(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 374 712 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.05.2024 Bulletin 2024/22

(21) Application number: **22209378.3**

(22) Date of filing: **24.11.2022**

(51) International Patent Classification (IPC):
A24C 5/01 *(2020.01)* ***A24C 5/60*** *(2006.01)*
A24C 1/42 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A24C 5/01; A24C 5/601; A24C 1/42

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **JT International SA**
1202 Geneva (CH)

(72) Inventor: **Lickefeld, Daniel**
54340 Riol (DE)

(74) Representative: **Hannke, Christian**
Hannke Bittner & Partner
Patent- und Rechtsanwälte mbB
Firmungstraße 4-6
56068 Koblenz (DE)

(54) METHOD FOR APPLYING A MARKING TO A WRAPPING MATERIAL FOR AN AEROSOL-GENERATION ARTICLE

(57) The present invention is directed to a method for applying at least one marking to a wrapping material for an aerosol-generation article. This method comprising the steps of providing a wrapping material in sheet or web form; guiding the wrapping material along a transport path to a printing unit module by support rollers; applying a substance to at least one surface of the wrapping material by the printing unit module; and heating the wrapping material and the substance applied to at least one surface of the wrapping material in a heating device.

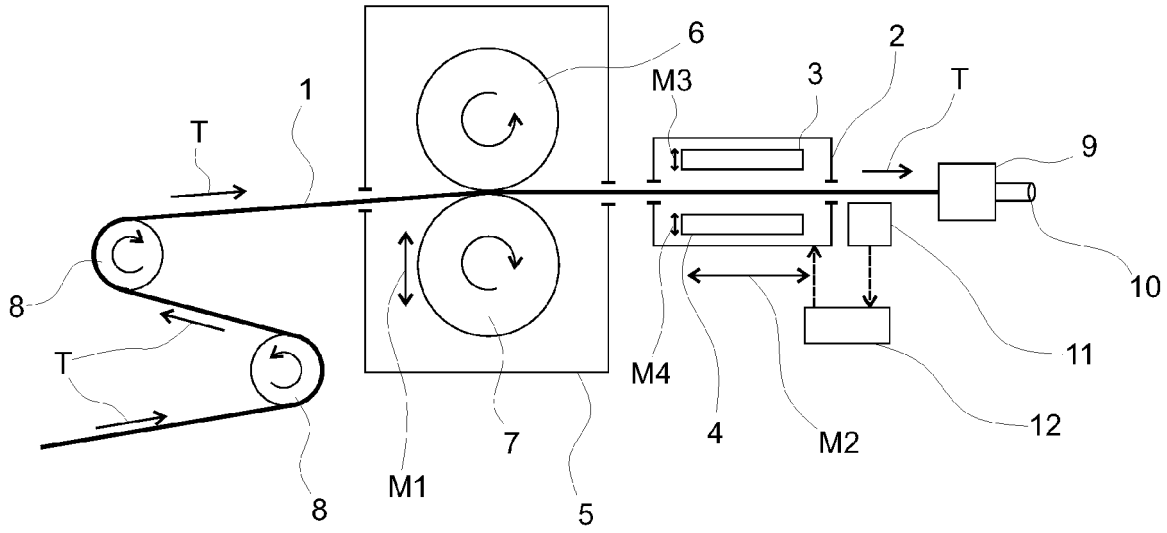

Fig. 1

EP 4 374 712 A1

Description

[0001] The present invention is directed to a method for applying at least one marking to wrapping material for an aerosol-generation article.

[0002] Aerosol-generation products such as cigarettes or heat-not-burn (HNB) articles are consumer goods produced in large quantities. They usually comprise a tobacco rod formed by wrapping cut filler and/or reconstituted tobacco with at least one layer of cellulosic wrapping material such as cigarette paper. In addition to its primary function as a tobacco wrapper, the wrapping material may serve as a communication carrier and may contain various printed or embossed marking (e.g. lettering, designs and/or colors). These can be part of brand features and thus contribute to product recognition.

[0003] US20170273353A1 discloses methods for applying heat conducting patches onto a web of smoking article wrapper material. The printing is carried out using printing apparatus having counter roller. The web is printed along the delivery path.

[0004] US20130087161A1 relates to a patterned wrapper for use in cigarette manufacture and methods of making the same. The cigarette wrapper has printed banded areas. The pattern is produced by supplying an aqueous starch solution to a printing station, such as an intaglio printing station.

[0005] However, prior art methods known for applying substances to wrapping materials for aerosol-generation products, in particular to a cigarette paper have the disadvantage that the applied substance does not dry sufficiently quickly after the printing process. In the subsequent process, for example, it can smudge on contact with guide rollers and contaminate these guide rollers.

[0006] Therefore, the objective of the present invention is to provide a method for applying markings to wrapping materials for aerosol-generation articles, wherein the applied substance can be dried after application, whereby the temperature of the wrapping material can be regulated quickly and accurately. An advantage of the present invention is that the applied substance can be dried in the best possible way, so that contamination of the production equipment, especially any touching roll coming into contact with the applied substance, can be reduced. This has the further advantage that the printing accuracy can be increased.

[0007] This object is reached by a method for applying at least one marking to a wrapping material for an aerosol-generation article, comprising the steps of:

a. providing wrapping material in sheet or web form,
b. guiding the wrapping material along a transport path to a printing unit module by support rollers,
c. applying a substance to at least one surface of the wrapping material by the printing unit module, and
d. heating the wrapping material and the substance applied to at least one surface of the wrapping material in a heating device.

[0008] The term marking preferably refers to any form of visual representation of information. This can be letters, numbers, lettering, images, symbols, patterns, QR codes or the like in one or more colors. The information may be directed to the consumer, and portions of brand features may be applied to help recognize the product. It is also conceivable that the marking is initially invisible and becomes visible during use, or is initially visible and becomes invisible during use. It is also conceivable that the marking performs functional tasks. It is conceivable that the marking releases aromas or nicotine during use or that the marking represents a safety element. For this purpose, the marking does not necessarily have to be visible. It is also conceivable that the marking is invisible and/or is a security element, which is not immediately recognizable by a user, but could be used for quality assurance, tracking, etc., if necessary.

[0009] Preferably, the wrapping material has two surfaces and is wound onto a bobbin at first. It is unwound from the bobbin and guided over one or more support rollers. The wrapping material can be deflected once or several times. This results in changes of direction in the transport path of the wrapping material, so that the transport path can have curves. The wrapping material can be tensioned simultaneously by the support rollers. The wrapping material is guided to a printing unit module.

[0010] The printing unit module preferably has a printing roller by means of which the substance is applied to the wrapping material. Preferably, the substance to be applied is first applied to a printing roller, for example via another roll. It is also conceivable that the substance is located on a tape which is guided between the wrapping material and the printing roller. In order to apply the substance to the wrapping material, it is conceivable that a pressure roller presses the wrapping material against the printing roller. It is also conceivable that the printing unit module has several printing rollers in order to print the wrapping material on both sides or to apply different substances (e.g. different colors, flavors). It is also conceivable that the substance is applied to the wrapping material by means of an inkjet printer or any other form suitable for applying substances to paper.

[0011] In a preferred embodiment, a heating device having one or more heating plates is used. The heating plate could be an ordinary aluminum heating plate, but could also be made of another material. The heating plate is preferably located inside and surrounded by some kind of box made of hard plastic (e.g. bioplastic) to keep the heat inside and to be more efficient. The wrapping material is preferably guided through the box, whereby the heating plate is arranged parallel to a longitudinal direction of the wrapping material, and spaced apart from it along a direction perpendicular to the longitudinal direction of the wrapping material.

[0012] According to an embodiment, the wrapping material is guided along the transport path at a speed in a range of 2.5 - 10 m/s, preferably in a range of 3 - 8 m/s, more preferably in a range of 4 - 7 m/s, more preferably

in a range of 5 - 6 mm, most preferably to 5.2 - 5.8 m/s. This speed could enable a large throughput of wrapping material, while at the same time keeping the mechanical stress on the wrapping material low so that tearing of the wrapping material can be avoided.

[0013] According to another or additional embodiment, a temperature of the wrapping material is increased during the heating step by 5 - 70°C, preferably 10 - 60°C, more preferably 20 - 50°C, and most preferably 30 - 40°C. By increasing the temperature of the wrapping material in such an amount, it is considerable that the applied substance can dry more quickly. Thus, contamination of the equipment, in particular of the support rollers, coming into contact with the applied substance can be reduced. It is also conceivable that the process speed and/or the printing quality can be increased. At the same time, it is conceivable that a temperature increase of the wrapping material by this amount will not cause the applied substance to become brittle and thus not crack. It is also conceivable that at this temperature increase, the bond of the applied substance is not negatively affected, so that it does not tend to peel off. Preferably, this temperature increase also does not cause any unwanted discoloration of the wrapping material.

[0014] According to a variant of the method, the heating device is arranged along the transport path of the wrapping material downstream the printing unit module. The term downstream refers to the direction of the transport of the wrapping material. By arranging the heating device downstream of the printing unit module and thus increasing the temperature of the wrapping material downstream of the printing unit module, the drying of the substance applied to the wrapping material can be advantageously supported.

[0015] In a preferred embodiment, the heating device is arranged at least 50 mm downstream the printing unit module, especially downstream the outlet of the printing roller. Preferably, the heating device is arranged in a range of 55 - 1000 mm, more preferably in a range of 60 - 800 mm, most preferably in a range of 70 - 500 mm downstream the printing unit module.

[0016] In a preferred embodiment, a heating element, e.g. a heating plate can be moved in translation parallel to the transport path of the wrapping material. For this purpose, it is conceivable that the heating element is displaced or that the entire heating device is displaced.

[0017] According to a variant of the method, the heating step is realized by a heating device. The heating device preferably comprises at least two heating elements, wherein preferably two heating elements are arranged on opposite sides of the transport path and/or opposite surfaces of the wrapping material. Thus, the amount of heat applied to the wrapping material can be increased so that, for example, the applied substance can dry more quickly. It is also conceivable that this preferred embodiment improves the temperature distribution in the wrapping material so that the applied substance can dry more quickly and/or more uniformly.

[0018] The heating elements are preferably arranged parallel to a longitudinal direction of the wrapping material. In a preferred embodiment, the distances between the heating elements and the wrapping material can be set individually. It is also conceivable that the distances between the heating elements and the wrapping material can be amended individually. Thus, it is conceivable that the temperature distribution in the wrapping material can be improved, which is advantageous for drying applied substance, so that it can dry faster and/or more evenly, for example.

[0019] In a preferred embodiment, it is conceivable that the temperatures of each heating element can be set individually. Thereby, the temperatures of the heating elements can be amended individually so that they have different temperatures. It is also conceivable that the heating elements have different dimensions. This allows the heat input to be individually adjusted for both surfaces of the wrapping material, so that the drying of the applied substance can be advantageously controlled. It is conceivable, for example, that the applied substance can be dried quickly without the wrapping material and/or the applied substance being damaged by thermal stress due to skillful selection of the temperatures or the size of the individual heating elements.

[0020] According to another preferred embodiment, the heating step is realized by a heating device which comprises at least one heating element. The heating device could be a contactless heating device, wherein the heating element is spaced apart from the transport path and/or the wrapping material Due to the contactless working of the heating device, it is conceivable that the printing quality is not negatively influenced. On the contrary, it is conceivable that the heating step by means of the heating device will improve the print quality if the applied substance can dry more quickly by using a heating device and is therefore not wiped out during further guidance of the wrapping material by means of support rollers.

[0021] In a preferred embodiment, the distance between the heating element and the wrapping material is preferably adjusted in a range of 3 - 300 mm, preferably in a range of 5 - 200 mm, more preferably in a range of 8 - 150 mm, more preferably in a range of 10 - 100 mm, most preferably in a range of 15 - 75 mm. Due to this distance between the wrapping material and the heating element, such an amount of the heat emitted by the heating element is transferred to the wrapping material preferably in the form of thermal radiation and in the form of convection, so that the desired temperature increase of the wrapping material as well as of the applied substrate for advantageously drying the substance is achieved.

[0022] By the expression of advantageous drying or the like, it is to be meant that the substance dries as quickly as possible, but without damaging the applied substance, for example, by weakening the bond with the wrapping material, by discoloring the substance, by forming cracks in the applied substance, or the like, or by

damaging the wrapping material, for example, by discoloring, deforming, or making it porous.

[0023] In a preferred embodiment, the method comprises a step of adjusting a temperature increase of the wrapping material during the heating step to a desired value by amending a distance between the wrapping material and a heating element of the heating device. To adjust the temperature of the wrapping material precisely, it is conceivable that the distance between the wrapping material and the at least one heating element is decreased or increased. It is conceivable that a heating element is translationally displaced along a direction normal to the surface of the wrapping material. Thus, the heat input into the wrapping material and thus the temperature increase of the wrapping material can be adjusted. In this case, a decreasing of the distance leads to an increasing of the temperature of the wrapping material, et vice versa. This allows the temperature increase of the wrapping material to be matched to thermal properties of the wrapping material and/or the applied substance, so that good drying can be achieved without damaging or negatively affecting the wrapping material or the applied substance. Furthermore, an advantage is that the supply of thermal energy can be quickly interrupted or activated.

[0024] In a preferred embodiment, a control device may be provided to adjust the temperature of the wrapping material. To control the temperature increase of the wrapping material, the temperature of the wrapping material can be measured downstream of the heating device by a sensor and the distance between the heating element and the wrapping material can be adjusted accordingly by the control device. Preferably, the sensor is a non-contact temperature sensor, such as a pyrometer.

[0025] In a preferred embodiment, it is also conceivable that a heating element can be tilted about an axis of rotation so that the distance between the wrapping material and certain points on the surface of a heating element can be varied by different amounts. It is conceivable that the axis of rotation is aligned parallel to the wrapping material and orthogonal to the transport direction, and that the axis of rotation is located with respect to the transport direction of the wrapping material at the front end of a heating element, at the rear end of a heating element, or in between those ends. It is also conceivable that the axis of rotation is aligned parallel to the transport direction of the wrapping material. In this way, the heat input can be varied across the width of the wrapping material, so that the energy input and thus the temperature increase can exhibit a gradient across the width of the wrapping material. This can be advantageous when a substance is applied non-homogeneously to the width of the wrapping material, for example when applying certain patterns.

[0026] According to a further variant, the method comprises a step of adjusting a temperature increase of the wrapping material during the heating step to a desired value by amending a temperature of a heating element of the heating device by a control device. The temperature of a heating element is preferably set to a temperature of 50 - 300°C, preferably 75 - 250°C, more preferably 100 - 200°C, most preferably to 150°C, preferably ± 20°C, more preferably ± 10°C, most preferably ± 5°C. These temperatures of the heating element can allow a high heating rate, so that an advantageous drying of the applied substance can be enabled.

[0027] In a preferred variant of the method, the temperature of the heating element determines the temperature of the wrapping material. In order to regulate the temperature increase of the wrapping material, it is conceivable that the temperature of the heating element can be changed. A control device could be provided to control the temperature of the heating element. The temperature of the wrapping material can be measured downstream of the heating device by a sensor and the temperature of the heating element can be adjusted accordingly by the control device.

[0028] The maximum temperature increase of the wrapping material is achieved with the minimum distance between the heating element and the wrapping material and the maximum temperature of the heating element.

[0029] In a preferred embodiment, the method comprises a step of bending the wrapping material or a part of the wrapping material longitudinally to form a cylinder. In a further preferred step, cutting the cylinder is conceivable to form a plurality of cylinders. In practice the wrapping material is folded longitudinally about the tobacco to form a continuous rod that is subsequently cut.

[0030] According to a further variant, the step of bending is realized by a bending unit module. Preferably the heating device is arranged upstream the bending unit module. More preferably the heating device is preferably arranged in a range of 50 - 10000 mm upstream the bending unit module, preferably in a range of 75 - 5000 mm, more preferably in a range of 100 - 2500 mm, most preferably in a range of 200 - 1500 mm upstream the bending unit module. By distancing the bending unit module from the heating device, it is possible that the applied substance is dried to such an extent or preferably completely dried before the wrapping material with applied substance reaches the bending unit module, so that the wrapping material can be bent by means of the bending unit module without wiping out the applied substance or that the bending unit module is not contaminated with the applied substance.

[0031] In a preferred embodiment, the transport path extends through the heating device over a length of 100 - 1000 mm, preferably 150 - 500 mm, most preferably 200 - 300 mm. Preferably, the transport path comprises at least one curved section located in the range of the heating device, wherein the curved course is caused by at least one roller located in the range of the heating device. By extending the transport path of the wrapping material over this distance in the heating device, such an amount of heat can be introduced into the wrapping material that the resulting temperature increase of the wrap-

ping material can be sufficient to dry the applied substance before reaching a further support roller, process step or the like. By deflecting the wrapping material by means of a guide roller, the path of the wrapping material within the heating device can be extended so that the wrapping material passes a heating element several times, for example, which can have a beneficial effect on the drying of the applied substance.

[0032] In a preferred embodiment, the substance applied by the printing unit module to at least one surface of the wrapping material is selected from a group comprising a pigment, a die, a flavouring agent, a nicotine source, an invisible marking and a security element.

[0033] If the substance is selected from a group comprising a pigment, it can be used to visually represent information on the wrapping material.

[0034] If the substance is selected from a group comprising a flavouring agent, the substance can influence the aroma of the aerosol-generation article. It is conceivable that the flavouring agent can be permanently released even before the aerosol-generation article is used and/or can pass into the filling of the aerosol-generation article, in particular into the tobacco material wrapped in the wrapping material.

[0035] It is also conceivable that the aroma is only released during the aerosol-generation article is used, for example when the glow reaches the area where the substance is applied to the wrapping material. It is thus conceivable that the flavor of the cigarette changes during use, so that, for example, the intensity of the flavor changes, increases or decreases.

[0036] If the substance is selected from a group comprising a nicotine source, it is conceivable that the nicotine can pass into the filling of the aerosol-generation article, in particular to the tobacco material, before and/or during use of the aerosol-generation article. It is also conceivable that the nicotine of the substance applied to the wrapping material is released only during use of the aerosol-generation article, thus changing the amount of nicotine consumed during use.

[0037] If the substance is selected from a group comprising invisible markings, it is conceivable that the substance may perform functional tasks. For example, it is conceivable that an adhesive is applied by means of the substance, which is used for manufacturing the cigarette. It is also conceivable that the substance is applied to form a safety element. For example, it is conceivable that the substance helps to extinguish the cigarette if it is not puffed on for a certain period of time and the risk of accidentally starting a fire can be reduced. It is also conceivable that the aerosol-generation article is extinguished before the glow reaches a filter to prevent it from being lit.

[0038] In a preferred embodiment, the substance to be applied is water-based. Thus, it is conceivable that the water evaporates due to the heating step so that, for example, the pigment of the substance remains on the wrapping material. It is conceivable that such water-based substances can be applied to the wrapping material using certain printing processes, such as ink jet.

[0039] Further advantages, objectives and features of the present invention will be described, by way of example only, in the following description with reference to the appended figures. In the figures, like components in different embodiments can exhibit the same reference symbols.

[0040] The figures show:

Fig. 1 schematic view of a preferred embodiment of a printing system

Fig. 2 process chart of a preferred method for applying markings to wrapping material for an aerosol-generation article

Fig. 3 process chart of a further preferred method for applying markings to wrapping material for an aerosol-generation article

Fig. 4 process chart of a further preferred method for applying markings to wrapping material for an aerosol-generation article

[0041] Figure 1 shows a schematic representation of an embodiment of a printing system. The wrapping material 1 is guided by means of guide rollers 8. By means of the guide rollers, the transport direction T of the wrapping material 1 is changed twice. However, further rollers and curves of the transport path are possible. The wrapping material 1 is passed through a printing unit module 5 and a heating device 2. The printing unit module 5 has a printing roller 6 and pressure roller 7 for pressing the wrapping material 1 against the printing roller 6. The pressure roller 7 is designed to be movable for this purpose, so that it can be removed from or moved towards the printing roller 6 by linear movement in the direction M1. By pressing the wrapping material 1 against the printer roller 6 with the means of pressure roller 7, the substance is applied to the wrapping material 1. At the same time, the direction of the transport path of the wrapping material 1 can be changed by guiding the wrapping material between the printing roller 6 and the pressure roller 7.

[0042] The heating device 2 has a first heating element 3 and a second heating element 4. These heating elements are arranged above and below the wrapping material 1, respectively, and parallel to the longitudinal direction of the wrapping material 1 when transported through the heating device 2. The heating elements 3, 4 are spaced apart from the wrapping material 1, the distance being individually adjustable in the directions M3, M4 normal to the surface of the wrapping material inside the heating device. Furthermore, it is possible to move the heating device 2 along the transport path of the wrapping material 1 in the direction M2, which is parallel to the transport direction T of the wrapping material inside the heating device.

[0043] It is possible that further guide rollers are arranged along the transport path of the wrapping material. For example, a guide roller can be arranged downstream

of the heating device 4 (not shown). Downstream of the heating unit 2, a bending module 9 can be arranged which forms the wrapping material 1 into a cylinder 10 by bending of the wrapping material 1 perpendicular its longitudinal axis.

[0044] Furthermore, a sensor device 11 can be arranged downstream of the heating device 2 by means of which the temperature of the wrapping material 1 can be determined. It is conceivable that the determined temperature data can be transferred to a control device 12. According to the temperature data, the control device 12 can control the heating device 2. Thus, it is conceivable that the distance between the wrapping material 1 and a heating element 3, 4 can be varied or the temperature of a heating element 3, 4 can be amended. Thus, it is possible to control the temperature rise of the wrapping material 1 and thus advantageously influence drying of the applied substance.

[0045] Figure 2 shows a process chart of the method for applying markings to wrapping material 1 in a preferred embodiment. In step a, a wrapping material 1 is provided in sheet or web form. In a preferred embodiment, the wrapping material 1 is wound on a bobbin. In step b1, the wrapping material 1 is guided along a transport path to a printing unit module 5. If the wrapping material 1 is initially present wound on a bobbin, the wrapping material 1 is unwound from the bobbin for the transport. It is conceivable that the wrapping material 1 is guided over one or more support rollers 8, resulting in one or more changes in the direction of transport path. It is also conceivable that the wrapping material 1 is strained by being guided by means of the support rollers 8. In step c, the substance is applied to at least one surface of the wrapping material 1 by means of a printing unit module 5. In step b2, the wrapping material 1 is guided from the printing unit module 5 to a heating device 2. In step d, the wrapping material 1 and the applied substance are heated by means of the heating device 2. In step b3, the printed wrapping material 1 is passed on for further processing.

[0046] Figure 3 shows a flow chart of the process for applying markings to wrapping material 1 in a preferred embodiment, which is an extended embodiment of that shown in Figure 2. In the embodiment according to Figure 3, additional steps are present. For example, in step e, while the wrapping material 1 is guided on from the heating device 2 according to step b3, the temperature of the printed wrapping material 1 is measured at the same time by means of a sensor 11. In step f, the temperature increase of the wrapping material 1 is regulated according to the determined temperature data. For this purpose, the control device 12 adjusts the heating device 2 so that, for example, the distance between a heating element 3, 4 and the wrapping material 2 or the temperature of a heating element 3, 4 is amended.

[0047] Figure 4 shows a flow chart of the process for applying markings to wrapping material 1 in a preferred embodiment, which is an extended embodiment of that shown in Figure 3. In step g, the wrapping material is bent to a cylindric form.

Reference Signs

[0048]

1	wrapping material
2	heating device
3	a first heating element
4	a second heating element
5	printing unit module
6	printing roller
7	pressure roller
8	supper roller
9	binding unit module
10	wrapping material in cylindric form
11	sensor device
12	control device
T	transport direction of the wrapping material
M1	movement direction of the pressure roller
M2	movement direction of the heating device or heating element
M3	movement direction of the first heating element
M4	movement direction of the second heating element
a	providing a wrapping material
b1	guiding the wrapping material to a printing unit
b2	guiding the wrapping material to a heating device
b3	guiding the wrapping material to a further process step
c	applying the substance to the wrapping material
d	heating the wrapping material
e	measuring the temperature of the wrapping material
f	adjusting the temperature increase of the wrapping material
g	bending the wrapping material

Claims

1. A method for applying at least one marking to a wrapping material (1) for an aerosol-generation article, comprising the steps of:

a. providing a wrapping material (1) in sheet or web form,
b. guiding the wrapping material (1) along a transport path to a printing unit module (5) by support rollers (8),
c. applying a substance to at least one surface of the wrapping material (1) by the printing unit module (5), and
d. heating the wrapping material (1) and the substance applied to at least one surface of the

wrapping material (1) in a heating device (2).

2. Method according to claim 1, wherein the wrapping material (1) is guided along the transport path at a speed in a range of 2.5 - 10 m/s, preferably in a range of 3 - 8 m/s, more preferably in a range of 4 - 7 m/s, more preferably in a range of 5 - 6 mm, most preferably to 5.2 - 5.8 m/s.

3. Method according to claim 1 or 2, wherein a temperature of the wrapping material (1) is increased during the heating step by 5 - 70°C, preferably 10 - 60°C, more preferably 20 - 50°C, and most preferably 30 - 40°C.

4. Method according to any of the preceding claims, wherein the heating step is realized by a heating device (2) arranged along the transport path of the wrapping material (1) downstream the printing unit module (5).

5. Method according to claim 4, wherein the heating device (2) is arranged at least 50 mm downstream the printing unit module (5), preferably in a range of 55 - 1000 mm, more preferably in a range of 60 - 800 mm, most preferably in a range of 70 - 500 mm downstream the printing unit module (5).

6. Method according to any of the preceding claims, wherein the heating step is realized by a heating device (2) which comprises at least two heating elements (3, 4), wherein preferably two heating elements (3, 4) are arranged on opposite sides of the transport path and/or opposite surfaces of the wrapping material (1).

7. Method according to claim 6, wherein the temperatures of each heating element (3, 4) can be set individually and/or that the heating elements (3, 4) have different dimensions.

8. Method according to any of the preceding claims, wherein the heating step is realized by a heating device (2), wherein the heating device (2) is a contactless heating device, wherein the heating element (3, 4) is spaced apart from the transport path and/or the wrapping material (1),

9. Method according to claim 8, wherein adjusting a distance between the heating element (3, 4) and the wrapping material (1) is preferably in a range of 3 - 300 mm, preferably in a range of 5 - 200 mm, more preferably in a range of 8 - 150 mm, more preferably in a range of 10 - 100 mm, most preferably in a range of 15 - 75 mm.

10. Method according to any of the preceding claims, comprising the step of adjusting a temperature increase of the wrapping material (1) during the heating step to a desired value by amending a distance between the wrapping material (1) and a heating element (3, 4) of the heating device (2).

11. Method according to any of the preceding claims, comprising the step of adjusting a temperature increase of the wrapping material (1) during the heating step to a desired value by amending a temperature of a heating element (3, 4) of the heating device (2) by a control device, wherein the temperature is preferably set to a temperature of 50 - 300°C, preferably 75 - 250°C, more preferably 100 - 200°C, most preferably to 150°C, preferably $\pm$ 20°C, more preferably $\pm$ 10°C, most preferably $\pm$ 5°C.

12. Method according to any of the preceding claims, comprising a step of bending the wrapping material (1) or a part of the wrapping material along its longitudinal direction to form a cylinder, and preferably a further step of cutting the cylinder to form a plurality of cylinders.

13. Method according to claim 12, wherein the step of bending is realized by a bending unit module (9) and a heating device (2) is arranged upstream the bending unit module (9) and the heating device (2) is preferably arranged in a range of 50 - 10000 mm upstream the bending unit module (9), preferably in a range of 75 - 5000 mm, more preferably in a range of 100 - 2500 mm, most preferably in a range of 200 - 1500 mm upstream the bending unit module (9).

14. Method according to any of the preceding claims, wherein the transport path extends through the heating device (2) over a length of 100 - 1000 mm, preferably 150 - 500 mm, most preferably 200 - 300 mm, wherein the transport path preferably comprises at least one curved section located in the range of the heating device (2), wherein the curved course is caused by at least one roller located in the range of the heating device.

15. Method according to any of the preceding claims, wherein the substance applied by the printing unit module (5)

to at least one surface of the wrapping material (1) is selected from a group comprising a pigment, a die, a flavouring agent, a nicotine source, an invisible marking and a security element.

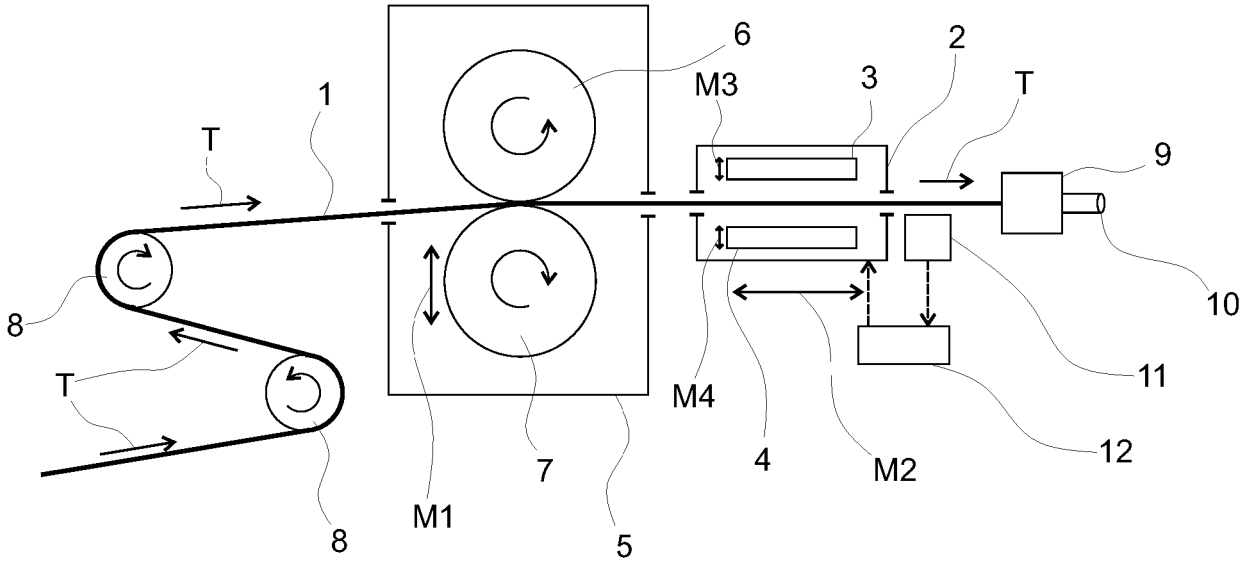

Fig. 1

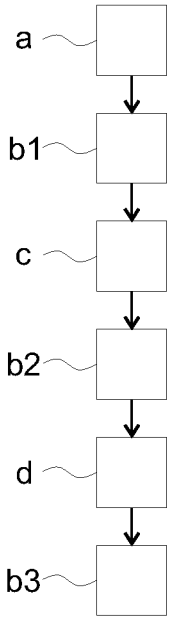

Fig. 2

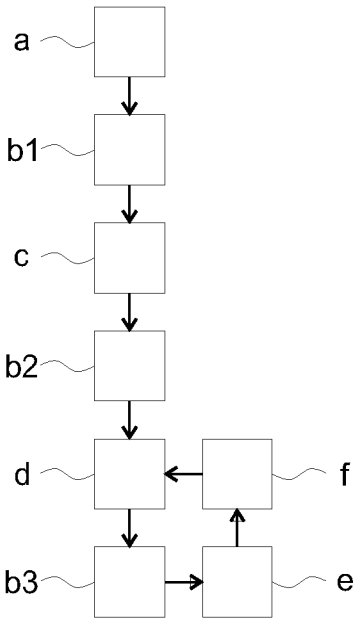

Fig. 3

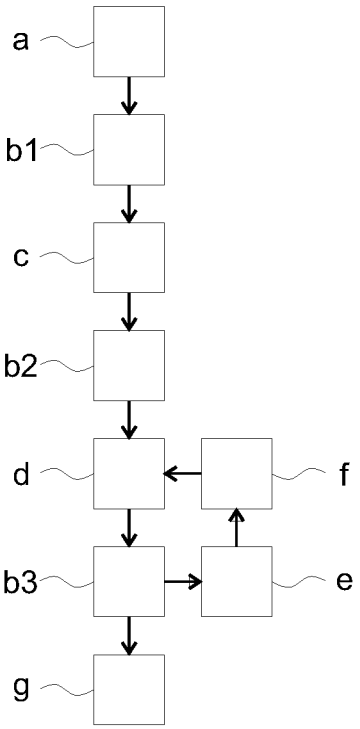

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 20 9378

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 1 723 878 A (EVERETT MOLINS WALTER) 6 August 1929 (1929-08-06)	1-5, 10-12, 14,15	INV. A24C5/01 A24C5/60
Y	* figure 1 *	6,8,9	
A	* page 1, line 58 - line 68 * * page 1, line 53 - line 60 *	7,13	ADD. A24C1/42
Y	GB 1 282 174 A (HAUNI WERKE KOERBER & CO KG [DE]) 19 July 1972 (1972-07-19) * figures 1,2 * * page 2, line 58 - page 3, line 45 *	6	
Y	CN 212 059 896 U (HENAN HUAGANG PRINTING CO LTD) 1 December 2020 (2020-12-01) * abstract; figure 1 *	8,9	
A	US 2012/205426 A1 (NEARY PATRICK F [US]) 16 August 2012 (2012-08-16) * figure 1 * * paragraph [0002] * * paragraph [0030] - paragraph [0039] *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 May 2023	Schwertfeger, C

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 20 9378

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1723878 A	06-08-1929	NONE	
GB 1282174 A	19-07-1972	NONE	
CN 212059896 U	01-12-2020	NONE	
US 2012205426 A1	16-08-2012	AR 084660 A1	29-05-2013
		TW 201238788 A	01-10-2012
		US 2012205426 A1	16-08-2012
		US 2012211553 A1	23-08-2012
		WO 2012099698 A1	26-07-2012

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20170273353 A1 **[0003]**
- US 20130087161 A1 **[0004]**