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Amended claims in accordance with Rule 137(2) EPC.

(54) **A PAPER ROLL WITHOUT CORE**

(57) The present invention discloses a paper roll without core, comprising a curl-resistant paper tape, the curl-resistant paper tape being crimped into cylinder shape with an end, a thin paper tape, a front end of the thin paper tape is fixed with the end of the curl-resistant paper tape; and a thermal-sensitive paper tape, a front end of the thermal-sensitive paper tape is fixed with an end of the thin paper tape, and the thermal-sensitive paper tape is wrapped around an outer circumference of

the curl-resistant paper tape. When the coreless paper roll is used till its end, the thin paper tape is not pressed or covered by the thermal-sensitive paper tape anymore, and can be pulled and broken in the cash register. So that the last section of the thermal-sensitive paper tape can break away from the curl-resistant paper tape and be used by the cash register. By this means, the thermal-sensitive paper tape is fully utilized.

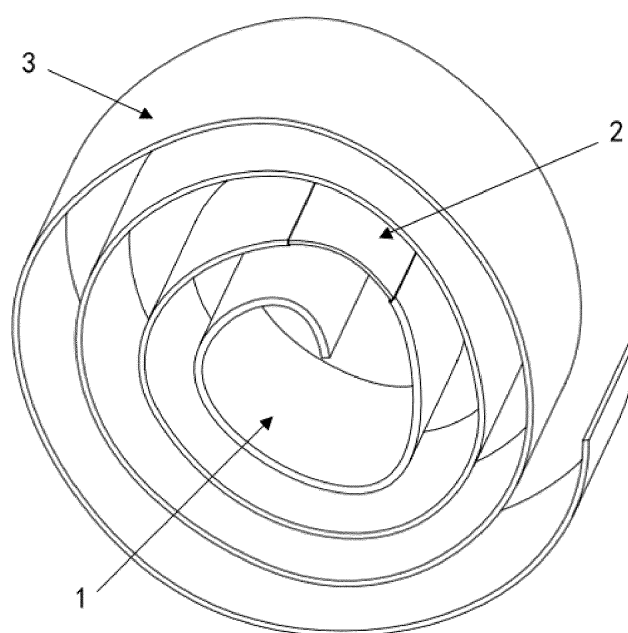


FIG. 1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a paper product, and more particularly to a paper roll without core (i.e., a coreless paper roll).

Description of Prior Art

[0002] Usually, the cash register paper roll is installed in the cash register through a core. Cash register paper roll is generally used for printing small receipts. It uses thermal-sensitive paper tape and has a cylindrical core on its core position. The core is discarded each time the cash register paper roll is replaced. Although the core is small, the accumulation of them is a waste. In addition, because the cash register paper roll is a kind of thermal-sensitive paper, if the cash register paper roll is made in a form without a core, the last section (that is, the section located in the core of the paper roll) will enter into long-term friction with the rotating shaft or reel. Since friction will generate heat, it will make the thermal-sensitive paper lose its thermal sensitivity.

[0003] The Chinese patent publication no. CN207434199U discloses a coreless cash register paper roll, which includes a thermal-sensitive paper tape and a curl-resistant paper tape, in which the ends of the heat-sensitive paper tape are fixed (i.e., spliced) with the front end of the curl-resistant paper tape, and the curl-resistant paper tape is crimped (i.e., rolled) into cylinder shape, and the thermal-sensitive paper tape is wrapped (i.e., wound) around the outer circumference or periphery of the curl-resistant paper tape. This solution solves the problem that the use of a coreless paper roll will lead the thermal-sensitive paper tape to lose its thermal sensitivity. However, after the thermal-sensitive paper is spliced with the curl-resistant paper, the last section of the thermal-sensitive paper tape (that is, the section close to of the curl-resistant paper tape) cannot be fully used, causing waste.

[0004] Therefore, it is an object of the present invention to provide a solution for the problem that the thermal-sensitive paper tape cannot be fully used.

SUMMARY OF THE INVENTION

[0005] The present disclosure provides a paper roll without core, comprising a curl-resistant paper tape, the curl-resistant paper tape being crimped into cylinder shape with an end, a thin paper tape, a front end of the thin paper tape is fixed with the end of the curl-resistant paper tape; and a thermal-sensitive paper tape, a front end of the thermal-sensitive paper tape is fixed with an end of the thin paper tape, and the thermal-sensitive paper tape is wrapped around an outer circumference of

the curl-resistant paper tape.

[0006] Alternatively, a longitudinal tensile strength of the thin paper tape is between 20 g/m² and 40 g/m².

[0007] Alternatively, a break line is provided laterally on the thin paper tape.

[0008] Alternatively, the break line is composed of multiple linearly arranged through holes.

[0009] Alternatively, notches are provided on both sides of the thin paper tape, and the notches correspond to a position of the break line.

[0010] Alternatively, the notches are of a triangular shape, and one angle of the triangular-shaped notches corresponds to the position of the break line.

[0011] Alternatively, the thermal-sensitive paper tape includes a silicone oil layer, a paper layer and a pressure-sensitive adhesive layer which are sequentially stacked.

[0012] Alternatively, the thermal-sensitive paper tape includes a surface paper layer, a pressure-sensitive adhesive layer, a silicone oil layer and a bottom paper layer which are sequentially stacked.

[0013] The beneficial effect of the present invention is that when the coreless paper roll is used till its end, the thin paper tape can be pulled and broken in the cash register, so that the last section of the thermal-sensitive paper tape can break away from the curl-resistant paper tape and be used by the cash register. By this means, the thermal-sensitive paper tape is fully utilized.

BRIEF DESCRIPTION OF DRAWING

[0014] Many aspects of the embodiments can be better understood with references to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the embodiments. Moreover, in the drawings, like reference numerals designate corresponding parts throughout two views.

[0015] The invention itself may be best understood by reference to the following detailed description of the invention, which describes an exemplary embodiment of the invention, taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic structural view of a coreless paper roll according to a first embodiment of the present invention;

Fig. 2 is a schematic structural view of one kind of the thin paper tape according to a first embodiment of the present invention;

Fig. 3 is a schematic structural view of another kind of the thin paper tape according to a first embodiment of the present invention;

Fig. 4 is a schematic structural view of a coreless paper roll according to a second embodiment of the present invention; and

Fig. 5 is a schematic structural view of a coreless paper roll according to a third embodiment of the present invention.

Reference signs

[0016] 1. Curl-resistant paper tape; 11. Silicone oil layer; 12. Paper layer; 13. Pressure-sensitive adhesive layer; 14. Surface paper layer; 15. Bottom paper layer; 2. Thin paper tape; 21. Break line; 22. Notch; 3. Thermal-sensitive paper tape.

DETAILED DESCRIPTION OF THE INVENTION

[0017] The present disclosure will be further described in detail below with reference to the drawings and specific embodiments, in order to better understand the objective, the technical solution and the advantage of the present disclosure. It should be understood that the specific embodiments described herein are merely illustrative and are not intended to limit the scope of the disclosure.

[0018] It also should be understood that the specific terms in the present disclosure are inter-changeable terms, for example, "first", "second"; also "front end" or "end" can be inter-changeably used. The orientation or positional relationship is based on the orientation or positional relationship shown in the drawings, and is only for the purpose of describing the present invention. It is not intended to indicate or imply that the device or element referred to must have a specific orientation and a specific orientation structure, or under a specific operation. Therefore, it cannot be understood as a limitation on the present invention.

[0019] It further should be understood that unless specified and defined otherwise, the first feature "on" or "down" of the second feature may be interpreted as direct contact between the first and second features, or as indirect contact between the first and second features through an intermediate medium. Moreover, the first feature is "above" the second feature may be interpreted that the first feature is directly above or obliquely above the second feature, or simply indicates that the first feature is higher in level than the second feature. The first feature is "below" and "lower than" the second feature may be interpreted that the first feature may be directly below or obliquely below the second feature, or it may simply indicate that the first feature is less horizontally lower than the second feature.

[0020] Reference will now be made to the drawing figures to describe the present invention in detail.

Embodiment 1

[0021] Referring to FIGs. 1-3, a paper roll without core is shown, which comprises a curl-resistant paper tape 1, a thin paper tape 2 and a thermal-sensitive paper tape 3. The curl-resistant paper tape being crimped into cylinder shape with an end. A front end of the thin paper

tape is fixed with the end of the curl-resistant paper tape. A front end of the thermal-sensitive paper tape is fixed with an end of the thin paper tape, and the thermal-sensitive paper tape is wrapped around an outer circumference of the curl-resistant paper tape.

[0022] Specifically, the coreless paper roll can be used in a cash register. The cash register pulls the thermal-sensitive paper tape and prints with it. When the thermal-sensitive paper tape still presses the thin paper tape from outside, the thin paper tape will not be subjected to sensible pulling force. When the coreless paper roll is used till its end, the thin paper tape is not pressed or covered by the thermal-sensitive paper tape anymore, and can be pulled and broken in the cash register. So that the last section of the thermal-sensitive paper tape can break away from the curl-resistant paper tape and be used by the cash register. By this means, the thermal-sensitive paper tape is fully utilized.

[0023] In some specific examples, in order to break the thin paper tape more easily, a longitudinal tensile strength of the thin paper tape is chosen between 20 g/m² and 40 g/m². The thin paper tape can be chosen from the thin paper tape disclosed in the Chinese patent publication no. CN1300198. The curl-resistant paper tape can be chosen from the curl-resistant paper tape disclosed in the Chinese patent publication no. CN200980157643.4.

[0024] In some specific examples, in order to break the thin paper tape more easily, referring to FIG. 2, a break line 21 is provided laterally on the thin paper tape. Furthermore, the break line is composed of multiple linearly arranged through holes.

[0025] In some specific examples, in order to break the thin paper tape more easily, referring to FIG. 3, notches 22 are provided on both sides of the thin paper tape, and the notches correspond to position of the break line. Furthermore, the notches are of a triangular shape, and one angle of the triangular-shaped notches corresponds to the position of the break line.

Embodiment 2

[0026] Specifically and referring to FIG. 4, the thermal-sensitive paper tape includes a silicone oil layer 11, a paper layer 12 and a pressure-sensitive adhesive layer 13 which are sequentially stacked. The pressure-sensitive adhesive in the pressure-sensitive adhesive layer 13 is also known as self-adhesive.

Embodiment 3

[0027] Specifically and referring to FIG. 5, the thermal-sensitive paper tape includes a surface paper layer 14, a pressure-sensitive adhesive layer 13, a silicone oil layer 11 and a bottom paper layer 15 which are sequentially stacked.

[0028] While the disclosure has been described by way of example and in terms of exemplary embodiment, it is

to be understood that the disclosures is not limited thereto. It is to be understood that the above-described embodiments are merely illustrative and not restrictive.

[0029] It will be readily understood by those skilled in the art that the above various preferred embodiments can be freely combined and superimposed without conflict. Various obvious or equivalent modifications or alterations to the above-described details will be included in the scope of the claims of the present disclosure without departing from the basic principles of the application. Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

Claims

1. A paper roll without core, comprising

a curl-resistant paper tape (1), the curl-resistant paper tape being crimped into cylinder shape with an end,
a thin paper tape (2), a front end of the thin paper tape is fixed with the end of the curl-resistant paper tape; and
a thermal-sensitive paper tape (3), a front end of the thermal-sensitive paper tape is fixed with an end of the thin paper tape, and the thermal-sensitive paper tape is wrapped around an outer circumference of the curl-resistant paper tape.

2. The paper roll in claim 1, wherein a longitudinal tensile strength of the thin paper tape is between 20 g/m² and 40 g/m².

3. The paper roll in claim 1 or 2, wherein a break line (21) is provided laterally on the thin paper tape.

4. The paper roll in claim 3, wherein the break line is composed of multiple linearly arranged through holes.

5. The paper roll in claim 3 or 4, wherein notches (22) are provided on both sides of the thin paper tape, and the notches correspond to a position of the break line.

6. The paper roll in claim 3 or 4, wherein the notches are of a triangular shape, and one angle of the triangular-shaped notches corresponds to the position of the break line.

7. The paper roll in one of the preceding claims, wherein the thermal-sensitive paper tape includes a silicone oil layer (11), a paper layer (12) and a pressure-sensitive adhesive layer (13) which are sequentially stacked.

8. The paper roll in the preceding claims, wherein the thermal-sensitive paper tape includes a surface paper layer (14), a pressure-sensitive adhesive layer (13), a silicone oil layer (11) and a bottom paper layer (15) which are sequentially stacked.

Amended claims in accordance with Rule 137(2) EPC.

1. A paper roll without core, comprising

a curl-resistant paper tape (1), the curl-resistant paper tape being crimped into cylinder shape with an end,
a thin paper tape (2) with grammage between 20 g/m² and 40 g/m², a front end of the thin paper tape is fixed with the end of the curl-resistant paper tape; and
a thermal-sensitive paper tape (3), a front end of the thermal-sensitive paper tape is fixed with an end of the thin paper tape, and the thermal-sensitive paper tape is wrapped around an outer circumference of the curl-resistant paper tape.

2. The paper roll in claim 1, wherein a longitudinal tensile strength of the thin paper tape is between 1.96133x10⁻⁷ and 3.92266x10⁻⁷ Megapascal, MPa.

3. The paper roll in claim 1 or 2, wherein a break line (21) is provided laterally on the thin paper tape.

4. The paper roll in claim 3, wherein the break line is composed of multiple linearly arranged through holes.

5. The paper roll in claim 3 or 4, wherein notches (22) are provided on both sides of the thin paper tape, and the notches correspond to a position of the break line.

6. The paper roll in claim 3 or 4, wherein the notches are of a triangular shape, and one angle of the triangular-shaped notches corresponds to the position of the break line.

7. The paper roll in one of the preceding claims, wherein the thermal-sensitive paper tape includes a silicone oil layer (11), a paper layer (12) and a pressure-sensitive adhesive layer (13) which are sequentially stacked.

8. The paper roll in the preceding claims, wherein the thermal-sensitive paper tape includes a surface paper layer (14), a pressure-sensitive adhesive layer (13), a silicone oil layer (11) and a bottom paper layer (15) which are sequentially stacked.

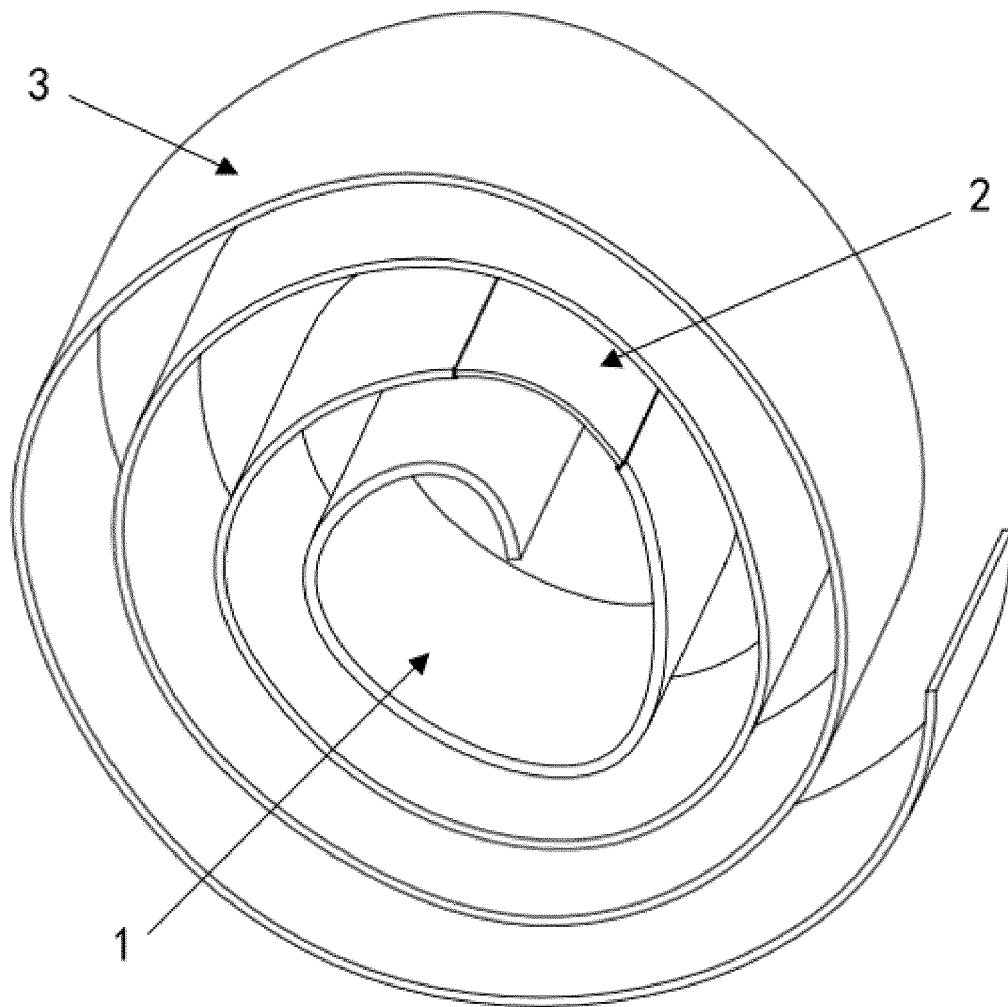


FIG. 1

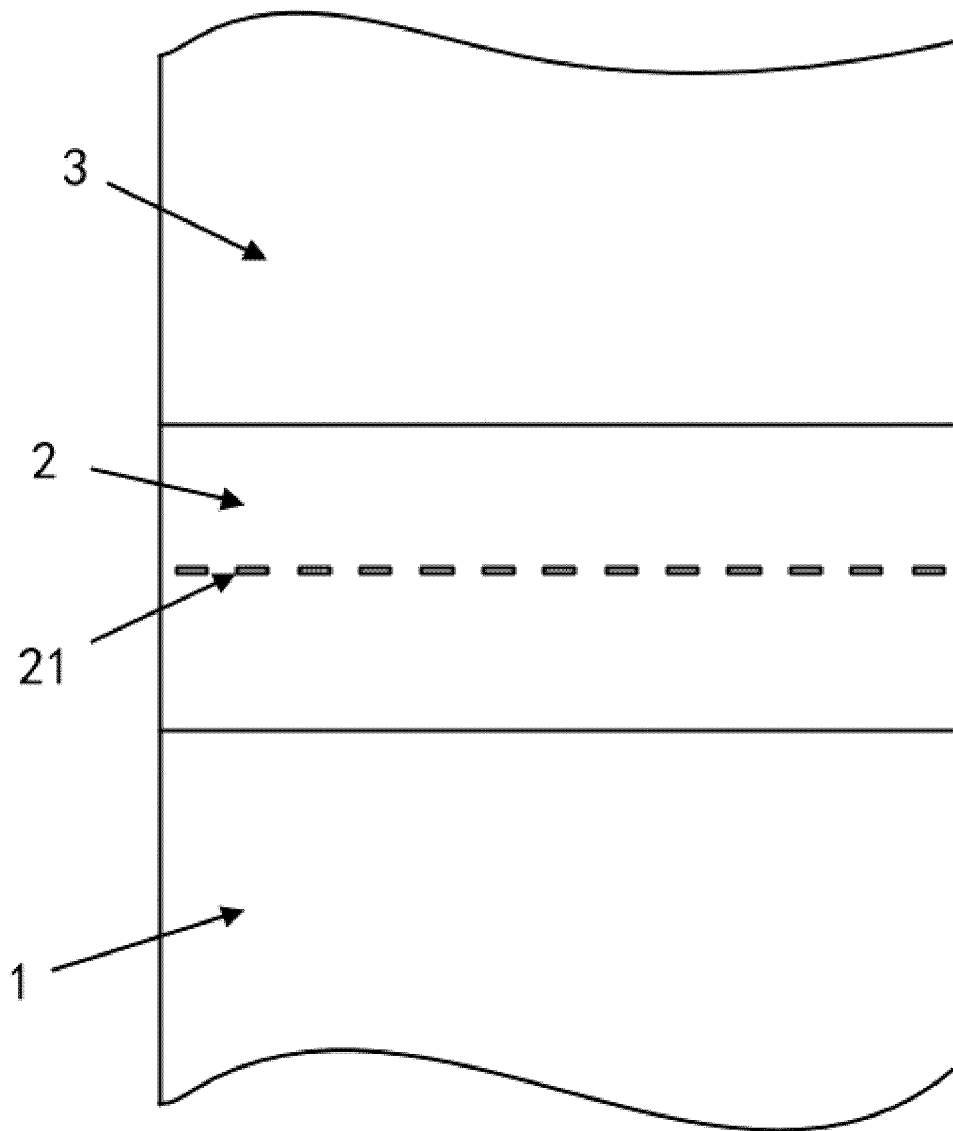


FIG. 2

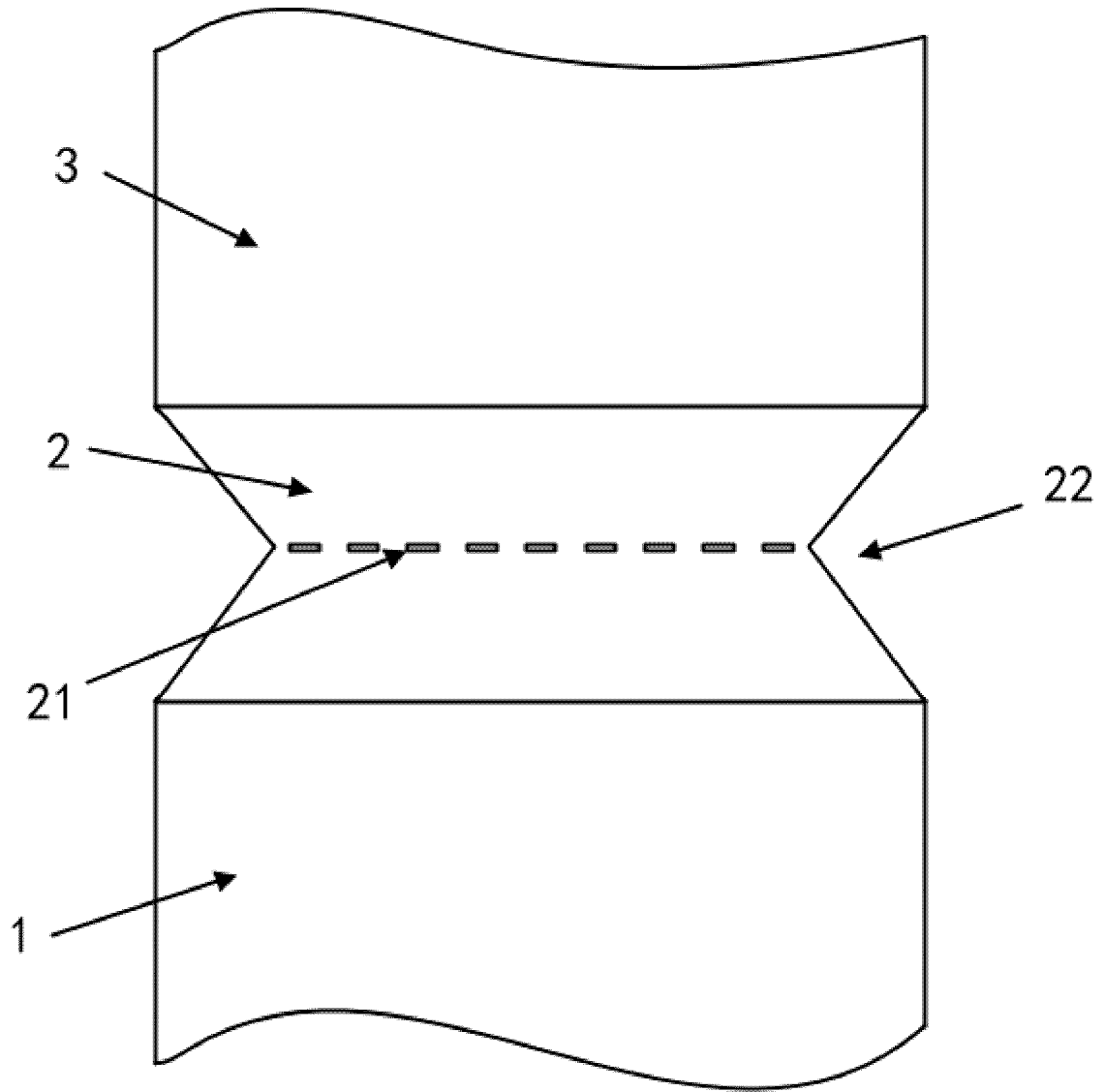


FIG. 3

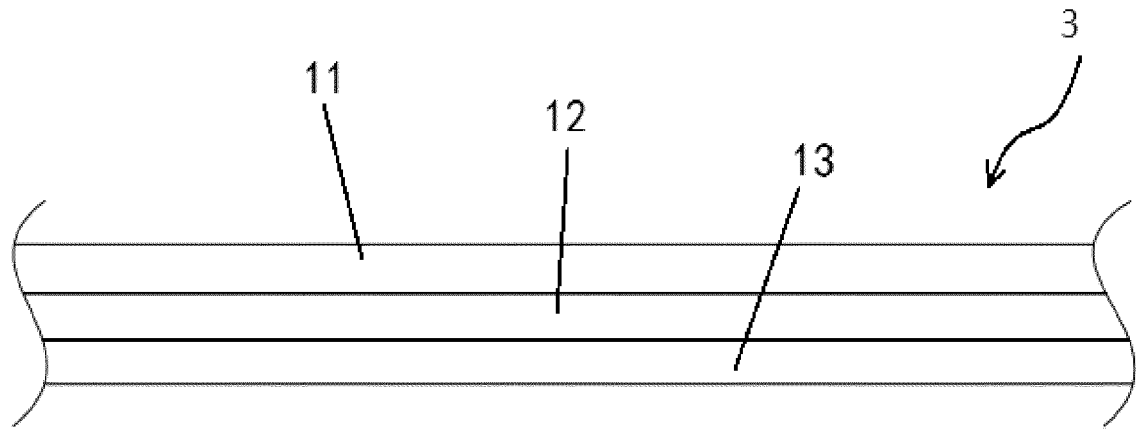


FIG. 4

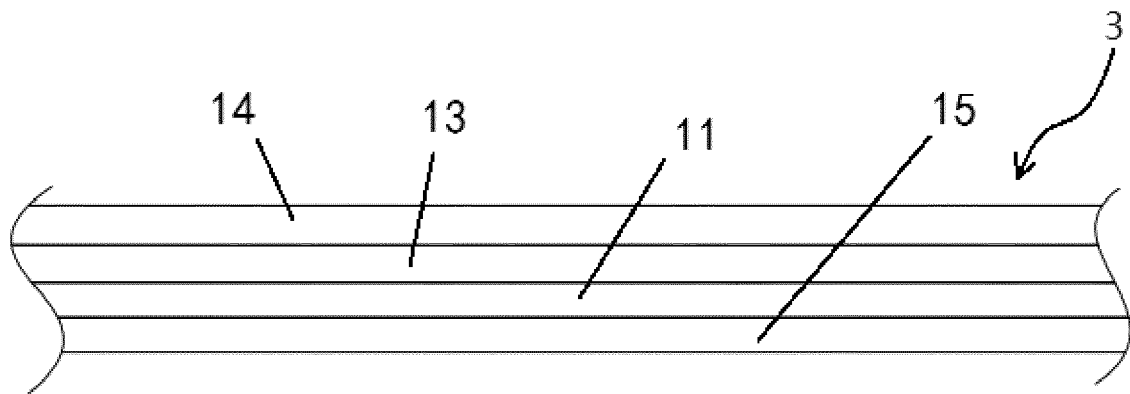


FIG. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 02 0020

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	CN 207 434 199 U (GUANGDONG GUANGLUN IND CO LTD) 1 June 2018 (2018-06-01) * claims 1-3 *	1-8	INV. D21H27/00 B41M5/50 B41M5/26 G07G5/00
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A	CN 209 216 427 U (SUZHOU GUANWEI THERMAL PAPER CO LTD) 6 August 2019 (2019-08-06) * claims 1-8; figure 1 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			D21H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 April 2020	Examiner Ponsaud, Philippe
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 EPO FORM 1503 03.02 (P04C01)

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 207434199 U [0003]
- CN 1300198 [0023]
- CN 200980157643 [0023]