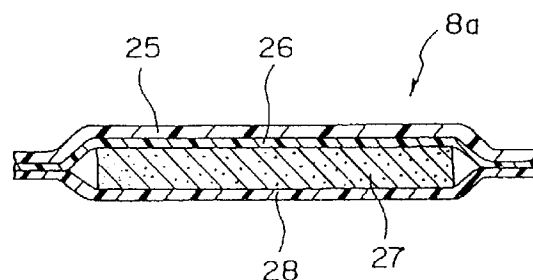
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(54) **Printing sheet.**

(57) A stencil or printing sheet (8a) having sufficient resistance against ambient condition and preservation ability and capable of providing a desirable printing quality even at an initial printing. The stencil sheet may include a thermoplastic film (25), an adhesive layer (26), an ink holding layer (27) and an ink impermeable film (28). The ink holding layer is sealingly covered by the thermoplastic film at one surface and the ink impermeable film at another surface. In other words, each of the ink holding layers (27) is enveloped by the thermoplastic film and the ink impermeable film. Thus, ink retained in the ink holding layer is sealingly maintained by these films. In use, the thermoplastic film is formed with a perforated image and is arranged to face a sheet to be printed. The upper ink impermeable film is then depressed to cause ink from the ink holding layer to ooze through the perforations of the lower thermoplastic film toward the sheet to be printed.

Fig. 2 (b)



The present invention relates to a printing sheet to be subjected to a perforating operation by a thermal head etc, and more particularly to a mimeographic printing sheet used for relatively small amount of the printing times.

Conventionally, has been known a mimeographic printing device in which a stencil sheet is selectively perforated. According to one conventional example shown in Figure 1, the printing device includes a housing 4 whose upper surface is provided with a dial 1 for selection of input characters. An upper surface of the dial is marked with Japanese Hiragana, alphabet, numerals and symbols. Further, at a centre portion of the dial 1, a push button 1a is provided for fixing a character selected by the rotation of the dial 1.

At an upper right portion of the dial 1, an input portion 2 is provided which includes a conversion key for converting Japanese Hiragana selected by the dial 1 into a Chinese character (Kanji), a shift key for selection between capital and small letter, a cursor shift key for moving a cursor, function keys for modifying a layout and format etc, and a power switch.

Further, at a lower portion of the input portion 2, a display portion 3 is provided for displaying the character inputted through the dial 1 and for displaying format and message. The display portion 3 is constituted by a liquid crystal display or a plasma display.

The housing 4 having the above described components mounted on its upper surface is made of a material such as a resin material. The housing has a generally hexahedral shape whose bottom is opened for covering a chassis 5 from above. The housing is relatively vertically movably assembled to the chassis 5 through a conventional arrangement.

The chassis 5 has three side walls 5a, 5b, 5c as shown in Fig. 1 to provide a generally U-shaped configuration. An ink pad holder 6 having an engagement piece 6a at its tip end is provided integrally with and positioned within the housing 4.

An ink pad 7 impregnating therein an ink is detachably engageable with the engagement piece 6a of the ink pad holder 6 from a side where no side wall of the chassis 5 is provided, i.e., from a lower left side in the drawing. Accordingly, if the housing 4 is pushed downwardly, the housing 4 together with the ink pad 7 are integrally moved in the vertical direction with respect to the chassis 5. Further, one of the side walls 5b of the chassis 5 rotatably supports each one end of a stencil sheet supply spool 10, a stencil sheet take-up spool 9 and a platen 13.

A thermal head 12 is provided for fusing a stencil sheet 8 so as to provide selective perforations therein. The thermal head 12 is provided pivotably about a shaft 19 supported to the side wall 5a of the chassis 5. Heat generating ends of the thermal head is pressingly movable toward the stencil sheet by a conventional mechanism, the stencil sheet being supplied from the supply spool 10 and supported on the platen

13. The stencil sheet 8 is positioned within the housing 5 and is supplied from the supply spool 10 through a takeup motor 11 and drive mechanism (not shown) and taken up by the takeup spool 9.

The stencil sheet 8 is made exclusively of a single film such as a thermoplastic film etc., and is adapted to pass between the thermal head 12 and the platen 13, and then is guided by guide rollers 16, 17 and 18 and is taken up by a predetermined amount by the takeup spool 9 to position the printing surface at a position immediately below the ink pad 7.

Further, a release lever 14 is pivotally attached to the chassis 5. The release lever 14 is adapted for releasing the thermal head 12 and the platen 13, which are normally adapted to nip the stencil sheet 8 therebetween, by a conventional manner so as to facilitate replacement of the stencil sheet 8.

Next, operation mode of the thus constructed mimeographic printing device will be described.

For producing a printing image with a new format, while the stencil sheet 8 is taken up by the takeup spool 9 at a low speed, the stencil sheet 8 passes between the thermal head 12 and the platen 13. In this case, selective heat generation occurs in the thermal head 12 in accordance with layout data inputted through the input portion 2 in order to provide perforation image in the stencil sheet 8.

The stencil sheet 8 thus perforated is taken up by a predetermined amount by the takeup motor 11 and is stopped so that the perforated image portion is brought to a position immediately below the ink pad 7. For the subsequent printing, the housing 4 provided integrally with the ink pad 7 is depressed, so that the ink impregnated in the ink pad 7 is released therefrom and passes through the perforations to reach the printing sheet 33, to thereby complete printing.

However, in the conventional mimeographic printing device, since the stencil sheet and the ink pad are provided independent of each other, test printing is required for completely coating the ink impregnated in the ink pad over an entire surface of the stencil sheet at a initial depression state. Further, for performing continuous printing with a new image, past record with respect to the former imaging may be remained on the surface of the ink pad, and therefore, new image printing may not be sufficiently achievable. Furthermore, since the ink impregnated in the ink pad is not sealingly maintained, its physical condition such as viscosity may be changed, depending on ambient circumstances. Therefore, it would be difficult to provide a stable printing quality for a long duration. Moreover, in an attempt to colour printing, replacement of ink pads is required with respect to each colour, and it would be difficult to conduct printing position adjustment.

According to the present invention, there is provided a printing sheet for use in printing an image, the sheet comprising a layer of ink-impregnated material

sandwiched between two film layers sealed together to retain the layer of ink-impregnated material therebetween, one of said film layers being made of perforatable material.

There is hereinafter described a stencil sheet having an improved resistance of an ink against ambient condition and improved ink preservation and capable of providing desirable printing quality even at a first printing with a new imaging perforation and also capable of facilitating colour printing.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an exploded perspective view showing a prior art mimeographic printing device;

Figure 2(a) is a perspective view showing a printing sheet according to one embodiment of this invention;

Figure 2(b) is an enlarged cross-sectional view taken along a line II-II in Figure 2(a); and

Figure 3 is an exploded perspective view showing a printing device employing the printing sheet shown in Figures 2(a) and 2(b).

A mimeographic printing sheet or a stencil sheet according to one embodiment of the present invention will be described with reference to Figures 2(a) and 2(b). A stencil sheet 8a includes a thermoplastic film 25, an adhesive layer 26, an ink holding layer 27 and an ink impermeable film 28. The ink holding layer 27 is made of a porous sheet or porous fibrous sheet. If desired, a yellow ink 29, magenta ink 30, cyan ink 31 and black ink 32 are impregnated in the respectively sectioned ink holding layers 27. The thermoplastic film 25 and the ink impermeable film 28 are bonded with each other for sealingly maintaining the ink holding layer 27 therebetween, with having size corresponding to a size of a printing area of the ink holding layer 27, thus ink holding layers 27 being sealingly separated from each other by the associated thermoplastic film 25 and the ink impermeable film 28.

The thermoplastic film 25 is made of a resin such as a polyethylene terephthalate. The thickness of the film 25 is preferably 1 to 4 μm . The adhesive layer 26 is made of a heat sensitive adhesive agent or solvent type adhesive agent. The porous sheet of the ink holding layer 27 is formed of a non woven fabric made of a chemical fiber such as polyethylene terephthalate (PET). The porous fibrous sheet of the ink holding layer 27 is formed of a non woven fabric made of natural fiber such as cotton and paper. Thickness of the ink holding layer 27 is preferably 40 to 100 μm . An entire thickness of the stencil sheet 8a is preferably from 50 to 500 μm .

Fig. 3 shows a mimeographic printing device which employs the stencil sheet 8a. The device shown in Fig. 3 is different from the conventional device shown in Fig. 1 in that the improved stencil sheet

8a is used instead of the conventional stencil sheet 8 made exclusively of thermoplastic film, and in that instead of the conventional ink pad 7 impregnating therein an ink, a pressure stand 7a formed of a resilient material is fixedly secured to the holder 6. The pressure stand 7a does not impregnate therein an ink, but the stand 7a is formed of a solid material.

The stencil sheet 8a is wound over a supply spool 10 shown in Fig. 3 in such a manner that the thermoplastic film 25 is positioned radially outwardly. If newly formatted printing surface is to be produced, the stencil sheet 8a is taken up at a constant speed by a takeup spool 9 while passing between the thermal head 12 and the platen 13. Selective heat generation occurs in the thermal head in accordance with layout data inputted through the input portion 2, so that only the thermoplastic film 25 is perforated. The stencil sheet 8a thus perforated is taken up by a predetermined amount by the takeup motor 11 similar to the conventional manner and is stopped at a position immediately below the resilient pressure stand 7a.

Printing is carried out by depressing the housing 4 which integrally provides the pressure stand 7a. Upon depressing operation, the ink impregnated in the ink holding layer 27 is squeezed out of the perforations formed in the thermoplastic film 25 for coating the ink over the printing sheet 33.

As is apparent from the foregoing description, since the ink holding layer 27 is sealingly maintained by the thermoplastic film 25 and the ink impermeable film 28 prior to the perforating operation to the thermoplastic film 25, the ink holding layer can provide sufficient resistance against ambient condition and can have sufficient preservation ability. Further, since a rear or inner surface of the thermoplastic film 25 has already been coated with the ink even prior to the perforating operation because of the positional relation to the internal ink holding layer 27, desirable printing quality can be obtained even at the first printing operation with a new perforation image. Furthermore, color printing can be easily performed by changing colors of the ink 27 at every printing area of the ink holding layers successively arrayed but sealingly separated from one another.

Further, since no ink pad is employed, it is possible to avoid conventional disadvantage in that the takeup load when taking up the stencil sheet over the takeup spool 9 is increased due to adhesion of the stencil sheet with the ink pad. This disadvantage can be eliminated in the present invention since no ink is provided between the ink impermeable film 28 and the pressure stand 7a.

The present invention is not limited to the above described embodiment, but various changes and modifications may be made without departing from the spirit and scope of the invention.

For example, in the illustrated embodiment, the sealingly maintained ink pads impregnate yellow ink,

magenta ink, cyan ink and black ink, respectively. However, the ink holding layers exclusively impregnating therein the black ink can be sealingly maintained if desired. In this case, it becomes possible to eliminate the conventional drawback in that printing quality is lowered due to past record of the former printing image on the ink pad when the new perforating image is used to perform repeated printing.

As described in detail, according to the stencil sheet of the present invention, resistance against ambient condition and preservation ability of the ink can be enhanced by respective sealing with respect to ink for the respective printing areas. Thus, desirable printing quality can be obtained even at the initial printing operation with a new perforation image. Further, color printing can be easily achieved without exchange of the ink pad, and takeup load when taking up the stencil sheet over the takeup spool can be reduced.

Claims

1. A printing sheet (8a) for use in printing an image, the sheet comprising a layer of ink-impregnated material (27) sandwiched between two film layers (25,28) sealed together to retain the layer of ink-impregnated material therebetween, one of said film layers (25) being made of perforatable material. 25 30
2. A sheet as claimed in claim 1, wherein the film layers (25,28) are sealed together to form a plurality of pockets, each said pocket being provided with a layer of ink-impregnated material (27). 35
3. A sheet as claimed in claim 2, wherein the layers of ink-impregnated material (27) in different ones of said pockets are impregnated with ink (29,30,31,32) of different colours. 40
4. A sheet as claimed in any of the preceding claims, wherein said one film layer (25) is adapted to be perforated by the selective application thereto of heat from a thermal printing head of a printing device. 45
5. A sheet as claimed in claim 4, wherein said one film layer (25) is a thermoplastic film. 50
6. A sheet as claimed in any of the preceding claims, wherein the other of said two film layers (28) is impermeable to ink.
7. A sheet as claimed in any of the preceding claims, further comprising an adhesive layer (26) positioned between the two film layers (25,28) for sealing the film layers together around the per-

iphery of the layer or layers of ink-impregnated material (27).

8. A sheet as claimed in claim 7, wherein the adhesive layer (26) is positioned between said one film layer (25) and the ink-impregnated material (27).
9. A sheet as claimed in any of the preceding claims, wherein the or each layer of ink-impregnated material (27) is in the range of 40 to 100 μm in thickness and/or the thickness of the whole sheet (8a) is in the range of 50 to 500 μm .
10. A printing device for use with a sheet as claimed in any of the preceding claims.

Prior Art

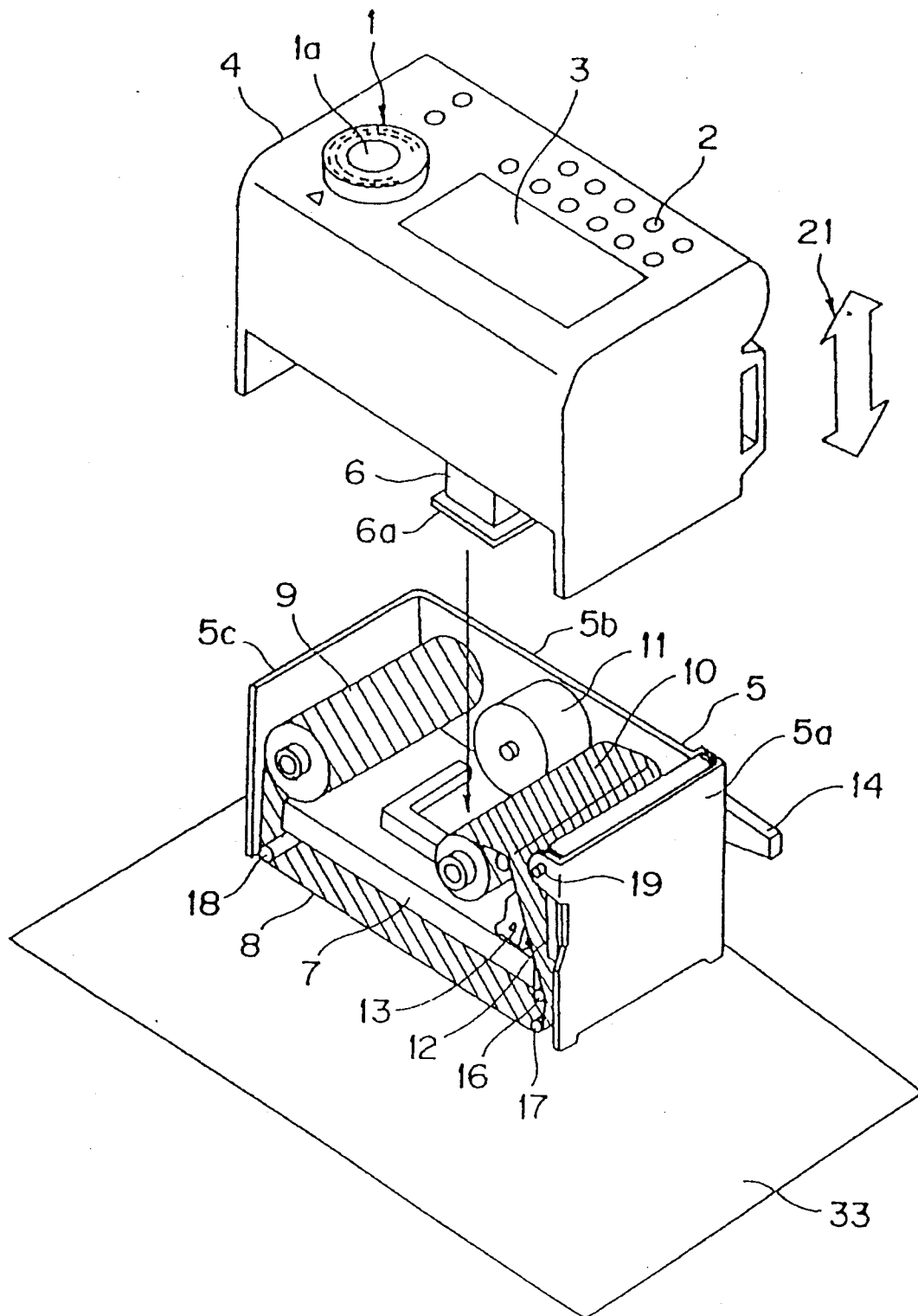


Fig. 2(a)

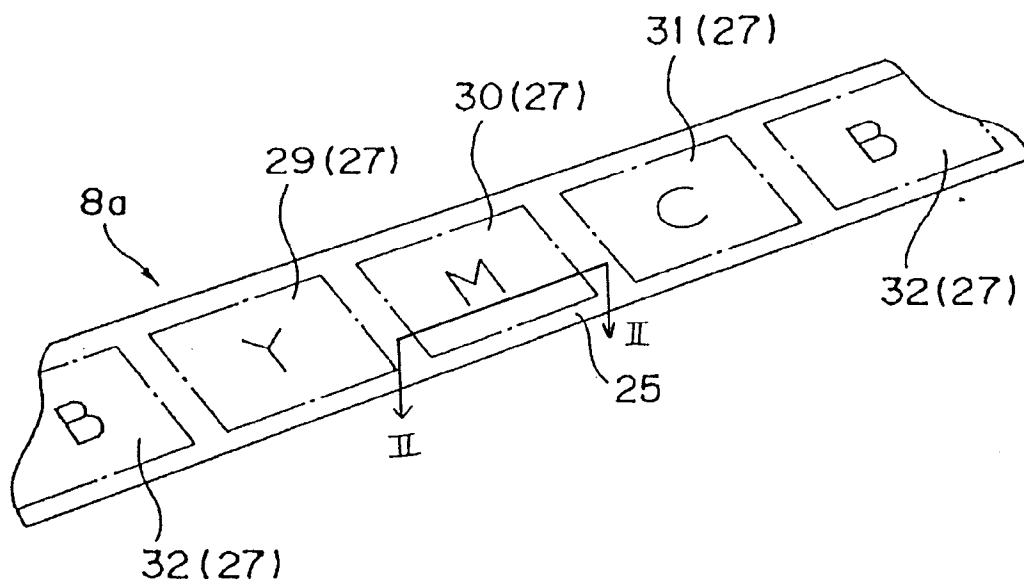


Fig. 2(b)

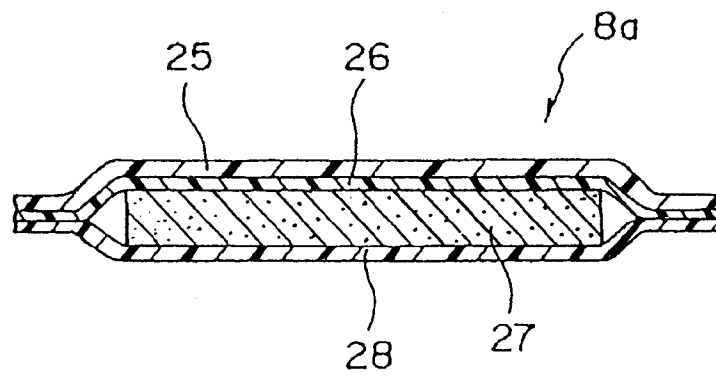
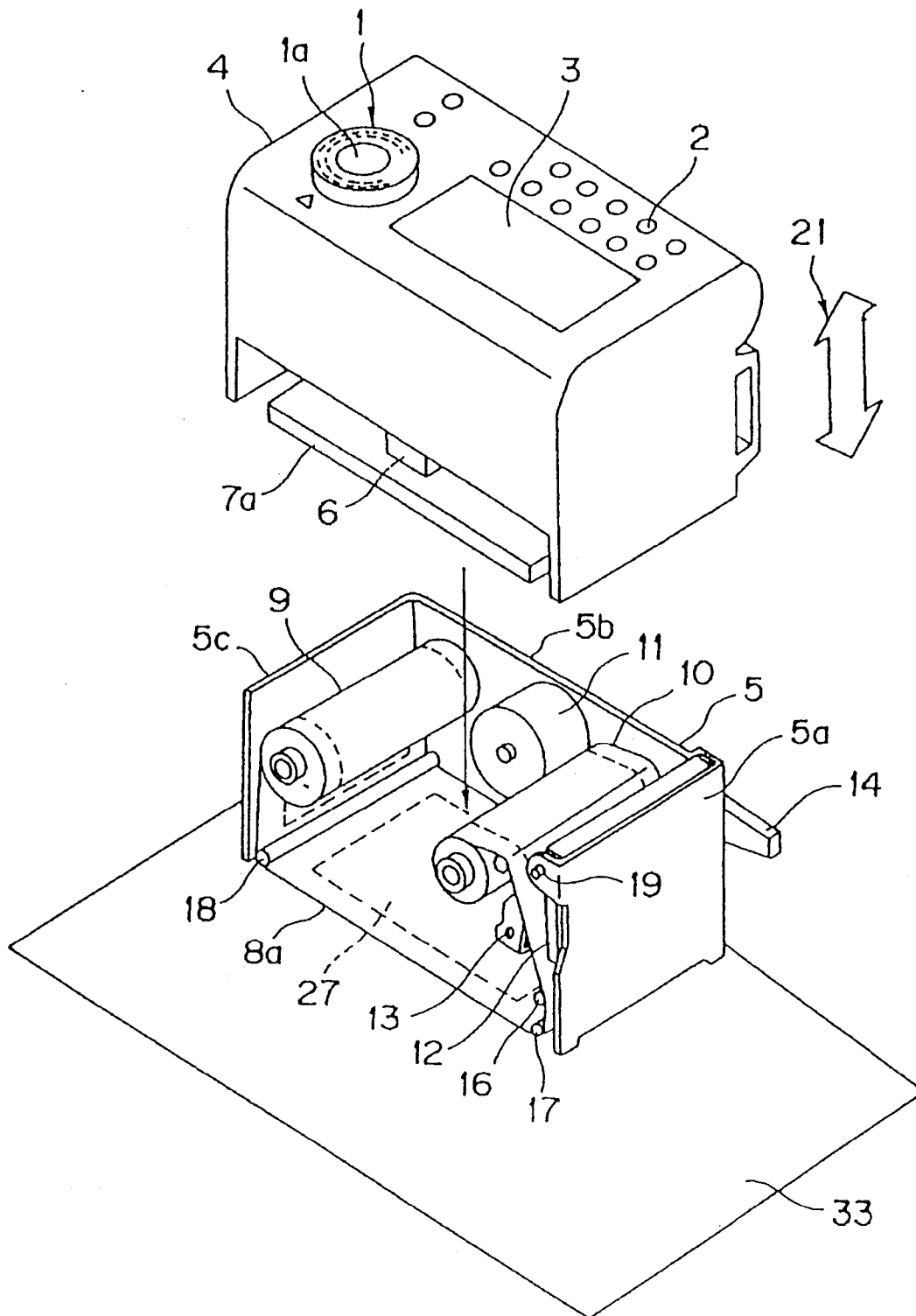


Fig. 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 8577

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.5)
X	EP-A-0 400 671 (TOMOEGAWA PAPER CO. LTD.) * page 5, line 4 - page 5, line 21; claims *	1,4-10	B41N1/24
Y	DE-B-1 188 090 (INTERNATIONAL BUSINESS MACHINES CORPORATION) * claims; figures 1,2,4A,4B * ---	1,4-10	
Y	DATABASE WPIL Section Ch, Week 9101, January 1991 Derwent Publications Ltd., London, GB; Class A05, AN 91-004360 & JP-A-2 281 997 (ASAHI CHEMICAL IND KK) 19 November 1990 * abstract *	1,4-10	
A	DATABASE WPI Section Ch, Week 7220, May 1972 Derwent Publications Ltd., London, GB; Class G05, AN 72-32301T & JP-B-47 016 102 (FUJI PHOTO FILM CO LTD) * abstract *	1-10	
A	PATENT ABSTRACTS OF JAPAN vol. 12, no. 459 (M-770)(3306) 2 December 1988 & JP-A-63 183 850 (NEC HOME ELECTRONICS LTD) 29 July 1988 * abstract * -----	1-10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
Place of search THE HAGUE		Date of completion of the search 19 JANUARY 1993	Examiner HILLEBRECHT D.A.
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