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(54) **METHOD AND APPARATUS FOR FORMING TEXTILE PAD FOR LAMINATE FLOOR UNDERLAYMENT**

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(57) **ABSTRACT**

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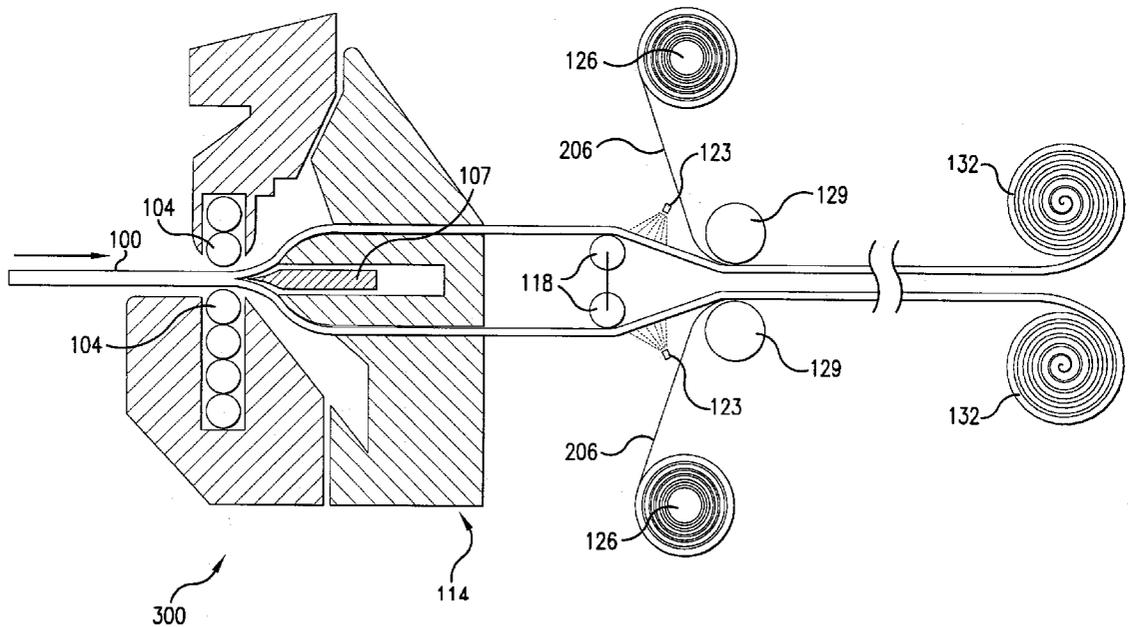
A method and apparatus are provided for forming textile pads from a textile batt. The method includes the steps of splitting an incoming single textile batt and forming partial thickness textile batts, applying an adhesive to outer surfaces of the partial thickness textile batts, and adhering vapor barriers to the partial thickness textile batts. The apparatus comprises a pair of feed rollers for receiving a textile batt, a splitting knife downstream of the pair of feed rollers, adhesive applicators positioned downstream of the splitting knife and capable of applying an adhesive to outer surfaces of the partial thickness textile batts, vapor barrier supply positioned downstream of the adhesive applicators and capable of supplying vapor barriers that contact the outer surfaces of the partial thickness textile batts, pressure rollers positioned downstream of the pair of vapor barrier supply rollers.

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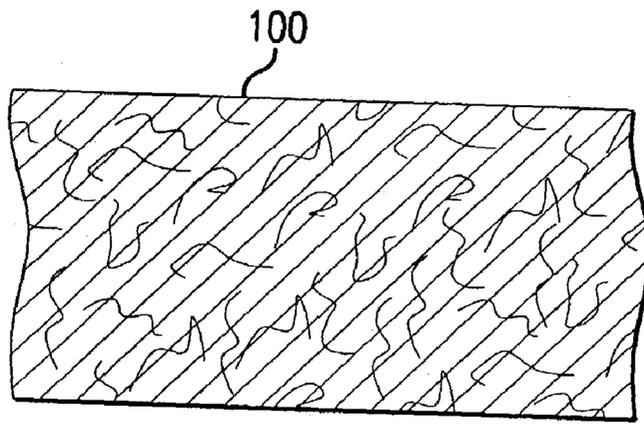


FIG. 1

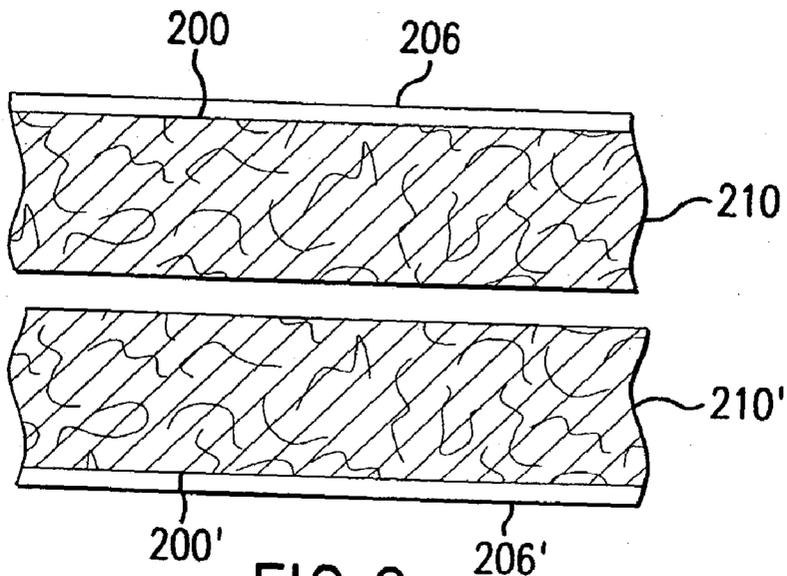
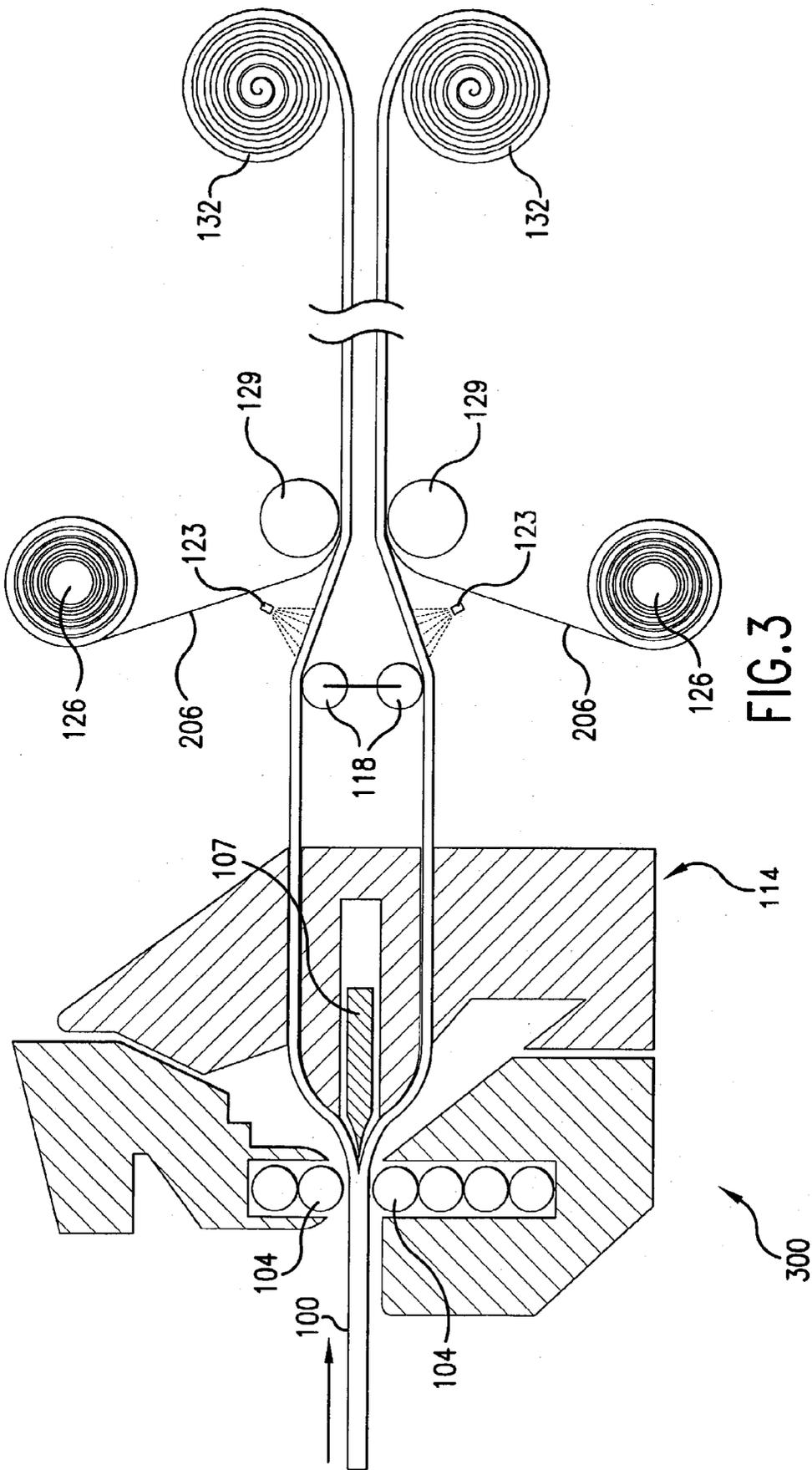


FIG. 2



METHOD AND APPARATUS FOR FORMING TEXTILE PAD FOR LAMINATE FLOOR UNDERLAYMENT

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a divisional of application Ser. No. 09/535,802, filed Mar. 28, 2000.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to a method and apparatus for forming a textile pad for laminate floor underlayment. More specifically, the invention relates to a method and apparatus for splitting a textile batt and forming two textile pads therefrom.

[0004] 2. Description of the Background Art

[0005] Textile pads are widely used in flooring applications. A pad is desirable when a flooring is applied over a sub-flooring.

[0006] Pads used in flooring applications serve multiple purposes. They may absorb impact, such as from persons walking on the flooring. They may provide sound deadening, and may provide insulating properties against heat transfer. Pads also may accommodate roughness, unevenness, or other flaws in the sub-flooring, and may provide a barrier against moisture and dirt. Finally, pads may lessen impact stresses on the flooring to lengthen the life of the flooring and make the flooring appear to be more durable and of a higher quality.

[0007] In the related art, a textile pad is not commonly used under laminate flooring. This is because a pad would have to be relatively thin so as to not cause any unevenness in transition areas (i.e., areas of flooring type transition, such as in doorways, etc.). In order to be acceptable, therefore, it is desirable that a laminate flooring pad be less than about ¼ of an inch in thickness, and more preferably about ⅓ inch in thickness.

[0008] In the related art, commercially available textile batts generally do not exist in thicknesses less than about ¼ of an inch. This is due to the soft, compressible, and pliable nature of the textile batt which heretofore has made a smaller thickness textile batt difficult to manufacture, if not impossible. As a result, related art laminate floors use something other than a textile pad.

[0009] What is needed, therefore, are improvements in methods and apparatus for forming textile pads for a laminate floor underlayment.

SUMMARY OF THE INVENTION

[0010] A method for forming textile pads from a textile batt is provided according to a first aspect of the invention. The method comprises the steps of feeding a textile batt in a first direction, splitting the textile batt longitudinally as the textile batt is fed, thereby forming a plurality of partial thickness textile batts, applying an adhesive to an outer surface of each of the partial thickness textile batts as the partial thickness textile batts are fed, and adhering a vapor barrier material to the adhesive coated surface of each of the

partial thickness textile batts to form a plurality of textile pads. In preferred aspects of this method, the partial thickness textile batts and plastic vapor barriers are passed through pressure rollers and partially compressed. The pressure rollers are maintained at an elevated temperature.

[0011] A method for forming two textile pads from a textile batt is provided according to a second aspect of the invention. The method comprises the steps of splitting the textile batt as the textile batt is fed, forming two partial thickness textile batts, wherein the textile batt is selected from the group consisting of polyester, nylon, acrylic, and cotton, or combinations thereof, applying an adhesive to outer surfaces of the two partial thickness textile batts as the two partial thickness textile batts are fed, and passing the two partial thickness textile batts and the two plastic vapor barriers through a pair of pressure rollers and partially compressing the two partial thickness textile batts and the two plastic vapor barriers at a pressure of about 400 psi and maintaining the pair of pressure rollers at a temperature of about 200 degrees Fahrenheit during bonding of the adhesive to form the two textile pads.

[0012] An apparatus for forming a plurality of textile pads from a textile batt is provided according to another aspect of the invention. The apparatus comprises a pair of feed rollers for receiving a textile batt, a splitting knife downstream of the feed rollers and capable of splitting the textile batt to produce partial thickness textile batts, adhesive appliers positioned downstream of the splitting knife and capable of applying an adhesive to an outer surface of each of the partial thickness textile batts, vapor barrier supply positioned downstream of the adhesive appliers and capable of supplying vapor barrier material that contacts the outer surfaces of the partial thickness textile batts, and pressure rollers positioned downstream of the vapor barrier supply and capable of partially compressing the partial thickness textile batts to bond of the vapor barrier adhesive.

[0013] The above and other features and advantages of the present invention will be further understood from the following description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 shows a side or cross-sectional view of a portion of a textile batt;

[0015] FIG. 2 shows two textile batts bonded to vapor barriers to form the two textile pads; and

[0016] FIG. 3 shows an apparatus for forming two textile pads from the textile batt.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] FIG. 1 shows a side or cross-sectional view of a portion of a textile batt 100. The textile batt 100 is commonly available in rolls of widths of about six feet and may range in thickness from about ¼ of an inch and up. This is too thick for a laminate floor underlayment for reasons given above.

[0018] The present invention solves the problem in the related art by providing a method and apparatus for splitting the textile batt 100 in order to form a plurality of textile pads

of a desired thickness. The present invention is capable of splitting a textile batt **100** to achieve for example a thickness of about $\frac{1}{16}$ of an inch, and forming textile pads therefrom.

[0019] The textile batt **100** may be manufactured from any of a wide variety of textile compositions, such as, for example, polyester, nylon, acrylic, cotton, polypropylene etc., or combinations thereof, including both natural and man-made fibers. The textile batt **100** is comprised of textile components, but does not have to be a woven material.

[0020] FIG. 2 shows two textile batts **200'** and **200** bonded to vapor barrier layers **206'** and **206** to form the two textile pads **210'** and **210**. The resulting pads may be used as a laminate flooring underlayment or as a pad for other types of flooring or for other purposes. The commercially available textile batt **100** has been split into two partial thickness batts **200'** and **200**, and each batt has been bonded to a vapor barrier layer **206'** and **206**.

[0021] Each partial thickness batt **200'** and **200** may be of equal thickness (i.e., the textile batt **100** is split in half), or may be of unequal thicknesses. The present invention is capable of forming a partial thickness batt of about $\frac{1}{16}$ of an inch or greater. The starting textile batt may be split longitudinally to provide two, three or more partial thickness batts.

[0022] FIG. 3 shows an apparatus **300** for forming two textile pads from the textile batt **100**. The apparatus includes a splitting machine **114**, a pair of tension rollers **118**, adhesive applicers **123**, a pair of vapor barrier supply rollers **126** providing the vapor barrier layers **206**, a pair of pressure rollers **129**, and a pair of take-up rollers **132**.

[0023] The splitting machine **114** in the preferred embodiment is a Mercier Turner Scimatic NT6 splitting machine, and includes a pair of feed rollers **104** and a splitting knife **107**. Alternatively, the apparatus **300** may include a set of feed rollers **104** and a splitting knife **107** in place of the splitting machine **114**.

[0024] The feed rollers **104** receive the textile batt **100** and pass it to the splitting knife **107**, where the textile batt **100** is split into the two partial thickness batts **200'** and **200**. The thickness of each partial thickness batt is determined by the both thickness of the textile batt **100** and the position of the splitting knife **107** in relation to the feed rollers **103**. When the splitting knife **107** is substantially centered between the feed rollers **104**, the textile batt **100** will be split into two substantially equal partial thickness batts.

[0025] In the present invention, it has been found that the textile batt **100** maybe controllably and accurately split if the feed rollers **104** are within a predetermined distance from the splitting knife **107**. The distance is important because of the compressible and pliable nature of the textile batt **100**. In the preferred embodiment, the predetermined distance is from about zero to about two millimeters.

[0026] In a preferred embodiment using the Mercier Turner splitting machine **114**, the splitting machine **114** is modified by adjusting the feed rollers **104** to a position as close as possible to the splitting knife **107**, and removing feed guides so that the splitting knife **107** may be moved closer. In addition, the splitting machine **114** is modified by changing the feed rollers **104** from a serrated surface type of multiple sections to a smooth surface type of a single piece construction.

[0027] The tension rollers **118** maintain a predetermined amount of tension on the two partial thickness batts **200'** and **200**.

[0028] The adhesive applicers **123** are downstream of the tension rollers **118** and apply adhesive to outer surfaces of the two partial thickness batts. In a preferred embodiment, the adhesive applicers **123** spray a layer of adhesive onto the two partial thickness batts. Alternatively, the adhesive applicers **123** may apply the adhesive directly, such as, for example, wipers or brushes.

[0029] The adhesive is preferably a high viscosity, low melting point adhesive that is applied hot and forms a bond as it cools (i.e., a "hot melt" adhesive). Such adhesives are available from H. B. Fuller, from Swift Adhesive, and from Western Adhesive (the Western Adhesive product is sold under the product name of RHM542). Alternatively, any other adhesive capable of bonding the textile batt to the vapor barrier may be used.

[0030] The pair of vapor barrier supply rollers **126** are also downstream of the tension rollers **118** and supply a vapor barrier **206'** and **206** to each of the two partial thickness batts **200'** and **200**.

[0031] The vapor barrier preferably is a plastic sheet material, typically about $\frac{1}{2}$ to about 1 mil in thickness. The vapor barrier, as the name implies, prevents the travel of vapor (usually water vapor) through the textile pad **210'** or **210**. In the preferred embodiment the vapor barrier **206'** and **206** is coextruded polyethylene, but alternatively any flexible vapor barrier of a suitable thickness may be used.

[0032] The pair of pressure rollers **129** are downstream of the adhesive applicers **123** and the vapor supply rollers **126**. The pair of pressure rollers **129** bring together the two partial thickness batts **200'** and **200** and the two vapor barriers **206'** and **206** to form the two textile pads **210'** and **210**. The pair of pressure rollers **129** heat and partially compress the batts during the bonding of the adhesive to form the two textile pads.

[0033] In the preferred embodiment, the pressure rollers **129** apply about 400 psi (pounds per square inch) of pressure to the two partial thickness textile batts **200'** and **200** and to the vapor barriers **206'** and **206**. In addition, the pressure rollers **129** are maintained at a temperature of about 200 degrees Fahrenheit. The heating partially softens or breaks down the vapor barrier to make it pliable and to aid in penetration of the vapor barrier by the adhesive.

[0034] Downstream of the pressure rollers **129** is a pair of take-up rollers **132**. The pair of take-up rollers **132** may be used to roll up the finished textile pads **210'** and **210**. The finished textile pads **210'** and **210** may be used as a floor underlayment, a laminate floor underlayment, as part of a paint drop cloth, etc.

[0035] While the invention has been described in detail above, the invention is not intended to be limited to the specific embodiments as described. It is evident that those skilled in the art may now make numerous uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts.

What is claimed is:

1. An apparatus for forming textile pads from a textile batt, comprising:

a pair of feed rollers for receiving said textile batt;

a splitting knife downstream of said pair of feed rollers and capable of splitting said textile batt to produce partial thickness textile batts;

adhesive applicers positioned downstream of said splitting knife and capable of applying an adhesive to outer surfaces of said partial thickness textile batts;

a vapor barrier supply positioned downstream of said adhesive applicers and capable of supplying vapor barriers that contact said outer surfaces of said partial thickness textile batts; and

pressure rollers positioned downstream of said pair of vapor barrier supply rollers.

2. The apparatus of claim 1, wherein said pair of feed rollers are positioned about zero to about 2 millimeters from said splitting knife.

3. The apparatus of claim 1, wherein said feed rollers and said splitting knife comprise a splitting machine.

4. The apparatus of claim 1, wherein said feed rollers and said splitting knife comprise a Mercier Turner Scimatic NT6 splitting machine.

5. The apparatus of claim 1, wherein said apparatus further comprises a pair of tension rollers downstream of said splitting knife and upstream of said adhesive applicers, said tension rollers capable of controlling tension in said two partial thickness textile batts.

6. The apparatus of claim 1, wherein said apparatus further comprises two take-up rollers downstream of said pressure rollers.

7. The apparatus of claim 1, wherein a textile pad of said two textile pads formed according to said method comprises a laminate floor underlayment.

8. The apparatus of claim 1, wherein said textile batt comprises natural fibers.

9. The apparatus of claim 1, wherein said textile batt comprises man-made fibers.

10. The apparatus of claim 1, wherein said textile batt is selected from the group consisting of polyester, nylon, acrylic, and cotton, polypropylene or combinations thereof.

11. The apparatus of claim 1, wherein a partial thickness textile batt is about $\frac{1}{16}$ to about $\frac{1}{8}$ inch in thickness.

12. The apparatus of claim 1, wherein a partial thickness textile batt is about $\frac{1}{16}$ to about $\frac{7}{16}$ inch in thickness.

13. The apparatus of claim 1, wherein said two partial thickness textile batts are of unequal thickness.

14. The apparatus of claim 1, wherein said two partial thickness textile batts are of equal thickness.

15. The apparatus of claim 1, wherein a vapor barrier of said two vapor barriers comprises plastic.

16. The apparatus of claim 1, wherein a vapor barrier of said two vapor barriers comprises coextruded polyethylene.

17. The apparatus of claim 1, wherein a vapor barrier of said two vapor barriers is about $\frac{1}{2}$ to about 1 mil in thickness.

18. The apparatus of claim 1, wherein said partially compressing step comprises passing said two partial thickness textile batts and said two plastic vapor barriers through a pair of pressure rollers.

19. The apparatus of claim 1, wherein said partially compressing step further comprises passing said two partial thickness textile batts and said two plastic vapor barriers through a pair of pressure rollers which apply a pressure of about 400 psi.

20. The apparatus of claim 1, wherein said partially compressing step comprises passing said two partial thickness textile batts and said two plastic vapor barriers through a pair of pressure rollers and said pair of pressure rollers are maintained at a temperature of about 200 degrees Fahrenheit.

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