EMBOSSING MACHINE TRANSFERRING PATTERN ON WET FLOCKED FABRIC

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Abstract

Present invention relates to a machine which directly transfers pattern on wet, colour or natural-colour flocked fabric base before drying fabric flocked in colour or natural-colour flocked fabric production line, which is used in various sectors, and a process involving the said machine. The invention is characterized with followings as main components: acid-corrosion, patterned cylinder (15) which directly transfers pattern on fabric, an unpatterned cylinder (14), which turns on within water, a system (13) which adjusts distance between cylinders, scraping blade (17), vacuum brushes (18), high-pressure blowing apparatus and air system (19), a sensor system (23) which monitors edge of fabric, a system and motor (20) which moves body of machine to left or right side.
EMBOSSING MACHINE TRANSFERRING PATTERN ON WET FLOCKED FABRIC

TECHNICAL FIELD OF INVENTION

[0001] Present invention relates to a machine which directly transfer pattern on colour or natural-colour flocked wet fabric base before drying fabric flocked in colour or natural-colour flocked fabric production line in order to be used as upholstery stuff used in furniture sector and clothing fabrics and products included in curtain, packaging and wall-coating sectors, the process involving this machine and products manufactured by this process.

BACKGROUND ART

[0002] In background art, heated and patterned steel cylinder is pressed on dried fabric and thus pattern is obtained. Processes, according to background art, are applied by hot emboss machines. Details of machine operating according to background art are given in FIG. 1.

[0003] As shown in FIG. 1, pattern is applied on flocked fabric when flocked fabric is dry (not wet or humid) in hot emboss process according to background art. Most significant disadvantage of hot emboss is that end-product lacks permanence and fine general appearance. Colours and appearance of emboss loses its appearance after a particular time and final quality deteriorates. Pattern transferred by hot emboss on flocked fabric cannot be seen clearly. After fabric is used for a short time, colours and pattern deteriorates. Because pattern is transferred on flocked and dried fabric and accordingly, pattern cannot diffuse base of flocked fabric and adhesive plastered to the base. Additionally, as steel cylinder contacts with surface of flocked fabric under high pressure and high temperature (200° C.), colour troubles are met.

[0004] Another process is described in document No WO 01/21878 which was submitted in 21 Sep. 2000 and issued in 21 May 2002 (FIG. 2). Process, described in document No WO 01/21878 A1, is air embossing method. In this process, pressure air passes through patterned holes on the surface of template cylinder and the air is blown on flocked wet fabric. There are holes, where air passes, and filled parts on surface of template cylinder used in the invention described in aforementioned document. Pressure air passes through perforated parts of cylinder and it applies pressure on flocked wet fabric and thus pattern is formed. Edges of pattern transferred on flocked fabric according to document No WO 01/21878 A1 are not clear. The pattern has rough appearance. Because pattern is transferred on flocked wet fabric via air and accordingly pattern is created by left or right deviation of flocks. According to method described in document No WO 01/21878 A1, flocks are not immersed into binder plastered on fabric via steel cylinder as in the machine which applies the process according to present invention. Consequently, the said two products (one manufactured according to the process described in document No WO 01/21878 A1 and the other product manufactured by machine according to the invention) are completely different.

[0005] U.S. Pat. No. 5,510,143 submitted 20 Jul. 1994 and issued in 23 Apr. 1996 describes an apparatus and method for creating a pattern on flocked fabrics, however resultant product is completely different than that of invention-related machine, process and end-product. Because, as described in document U.S. Pat. No. 5,510,143, flocks in flocking units are stuck on binder-coated surface by angle of 75 degrees. In present invention, flocks are stuck on surface by angle of 90 degrees. The said differences between two processes offer a divergent touch and appearance to flocked fabric. Steel cylinder of apparatus according to document U.S. Pat. No. 5,510,143 only felts flocks. Patterned steel cylinder according to the invention lays flocks on wet binder coated on surface of fabric. The significant differences, in operation of machine developed according to present invention, provide three-dimensional appearance, net contour and dual colour to Flocked fabric. The said vital features cannot be provided by apparatus and method described in above document. Because, if upper steel cylinder is desired to approach lower straight cylinder that is if flock is desired to be laid on binder as in present invention, a continuous cleaning system should be applied on lower and upper cylinders. However, such a cleaning system is not mentioned in aforementioned document (U.S. Pat. No. 5,510,143).

[0006] The said innovations have been realized in the machine according to the present invention and apparatus are invented which cleans lower cylinder and upper patterned cylinder as long as cylinders operate in invention-related machine. Foreign materials (adhesive, flock lump and others) on cylinders are scrapped by a blade located on contrary of operating direction of lower cylinder; the said cylinder passes through water and re-cleaned by rubber blade which is in the operating direction of lower cylinder and thus the process is continuous as long as machine operates.

[0007] In the machine according to the invention, vacuum brush and pressure air jet is used for cleaning upper patterned cylinder. Vacuum brushes simultaneously turn in different direction at both sides of cylinder and if flocked adhesive lump is stuck to patterned steel cylinder, the lump is immediately removed. In each turn of cylinder, the said flocked binder lump is prevented to form defect on product.

[0008] Moreover, air is applied on patterned steel cylinder by one pressure air jet. In this process, foreign materials on steel cylinder or in hole parts of cylinders are removed.

[0009] As long as machine, according to the present invention, operates, lower and upper cylinders are continuously cleaned and thus the machine had been available for industry.

[0010] Another significant difference of machine according to the invention in comparison with process applied by machine described in document U.S. Pat. No. 5,510,143 is that A.C. (alternative Current) flocking technique is applied in the said invention. Flocks are 15 degrees away from vertical axis (75 degrees). However, in the machine according to the invention, D.C. (Direct Current) flocking technique is applied. Flocks are exactly in vertical axis (90 degrees) (This issue is described in details below). Additionally, another significant feature of the machine according to present invention, pattern on upper cylinder is created by acid-corrosion method or a patterned cylinder which is coated by rubber with the technique of laser cutting. In aforementioned invention, another method which are different from the present invention was used in forming pattern on the cylinder.

[0011] In the machine according to the present invention, significant differences of end-products manufactured according to the process involving the said machine from apparatus and method described in document U.S. Pat. No. 5,510,143 are as follows:

[0012] 1. Flocking system of the machine according to present invention is D.C. Position of flocks on binder is at 90 degrees. A.C. system was used in document U.S. Pat. No. 5,510,143 and position of flocks on binder was
at 75 degrees (D.C and A.C. systems are completely different current). They serve for sticking flock powders within adhesive (FIG. 7a-b).

[0013] 2. In the machine according to present invention, pattern on upper cylinder is created by acid-corrosion technique and no special material is coated. Also, the patterned cylinder which is coated by rubber, using the "ofset" technique can be used instead of the steel cylinder. In document U.S. Pat. No. 5,510,143, a different technique is applied for creating pattern on steel cylinder and a special material is coated.

[0014] 3. As long as lower cylinder of machine according to the invention operates, it is located within water and surface of cylinder is cleaned by steel and plastic blades. No such apparatus can be observed in document U.S. Pat. No. 5,510,143. As any foreign material on lower cylinders cause level difference, upper steel cylinder contacts with binder. However, this problem is resolved by apparatus according to the invention.

[0015] 4. In the machine according to the invention, surface of steel cylinder is continuously cleaned by vacuum brush and pressure air as long as machine operates such an apparatus is not involved in document U.S. Pat. No. 5,510,143.

[0016] 5. Flock absorption apparatus, which will absorb free flocks at exit of flocking unit and in the entrance of wet emboss machine, is added to process of machine according to the invention.

[0017] 6. In the machine according to the invention, upper cylinder lays flocks onto binder. However, in document U.S. Pat. No. 5510,143, upper cylinder flocks flocks.

[0018] 7. In the machine according to the invention and in the process involving this machine, fabric flocked by different amount and type of natural or colour flocks is processed in different washing, emboss, painting and drumming procedures and thus significantly different new products are obtained. However, no process-related description is included in document U.S. Pat. No. 5,510,143.

[0019] 8. A different process and product is described in document U.S. Pat. No. 4,668,313, which was submitted in 15 Feb. 1985 and accepted in 26 May 1987. In this document, flocked wet product from flocking unit is passed through calendaring cylinder and all flocks on surface of fabric is uni-directionally sloped. Surfaces of both lower and upper cylinder are smooth and no pattern is applied. Following the said procedure, an embossing process on preferentially flocked flocks (if there is), is completely different from the process described in present invention, the product obtained by the process, the machine according to the invention and totally a new product is obtained. Moreover, a straight platform is present under steel cylinder which applies pattern on calendared flocks in document U.S. Pat. No. 4,668,313. There is no straight steel cylinder as in the machine according to the invention. Moreover, the machine according to the invention does not relate to calendaring work. In upper side, patterned steel cylinder calendar a part of flocks and others remain, thus pattern is formed.

[0020] A different process and product is described in document GB 215 97 30A, which was submitted in 12 Apr. 1985 and accepted in 11 Dec. 1985. First, adhesive is transferred to fabric in the said document. Later, fabric passes through flocking unit, followed by calendaring cylinders. Calendaring cylinders calendar all flocks on surface uni-directionally. Additionally, upper and lower cylinders are smooth and no pattern is formed. Then, excess flock is removed by passing fabric through suction unit. Following this process, a patterning procedure is applied optionally on calendared flock. However, no straight platform is present under upper steel cylinder in embossing procedure of the said document. The process does not relate to the machine according to present invention. Because calendaring process is not included in our process and additional shape and operating principle of the said cylinder is completely different.


AIMS OF DEVELOPING MACHINE ACCORDING TO INVENTION

[0022] Followings are aimed when developing emboss machine according to which transfers pattern on flocked wet fabric;

[0023] Transferring pattern by steel cylinder applied in hot emboss machine (FIG. 2) without need of heating process;

[0024] Transferring pattern by steel cylinder applied in hot emboss machine (FIG. 2) without need of high pressure environment and heating process;

[0025] Avoiding pre-drying process applied in hot emboss procedure and thus lack of need to pre-drying process;

[0026] Completing all steps of process according to the invention rapidly and sequentially;

[0027] Enabling lower machine investment cost in comparison with that of air emboss and hot emboss machines;

[0028] Enabling lower power cost in comparison with hot emboss machine;

[0029] Providing ease of operation;

[0030] Providing high efficiency;

[0031] Removing air applied in air emboss machine;

[0032] Obtaining faster operation and cost-effective due to patterned steel cylinder by acid-corrosion method or cylinder covered by rubber.

[0033] Additionally, followings are also aimed in emboss machine transferring pattern on wet flocked fabric which was developed according to invention, in the process involving the said machine and also in developing product manufactured according to the said process;

[0034] Enabling permanent and different pattern transfer on colored or natural flocked fabric leaving flocking unit wet instead of flocked and dried fabric base;

[0035] Avoiding foreign materials (flock lump, binder coagulate etc.), which may be formed during production phase, to prevent operation of machine developed according to the invention.
Gaining dark and light colour during emboss and dying processes as flocks, pressed by steel cylinder in order to emboss, are immersed into lower binder layer.

Enabling clear-cut, net and three-dimensional patterns on flocked fabric

Increasing possibility of new product development in Exchange for lower costs

Different and superior appearance and permanence of effects on pattern.

Developing a machine which is first applied to industry in this field.

DESCRIPTION OF DRAWINGS

Drawings are below which are prepared and annexed for better description of embossing machine according to invention, that transfers pattern on flocked wet fabric.

FIG. 1—Schematic view of hot embossing process (background art)

FIG. 2—Schematic view of air embossing process (background art)

FIG. 3—Schematic view of cold and wet embossing machine (described in document U.S. Pat. No. 5,510,143).

FIG. 4—Schematic view of cold and wet embossing machine according to present invention

FIG. 5—Schematic view of cold and wet embossing process of machine according to the invention

FIG. 6—View fabric surface of product manufactured by cold and wet embossing machine according to invention.

FIG. 7—View of A.C. and D.C. flocking and sections of flocked fabric

DESCRIPTION OF ELEMENTS FORMING THE INVENTION (ELEMENTS-PARTS-FEATURES)

Components (elements) are assigned a separate number, which are included in designated and annexed figures for better description of embossing machine according to the invention that transfers pattern on flocked wet fabric.

FIG. 1, SCHEMATIC VIEW OF HOT EMBOSS PROCESS

1. Fabric
2. J-box (unit collecting fabric)
3. Brush (serves to remove foreign materials on surface of fabric)
4. Hot, patterned steel cylinder
5. Cooling cylinders
6. Hot embossed end-product

FIG. 2, SCHEMATIC VIEW OF AIR EMBOSS MACHINE

7. Flocked fabric
8. Air blade
9. Patterned cylinder

FIG. 3, SCHEMATIC VIEW OF COLD EMBOSS MACHINE DESCRIBED IN DOCUMENT U.S. PAT. NO. 5,510,143

10. Fabric
11. Flocking Unit
12. Custom-coated patterned steel cylinder

FIG. 4, SCHEMATIC VIEW OF COLD AND WET EMBOSS MACHINE ACCORDING TO PRESENT INVENTION

10. Pistons (serves to slide patterned steel cylinder)
11. Patterned cylinder bed (carries back-up and operating cylinders)
11a. Back-up cylinder
11b. Back-up cylinder
12. Motor (turning patterned cylinder)
13. Motor (serving to adjust the distance between two cylinders)
14. Lower steel cylinder (unpatterned cylinder)
15. Embossing cylinder (patterned by acid corrosion method or rubber coated cylinder)
16. Water reservoir
17. Scrapping blade and ragle
18. Brush and suction
19. Blowing
20. Motor (main)
21. Machine body
22. Rail
24. Safety cylinders

FIG. 5, VIEW OF COLD AND WET EMBOSS PROCESS ACCORDING TO INVENTION

25. Fabric
26. Binder application
27. Flocking Unit
28. Suction unit (removing excess flocks)
29. Cold emboss (cold embossing cylinder)
30. Owen
31. Cold cylinders
32. Retention cylinder
33. End-product

FIG. 6, VIEW OF FABRIC SURFACE FROM COLD AND WET EMBOSS MACHINE ACCORDING TO THE INVENTION

6a. View of fabric surface
6a.1. Flock coated fabric
6a.2. Cold-embossed flocked fabric
6b.1. Side sectional view of unembossed flocked fabric
6b.2. Side sectional view of embossed flocked fabric

FIG. 7, A.C. AND D.C. FLOCKING, FLOCK VIEWS

7a. A.C. Flocking
7b. D.C. Flocking

DETAILED DESCRIPTION OF MACHINE ACCORDING TO THE INVENTION

Main process steps of embossing machine according to the invention, which transfers pattern on flocked wet fabric; and processes applied by the said machine are as follows:
1. Enabling pattern transfer by directly passing colour or natural flocked wet fabric from flocking unit between patterned steel cylinder (15) and lower steel cylinder (unpatterned cylinder) (14).

2. Drying embossed and flocked wet fabric with courtesy of cold cylinder (29).

3. Dying embossed and colour or natural flocked fabric in single or multiple colours.

Colour or natural-colour flocked, wet fabric (but undyed) from flocking unit is directly transferred by embossing machine according to the invention and if natural flock is used, various dying methods are used and the aforementioned processes are sequentially performed.

Emboss machine according to the invention, which transfers pattern on wet fabric, comprises following elements.

Patterned steel cylinder (patterned by acid corrosion method or rubber coated) (15)

Unpatterned (straight) steel or plastic carrier cylinder (14).

Scraping blade, angle (17)

Vacuum brushes (18) cleaning surface of patterned steel cylinder.

Pressure air jet apparatus (19) cleaning foreign materials on surface of patterned steel cylinder or from pattern holes.

Machine body (21) moving left-right side.

Steel and plastic blade (17), continuously cleaning surface of lower cylinder.

Water reservoir (16), enabling lower cylinder contact with water.

Motors (12, 13 and 20), adjusting distance between lower and upper cylinders in microns.

Sensors (23), monitoring right-left move of fabric.

The machine, according to the invention, comprises fabric to be flocked, if required, and binder laying apparatus, flocking unit where binder coated fabric will be flocked, and a suction unit where free flocks on flocked and wet fabric is suctioned under and above fabric. Additionally, the machine includes an oven, where wet embossed and flocked fabric is dried if necessary, and also units which serve brushing, cooling and rolling dry flocked fabric.

The process which includes the machine developed in this invention is characterized by the steps of plastering the binder on the fabric which will be flocked, flocking the binder coated fabric, sucking the free flocks from the surface and bottom of the flocked wet fabric, patterning the flocked fabric by passing it in between the patterned steel cylinder (15) and straight cylinder rotating in water, drying the patterned and flocked fabric, brushing the flocked fabric, cooling and rolling as bobbin.

According to technical field, there are two types of flocking process; A.C. and D.C. In general, A.C. flocking system is used in United States of America. However, at European Union countries, D.C. Flocking system is applied. In A.C. flocking, flocks are stuck on binder, coated on fabric, by angle of 75 degrees (FIG. 7a), but flocks are stuck on binder, coated on fabric, by angle of 90 degrees in D.C. flocking (FIG. 7b). Flock powders are stuck on wet binder, coated on fabric, by electric current; electric current is an electric field which is formed by increasing voltage of electric current to 220 volt and decreasing amper to milli ampere. Technical values of electric power are completely different in D.C. and A.C. electrical fields and there also differences in used system and apparatus. Standing positions of flocks stuck into binder is also different (FIG. 7). Additionally, chemical conductor materials used in flock are in different amount and type.

There are significant differences between products manufactured by the two techniques. D.C. flocking method is used in present invention. While flocked fabric, coming wet from flocking unit (26), is passed through patterned (15) and straight cylinder (14), flocks on fabric are embedd into binder in a transverse manner by adjustable pressure of upper patterned steel cylinder (15). Due to pattern formed on upper steel cylinder (15), a pattern is formed by flocks, which are embedd into wet binder on fabric but not pressed. This product is transferred to oven (29) and dried, thus process is completed. However, if lower unpatterned (14) and upper patterned steel cylinders (15) are not continuously cleaned during operation, the machine cannot operate. Binder contaminants flock lumps or other materials on lower cylinder (14) or upper cylinder (15) causes defect in each turn of cylinder. After a particular period, the apparatus cannot create pattern. As these troubles are completely resolved in the machine according to the invention, the apparatus had become available to be used in this industry.

Unpatterned cylinder (14) turns within water reservoir (14). Therefore foreign materials on the surface of cylinder (14) are cleaned within water (16).

In order to replace upper patterned steel cylinders assembled to the machine according to the invention, one-cylinder, two-cylinder (11a) and three-cylinder (11b) apparatus are present. While one of patterned steel cylinder is working, other cylinders (11) are kept as back-up.

In the machine according to the invention which transfers pattern on flocked fabric, all patterns with any shape or appearance can be transferred.

In the machine according to the invention which transfers pattern on flocked fabric, the fabric which was applied wet and cold emboss and painted in natural colour in different length, brightness and denier and which was dried, is directly transferred to washing and drumming machine if colour flock is applied; or the fabric is transferred to either wet emboss machine or rope—during machines and dried following oven, if natural (white) flock is applied. Moreover, multi-colour appearance is obtained by paper transfer embossing method.

Machine according to the invention which transfers pattern of flocked fabric, is used in embossing upholstery and wear fabrics used in furniture and ready-made wear industry. Additionally, product related to curtain, packaging and wall coating can be manufactured by this machine. In first procedure, base is coated by natural or colour flock via steel cylinder and dried, then adhesive (binder) is laid on this surface smoothly by plastering method followed by natural or colour flock application and finally product is dried. This dried product is wet and multi-coloured embossed, thus totally different product is obtained or the product is transferred to rope-dying machine and another type of product is obtained or the product is painted by multiple colours with courtesy of paper transfer method. If colour flock is applied in final layer, product is passed through washing and drumming machines. It is coated by colour flock with various lengths, brightness and denier in flocking unit and embossed, dried.
and flocked fabric is subjected to washing and drumming process, if colour flock is used.

ADVANTAGES OF THE INVENTION

[0122] Embossing machine according to the invention, which transfers pattern on flocked wet fabric, and flocked fabrics, which are patterned by wet and cold embossing, have following advantages.

[0123] On the contrary to all other products, flocks are embedded into binder plastered on fabric by steel cylinder in accordance with pattern and they possess following unique features;

[0124] Contours of pattern are more clear and three-dimensional.

[0125] Contours of pattern are more deep and permanent.

[0126] As free flocks and binder-embedded flocks absorb different amount of dye tone and sartone colours appear (dual-colour).

1. An embossing machine, which transfers pattern on flocked wet fabric, characterized in that the said machine can be applied in upholstery stuff used in furniture sector, fabrics used in clothing sector and curtain fabrics as well as packaging, wall coating sectors whereby the said machine comprises the following elements which enables pattern to be transferred on colour or natural-colour flocked wet fabric from flocking unit (I);

- Acid-corrosion, patterned steel cylinder (15), which transfers pattern directly on fabric, or patterned rubber coated steel cylinder,
- Unpatterned (straight) cylinder (14), which turns (rotates) within water,
- System and motors (13), which adjust distance between cylinders in a sensitive manner,
- Scrapping blade (17),
- Vacuum brushes (18),
- High-pressure blowing apparatus and air-system (19),
- Sensor system (23), monitoring edge of flocked fabric
- System and motor (20), which moves body of machine to left and right side,
- Back-up system and motor (12), which enables rapid replacement of patterned steel cylinder,
- Safety cylinders

2. A process transferring pattern on wet flocked fabric comprising the steps of plastering the binder on the fabric which will be flocked, flocking the binder coated fabric, sucking the free flocks from the surface and bottom of the flocked wet fabric, patterning the flocked fabric by passing it in between the patterned steel cylinder (15) and straight cylinder rotating in water, drying the wet patterned and flocked fabric, brushing the flocked fabric, cooling and rolling as bobbin.

3. A machine which transfers pattern on wet, flocked fabric, according to any of preceding claims, characterized in that, the machine involves washing, drumming units if color flock is used or the machine involves embossing, drying or paper transfer painting units if natural flock is used.

4. A machine which transfers pattern on wet, flocked fabric, process involving the machine and fabric produced according to the said process according to any of preceding claims, characterized in that the fabric, patterned in various length, brightness and denier in flocking unit followed by drying, is dyed in rope-dying machines.

5. A machine which transfers pattern on wet, flocked fabric, process involving the machine and fabric produced according to the said process according to any of preceding claims, characterized in that the fabric, patterned in various length, brightness and denier in flocking unit followed by drying, is dyed uni-or multi-colour in textile wet emboss machines.

6. A machine which transfers pattern on wet, flocked fabric, process involving the machine and fabric produced according to the said process according to any of preceding claims, characterized in that, the fabric, which is coated by natural (white) flock, in various length, brightness and denier in flock unit followed by patterning and drying, is re-plastered by binder and re-coated by natural or colour flock in various length, brightness and denier in flocking unit and then the product is dyed by any one of rope-drying, wet emboss or paper transfer pattern methods.

7. A machine which transfers pattern on wet, flocked fabric, process involving the machine and fabric produced according to the said process according to any of preceding claims, characterized in that the fabric, patterned in various length, brightness and denier in flocking unit followed by drying, in dyed in uni- or multiple-colour by paper transfer embossing.

8. A machine which transfers pattern on wet, flocked fabric, process involving the machine and fabric produced according to the said process according to any of preceding claims, characterized in that the fabric, patterned in various length, brightness and denier in flocking unit followed by drying is subjected to washing and drumming process if flock is coloured.

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