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20122 Milano (IT)(54) **Method for the surface treatment of a flat-structured material**

(57) A method for the treatment of one of the surface sides of a flat-structured material with a large surface development and highly reduced thickness with respect to said surface development, from a minimum working height (weft) to a maximum of 2.50 m (2,500 mm) which can be wrapped into a cylindrical roll, both at the inlet (before treatment) and at the outlet (after treatment), comprising:

- putting said material, on the side of the surface of interest, in contact with a moving solid;
- regulating the reciprocal position between the

surface of the flat-structured material to be treated and the moving solid, this in turn being in constant contact with a moving solid inside a liquid bath;

- moving said solid inside said liquid bath to allow the above liquid to be transferred onto the surface of the adjacent solid (a);
- programming the temperature and also the composition of said liquid bath in relation to the treatment to be effected on the surface of interest of the material to be treated;
- subjecting the material thus treated to finishing operations.

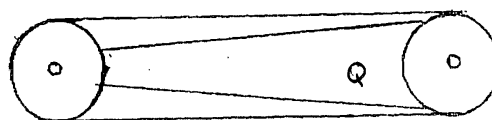
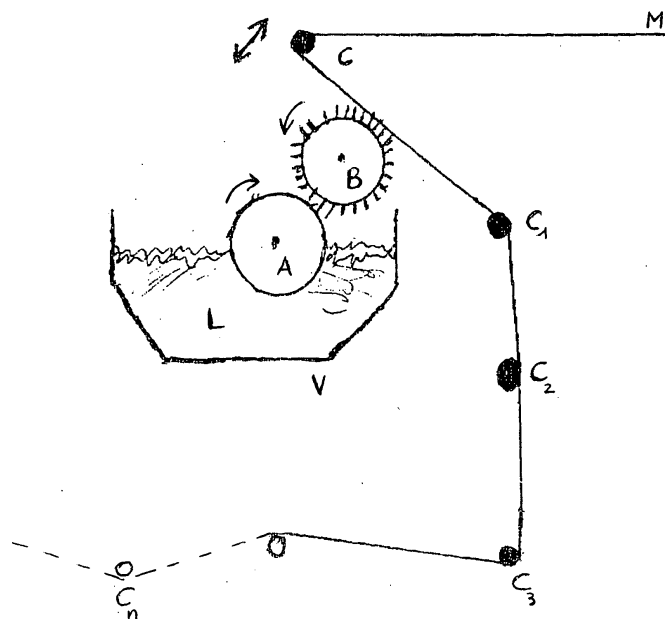


Fig. 1

Description

[0001] The present invention relates to a method for the treatment of one of the sides of a flat-structured material having a large surface development and highly reduced thickness with respect to this surface development, from a minimum working height (weft) to a maximum of 2.50 m (2,500 mm) which, when necessary, can be wrapped into a cylindrical roll, both at the inlet (before treatment) and at the outlet (after treatment). The method substantially comprises the contact of the surface of interest with a moving solid, which, in turn, is in contact with another solid, the latter also in movement and partially immersed in a liquid bath in which it is soaked and of which it soaks the surface of the previous solid. The latter, in turn, transmits the effect to the surface of the material to be treated: the composition and temperature of the liquid bath are suitably selected in relation to the result to be obtained on the surface of the material to be treated. The method also envisages that the material thus treated be finally sent for suitable finishing treatment: in particular, the material treated is sent to a heated cylinder having on its circumference from two to infinite traces with rounded steel bars and/or a completely smooth cylinder. The material slides to the cylinder by means of a closed-ring felt, where it is dried and pressed between the two bodies (heated cylinder and felt).

[0002] By extension and as a logical consequence, the present invention also relates to the devices used for the embodiment of the method defined above. More specifically, the object of the present invention relates to a method for preparing fabrics having different "feel effects" and/or coloured "visible effects", obtained by treating the same on one side only.

[0003] The use of machines for effecting the polishing of fabrics is known in the practice of the textile industry. For the polishing of pile fabric, these machines are equipped with a basin in which a bachelite cylinder is half immersed in a bath of cold water and chemical products.

[0004] A brush is situated above this cylinder, which, by pressing against the cylinder, collects the liquid from said cylinder and transfers it to the pile side of the fabric, i.e. onto the "loden"-type straight side.

[0005] The fabric thus treated is normally sent onto a heated cylinder, equipped with knurled combs, which completes the polishing operation of the pile and effects the alignment of the pile. It is also known that fabrics with particular "feel effects" can be prepared by applying specific chemical products to the same, according to procedures which envisage the complete immersion of the fabric in the solution (or suspension) of the chemical product of interest, (foulard) and the subsequent drying operation of the fabric thus impregnated; this kind of procedure inevitably leads to the excessive waste of chemical products and, furthermore, it is also impossible to obtain a fabric with two sides treated in different ways. As is known, immersion procedures can also be avoided

by effecting surface treatment of the fabrics by means of printing or laying operations on one side only, allowing fabrics to be obtained with patterns on a white or on a coloured background.

[0006] The Applicant has now found that it is possible to effect treatment on one side only of the fabric, using reasonable quantities of chemical products, by programming their distribution on one side only of the fabric of interest and thus with the possibility of having a different treatment on the other side, if necessary and/or desired. In this way fabrics are produced with the desired feel and/or coloured visible effect, on one side and a different feel or visible effect on the other, resorting to the use of a machine such as that described above for effecting the polishing of pile fabric, exceeding the limits of use with single variations which confer a new and unexpected structure, and whose use can also be surprisingly extended beyond the textile industry.

[0007] The object of the present invention relates, in fact, to a method for the treatment of one of the surface sides of a flat-structured material with a large surface development and highly reduced thickness with respect to this surface development, capable, if necessary, of being wrapped in the form of a cylindrical roll both at the inlet (before treatment) and outlet (after treatment). The method according to the present invention comprises:

- (a) putting said material, on the side of the surface of interest, in contact with a moving solid;
- (b) regulating the reciprocal position between the surface of the flat-structured material to be treated and the moving solid (brush or pattern-shaped cylinder), this in turn being in constant contact with a moving solid inside a liquid bath;
- (c) moving said solid inside said liquid bath to allow the above liquid to be transferred onto the surface of the adjacent solid (a);
- (d) programming the temperature and also the composition of said liquid bath in relation to the treatment to be effected on the surface of interest of the material to be treated;
- (e) subjecting the material thus treated to finishing operations.

[0008] In step (a), the moving solid is preferably a collecting brush of the liquid made of animal, vegetable or synthetic fibre (nylon, etc.). The brush can be made up of aligned fibres with a uniform height or aligned fibres alternating with empty spaces. Depending on the type of treatment, the brush can consist of a pattern-shaped cylinder made of various materials (figure 3) of which the rate of the patterned cylinder is the same as the rate of the fabric being treated.

[0009] Figure 3 shows an illustrative detail of this solid. As already mentioned, the method according to the invention has a general valence: materials which can, in fact, be subjected to the above surface treatment are: natural and synthetic, or artificial fabrics; non-woven

fabrics, and, according to a more general definition, materials from any type of natural fibres such as vegetable or animal fibres; all kinds of synthetic and artificial fibres; vegetable fibres such as linen, cotton, ramie, hemp, jute fabrics, furs and others; all kinds of paper; animal fibres such as silk, woollen fabrics such as, for example, cachemire, alpaca, vicuna, mohair and furs; or hide, furs and leather in general; synthetic fibres such as polyester fabrics, polyester furs and acrylic fibres; artificial fibres such as fabrics made of viscose, nylon and others, or plastic materials such as polypropylene, polyethylene, PVC, PET, furs and the like.

[0010] In particular, the method for the treatment of one of the sides of a flat-structured material with a large surface development and highly reduced thickness with respect to said surface development from a minimum working height (weft) to a maximum of 2.50 m (2,500 mm), envisages that the material to be treated (M in figure 1) enter into contact (a) on the part of the surface of interest with a cylindrical brush, on which it presses due to the mechanical movement of a cylinder (C in figure 1), creating a lesser or greater distance between the fabric and the brush (b). The rotating brush (b), comes into contact with a cylindrical body which undergoes a rotating movement, regulated (c) in the opposite direction to that of the cylindrical brush. This second cylinder is partially immersed in a liquid bath, whose temperature and composition are programmed (d) in relation to the effect to be obtained on the material with the treatment itself; once the material has undergone controlled impregnation, it is passed (e) over a heated cylinder having on its circumference from two to infinite traces with rounded steel bars and/or a completely smooth cylinder. The material slides to the cylinder by means of a closed-ring felt, where it is dried and pressed between the two bodies (heated cylinder and felt). The above cylinder (Q-Q1) on which the finishing operations are effected, consists of an empty cylinder for containing the heating resistances; it does hold knurled combs but has smooth surfaces (Q1), or is equipped with rounded steel bars (Q). The cylinder has a rate ranging from 200 to 800 revs per minute and is heated to a temperature of up to 220°C. The material (M) (figure 2) runs to the above cylinder by means of a closed ring felt (a1) and at a varying pressure by means of pneumatic pistons. In this phase, the material is dried and pressed between two bodies: one which is metallic, cylinder (Q-Q1) and one felt (a1).

[0011] The process scheme of the method according to the present invention appears more evident by referring to the drawing of figure 1 (already mentioned above) provided herein for illustrating the method according to the present invention. In this drawing, A is the cylinder which is immersed and rotates in the bath L, B is the brush cylinder or pattern-shaped cylinder which enters into contact with said cylinder and with the surface of the material M which is entrained by the carrier cylinders C1, C2 ... Cn and presses on the brush B due to the mechanical movement of the cylinder C. It is finally treat-

ed in the finishing cylinder (Q-Q1). According to specific demands and effects, the cylinder C can be raised to prevent the conveyed product from being transferred over the material M, and then return again to exert pressure in alternating and non-alternating phases.

[0012] The pattern-shaped brush or cylinder, indicated in figure 1 with B, is preferably rotated in an anti-clockwise direction and has a fixed rate. The pattern-shaped brush or cylinder can also have a horizontal transfer movement (oscillating) to the right or left (coming and going) which allows the desired coloured "visible effect". The cylinder A is made of bachelite or a non-porous material, and rotates in a clockwise direction.

[0013] The bath, indicated in figure 1 with L, consists of water, chemical products, or a solvent selected from those normally used in the embodiment of processes in the textile industry or a mixture of water and chemical products, and/or a mixture of solvents and chemical products, and/or a mixture of water, solvents and chemical products.

[0014] In relation to the surface treatment of the material to be produced, the bath contains, dissolved, dispersed or suspended in water and in the solvents indicated above, one or more chemical products which can be selected from textile auxiliary products (for dyeing, post-dyeing, refinishing, innovative finishing); detergents; products for the dyeing and finishing of leather and furs; products for the dyeing and surface treatment of paper; cosmetic products, such as, for example, creams, milk, balsams, perfumes; decorative products (glitter and sequins in general).

[0015] In the method according to the present invention, the temperature of the bath L is programmed and controlled. Said temperature, selected within the range from room temperature to 90°C, is controlled and regulated by means of a rheostat inserted in a structure or surface positioned inside the tank; the heating however is always effected by means of indirect vapour, in order to avoid any possible pollution of the liquid inside the tank (V in figure 1), and/or by means of electric resistances.

[0016] The material (M in figure 1) presses on the brush B due to the mechanical movement of the cylinder (C in figure 1) causing a lesser or greater distance between the fabric and the brush (B), consequently exerting an extremely variable pressure depending on the type of treatment. Said cylinder (C) contemporaneously rotates in synchrony with the advancing of the material on the carrier cylinders. The material moves at a rate ranging from 1 meter per minute to 25 meters per minute until it reaches the finishing cylinder, Q-Q1 in figure 1 and in detail in figure 2.

[0017] The method according to the invention is particularly advantageous in producing specific feel effects on textile materials which are thus treated on one side only and, if necessary or desired, can be subjected to a different treatment on the opposite side; the distribution of the product takes place on one side only of the fabric,

with a partial and reasonable penetration inside the thickness.

[0018] Another object of the present invention, of which it is an integrant part, relates to the device for embodying the method for the surface treatment of flat-structured materials, as defined and illustrated in detail in the previous description and figures. In particular, included in the objectives of the present invention is a device which is suitable for the embodiment of the method, comprising:

- a set of two cylindrical solids in reciprocal movement, of which:
 - one consists of a brush or shaped cylinder,
 - the other is immersed and rotates in a liquid bath,
 - and these rotate in opposite direction to each other;
- a tank for said liquid bath;
- a series of carrier cylinders for moving said material;
- a pressure cylinder for the contact of said material with said brush or shaped cylinder;
- an empty cylinder for the finishing operations characterized by smooth surfaces.

[0019] The details of the different components of said device are those described above, and reference can be made to these for a better understanding of the device itself.

Claims

1. A method for the treatment of one of the surface sides of a flat-structured material with a large surface development and highly reduced thickness with respect to said surface development, from a minimum working height (weft) to a maximum of 2.50 m (2,500 mm) which can be wrapped into a cylindrical roll, both at the inlet (before treatment) and at the outlet (after treatment), comprising:

- a) putting said material, on the side of the surface of interest, in contact with a moving solid;
- b) regulating the reciprocal position between the surface of the flat-structured material to be treated and the moving solid, this in turn being in constant contact with a moving solid inside a liquid bath;
- c) moving said solid inside said liquid bath to allow the above liquid to be transferred onto the surface of the adjacent solid (a);
- d) programming the temperature and also the composition of said liquid bath in relation to the treatment to be effected on the surface of interest of the material to be treated;

e) subjecting the material thus treated to finishing operations.

2. The method for the treatment of one of the surface sides of a flat-structured material as described in the previous claim, wherein the material to be treated moves under the action of carrier cylinders and, due to the effect of a pressure cylinder, enters into contact (a), on the part of the surface of interest, with a brush or pattern-shaped cylinder which, by rotating (b), enters into contact with a cylindrical body, which undergoes a rotating movement, regulated (c) in the opposite direction to that of the brush or pattern-shaped cylinder, partially immersed in a liquid bath, whose temperature and composition are programmed (d), thus favouring the surface treatment of the material which, in correspondence with the surface treated, is passed (e) between a heated cylinder, having a surface substantially without any roughness and a closed ring felt under pressure.
3. The method for the treatment of one of the surface sides of a flat-structured material as described in any of the previous claims, wherein the materials to be treated are selected from any type of natural fibres such as vegetable or animal fibres; all kinds of synthetic and artificial fibres; vegetable fibres such as linen, cotton, ramie, hemp, jute fabrics, furs and others; all kinds of paper; animal fibres such as silk, woollen fabrics such as, for example, cachemire, alpaca, vicuna, mohair and furs; or hide, furs and leather in general; synthetic fibres such as polyester fabrics, polyester furs and acrylic fibres; artificial fibres such as fabrics made of viscose, nylon and others, or plastic materials such as polypropylene, polyethylene, PVC, PET, furs.
4. The method for the treatment of one of the surface sides of a flat-structured material as described in the previous claim, wherein the material is preferably selected from natural and synthetic fibres and non-woven fabrics.
5. The method for the treatment of one of the surface sides of a flat-structured material as described in claims 1 and 2, wherein the moving solid which enters into contact with said material is a brush made of animal, vegetable or synthetic fibre or a pattern-shaped cylinder made of various materials.
6. The method for the treatment of one of the surface sides of a flat-structured material according to the previous claim, wherein the brush or pattern-shaped cylinder is preferably rotated in an anti-clockwise direction.
7. The method for the treatment of one of the surface

sides of a flat-structured material according to claims 5 and 6, wherein the brush can be made of aligned fibres with a uniform height or aligned fibres alternating with empty spaces.

8. The method for the treatment of one of the surface sides of a flat-structured material according to claim 6, wherein the brush or pattern-shaped cylinder can have a horizontal transfer movement (oscillating) to the right or to the left (coming and going).

9. The method for the treatment of one of the surface sides of a flat-structured material as described in claims 1 and 2, wherein the cylinder immersed in the liquid bath consists of bachelite or another non-porous material.

10. The method for the treatment of one of the surface sides of a flat-structured material according to claims 1 and 2, wherein the liquid bath consists of water, chemical products, or a solvent selected from those normally used in the embodiment of processes in the textile industry or a mixture of water and chemical products, and/or a mixture of solvents and chemical products, and/or a mixture of water, solvents and chemical products.

11. The method for the treatment of one of the surface sides of a flat-structured material according to the previous claim, wherein the solvents are selected from those normally used in the textile industry.

12. The method for the treatment of one of the surface sides of a flat-structured material according to claim 10, wherein the chemical products are selected from auxiliary products (for dyeing, post-dyeing, re-finishing, innovative finishing); detergents; products for the dyeing and finishing of leather and furs; products for the dyeing and surface treatment of paper; cosmetic products, creams, milk, balsams, perfumes; decorative products (glitter and sequins in general).

13. The method for the treatment of one of the surface sides of a flat-structured material as described in claims 1 and 2, wherein the liquid bath is preferably heated by means of indirect vapour or by electric resistances.

14. The method for the treatment of one of the surface sides of a flat-structured material according to claims 1 and 2, wherein the liquid bath is preferably heated by means of a coil in which vapour flows.

15. The method for the treatment of one of the surface sides of a flat-structured material according to the previous claims 13 and 14, wherein the temperature of the liquid bath is regulated and controlled by a

rheostat.

16. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the pressure on the brush or shaped cylinder is regulated as a result of the mechanical movement of a cylinder.

17. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the cylindrical brush preferably rotates in an anticlockwise direction and has a fixed rate and the cylinder immersed in the liquid bath rotates in a clockwise direction, at a varying rate.

18. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the finishing cylinder rotates at a rate ranging from 200 to 800 revs per minute.

19. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the finishing cylinder is heated to a temperature of up to 220°C.

20. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the finishing cylinder is equipped with from 2 to an infinite number of rounded steel bars.

21. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the finishing cylinder has a completely smooth surface.

22. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the material undergoes the drying and pressing phase in contact with a heated metallic cylinder and a felt cylinder.

23. The method for the treatment of one of the surface sides of a flat-structured material according to the previous claim, wherein the above finishing felt is equipped with pneumatic pistons which regulate its pressure over the material treated.

24. The method for the treatment of one of the surface sides of a flat-structured material according to claims 2 and 12, wherein the purpose of the treatment itself is to confer a particular "feel" on one side of the material.

25. The method for the treatment of one of the surface sides of a flat-structured material according to claims 2, 8 and 17, wherein the treatment itself is effected to confer a particular coloured "visible effect" to one side of the material.

26. The method for the treatment of one of the surface sides of a flat-structured material according to claim 2, wherein the pattern-shaped cylinder has a rate identical to that of the fabric being treated. 5
27. A device for the embodiment of a method according to one or more of the previous claims, comprising:
- a set of two cylindrical solids in reciprocal movement, of which: 10
 - one consists of a brush,
 - the other is immersed and rotates in a liquid bath,
 - and these rotate in opposite directions to each other; 15
 - a tank for said liquid bath;
 - a series of carrier cylinders for moving said material; 20
 - a pressure cylinder for the contact of said material with said brush cylinder;
 - an empty cylinder for the finishing operations **characterized by** smooth surfaces. 25
28. The method for the treatment of one of the surface sides of a flat-structured material substantially as described and claimed in claims 1 to 26.
29. Equipment for the treatment of one of the surface sides of a flat-structured material when substantially effected according to the method in accordance with claims 1 to 26. 30
30. A flat-structured material with a large surface development and reduced thickness with respect to said development having a surface treated according to the method in accordance with claims 1 to 26. 35

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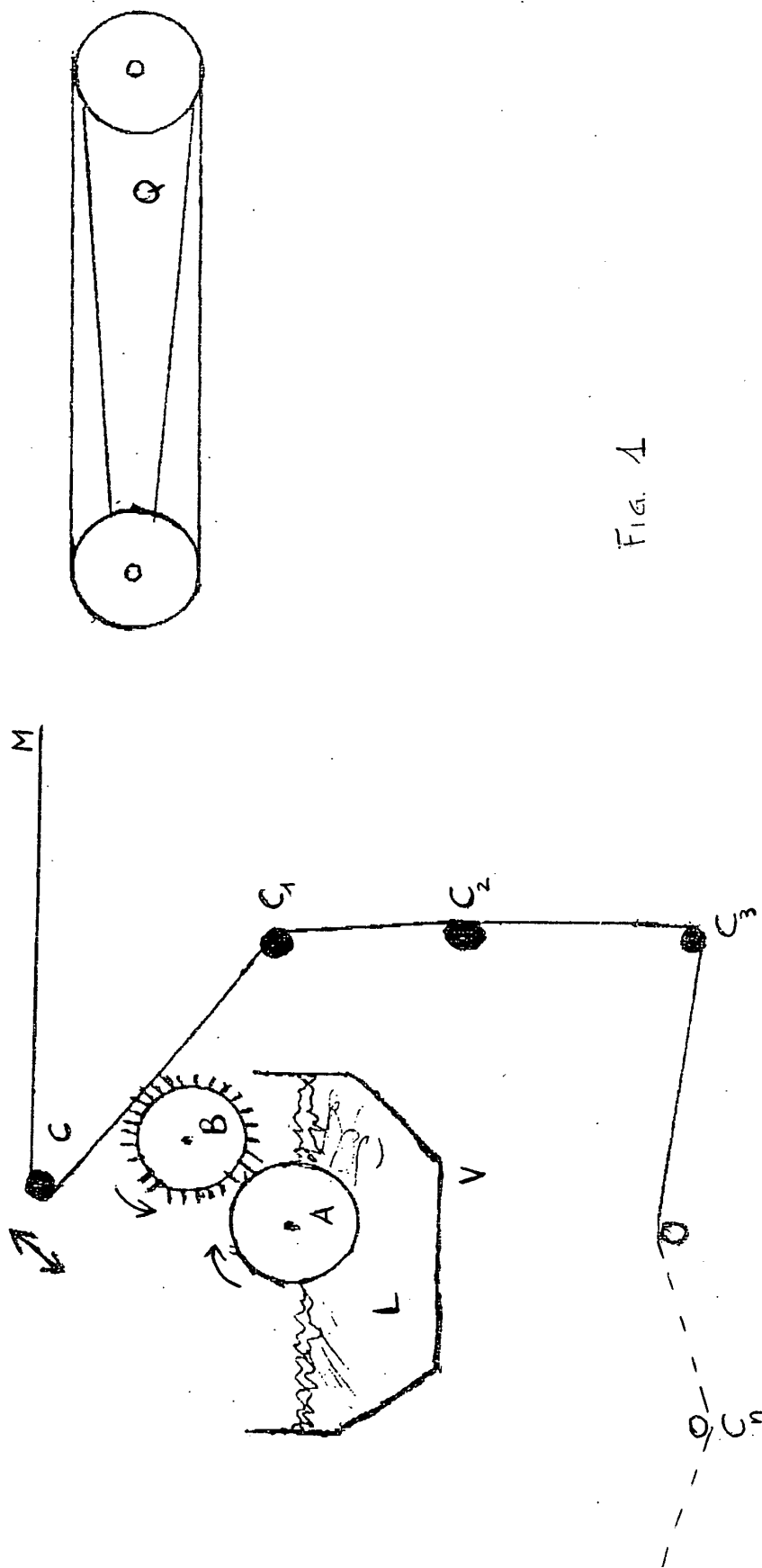


Fig. 1

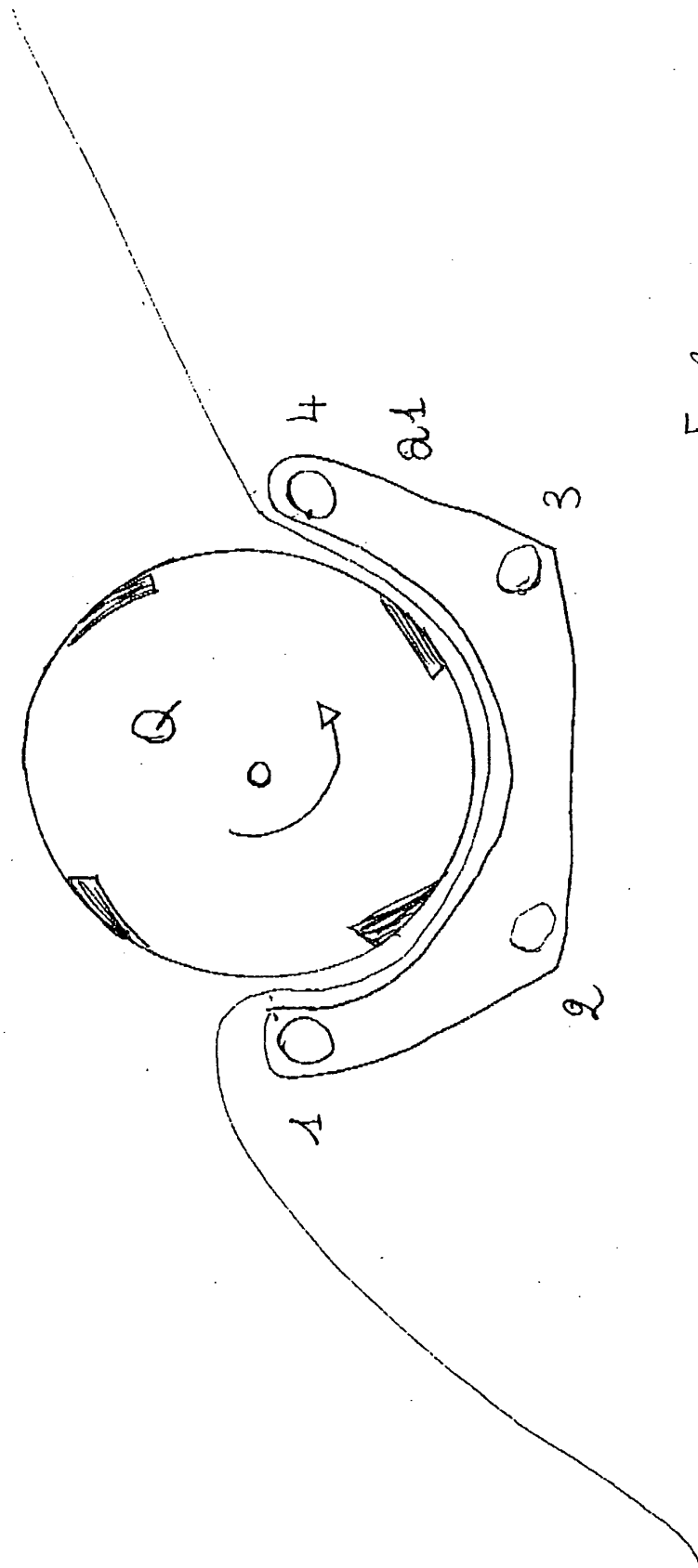


Fig. 2

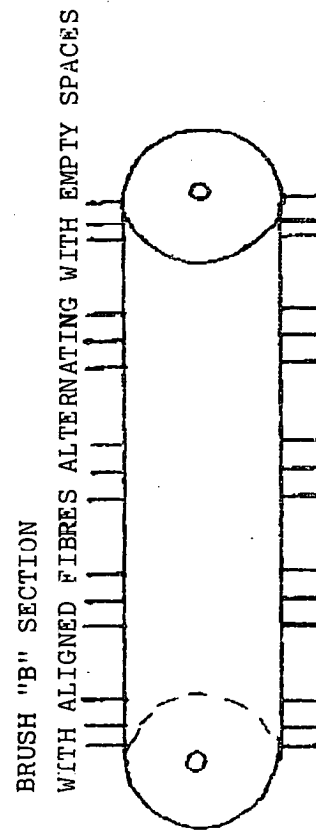
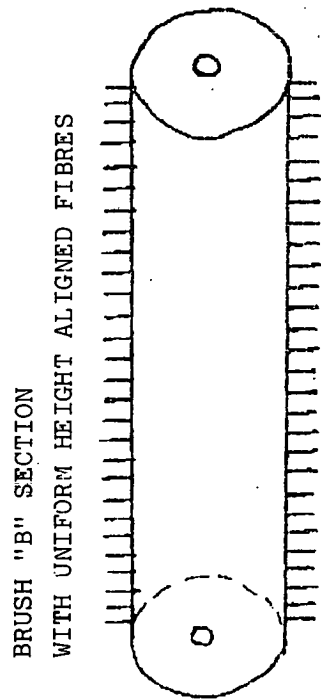


FIG. 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 6783

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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X	GB 788 939 A (HALL HARDING LTD) 8 January 1958 (1958-01-08) * page 1, line 21 - line 38 * * figure 1 * -----	1,3,4, 9-14, 28-30	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D06M B05C D06B C14C D21H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 March 2004	Examiner Fiocco, M
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 02 6783

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