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(54) Method and device for finishing textile materials

(57) Finishing method and device (10) for textile material made of cotton, wool, synthetic fibers or suchlike. The method provides that a fabric (11) is first subjected to a wetting or damping step and then to a brushing step performed by making the fabric (11) pass on rotary abrasive brushes (14) mounted on a rotary drum (12). There are from 2 to 16 rotary abrasive brushes (14) and they have a lining (20) consisting of long, thin and flexible abrasive filaments. The brushing step is followed by a step of squeezing the fabric (11) in order to regulate its humidity content and to remove the excess water.

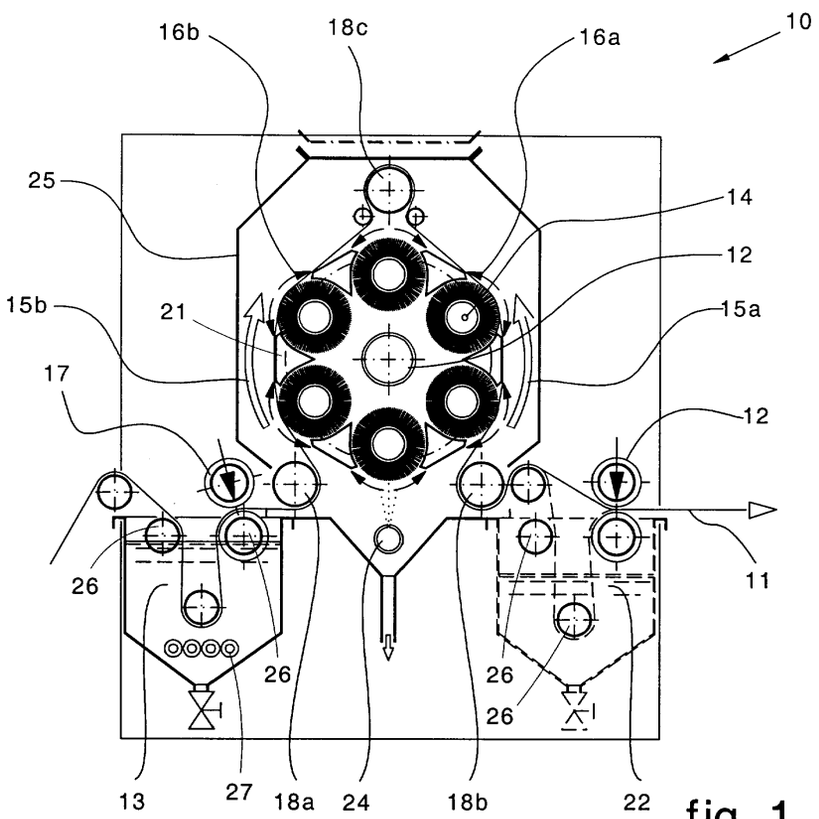

fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a finishing method for textile material and the relative device.

[0002] The invention is applied in finishing treatments for fabrics and hosiery in order to give the feel of the fabric particular aesthetic effects, for example the ageing effect or pre-washed effect. The invention can also be applied substantially to any type of textile material, both in the field of cotton and also in that of synthetic fibers, wool and hosiery.

BACKGROUND OF THE INVENTION

[0003] One of the known treatments in finishing processes provides to draw the textile material around a plurality of rotary elements whose surfaces are lined with abrasive paper or other material having abrasive properties. A machine that achieves this type of treatment is disclosed, for example, by EP-A-0.649.928.

[0004] EP-A-1.072.213 discloses a machine comprising a plurality of rotary brushes arranged on the periphery of a rotary drum and separated from each other by tensioning/stretching means which keep the fabric tense in the segment between one brush and the adjacent one.

[0005] It is also known, in order to obtain higher quality results, and particularly with certain types of fabrics, to send to the machine a wet or at least dampened fabric.

[0006] WO-A-99/01602 discloses a grinding device comprising a rotary drum upon which a plurality of small rotary grinding cylinders lined with abrasive paper or the like are mounted.

[0007] Means for wetting or dampening the fabric are arranged upstream of the rotary drum, so the grinding cylinders are caused to exert their grinding action on a fabric at least partly wetted.

[0008] The present Applicant is not aware of an integrated machine of the type with rotary abrasive brushes, comprising long, thin and flexible filaments, suitable to treat wet textile material advancing continuously, with high efficiency and effective results.

[0009] The present Applicant has therefore devised, tested and embodied this invention to overcome these shortcomings of the state of the art, and to obtain further advantages as will be shown hereafter.

SUMMARY OF THE INVENTION

[0010] The present invention is set forth and characterized in the respective main claims, while the dependent claims describe other characteristics of the invention.

[0011] The purpose of the invention is to achieve a method and a device for finishing textile material, suitable to obtain a very high quality result in a machine of limited bulk, simple in construction and functioning, extremely versatile and adaptable to different types of fabrics and different types of treatments to be done.

[0012] According to the invention, the device comprises a rotary drum or barrel on whose circumference a plurality of abrasive brushes are mounted, also rotary, consisting of a central shaft and a lining made of abrasive material.

[0013] According to the invention, the abrasive material consists of long thin nylon filaments, or other similar material, also of a composite type and at least partly flexible.

[0014] According to a variant, the abrasive material consists of thin and flexible filaments made of horsehair or similar material. According to another variant, the abrasive material consists of thin and flexible filaments made of natural or artificial rigid bristle, or metal or other suitable material.

[0015] According to the invention, upstream of the rotary drum, in the direction of feed of the fabric, there is at least an impregnation assembly suitable to wet or at least dampen the fabric before it comes into contact with the rotary abrasive brushes and particularly with the relative flexible filaments.

[0016] The action of the thin and flexible abrasive filaments of the brushes on a fabric which is wet or dampen allows to obtain "touch" and "hand" effects which are not obtainable if the fabric to be treated is dry. In fact, the action of the thin and flexible filaments on a wet fabric is less accentuated and raises less the pile, so the pile obtained is softer, shorter and more dense.

[0017] In a first embodiment, the impregnation assembly comprises at least a tub inside which the fabric is made to pass, and at least partly immersed, before being sent to the drum. In another embodiment, as an alternative to or combined with the first, the impregnation assembly comprises at least a spray or shower dispenser or similar.

[0018] In one embodiment of the invention, the fabric is impregnated with substantially pure water while, according to a variant, the fabric is impregnated with water to which, for example, chemical products have been added.

[0019] According to a variant, the impregnation step is associated with a squeezing step which serves to regulate the humidity content of the fabric and to eliminate the excess water before the brushing treatment. According to another variant, the impregnation tub into which the fabric is immersed is associated with heating means.

[0020] According to the invention, at outlet from the rotary drum there is at least a squeezing assembly through which the fabric is made to pass; the function of the squeezing assembly is to regulate the humidity of the fabric emerging from the treatment, so as not to send fabrics which are too damp or wet to subsequent treatments.

[0021] In a preferential embodiment, the squeezing assembly comprises at least a pair of rollers able to act

with adjustable pressure on the fabric passing through. According to a variant, the squeezing assembly is associated with rinsing means.

[0022] The abrasive brushes are distributed symmetrically on the circumference of the rotary drum and the number can vary according to their size and the size of the drum itself. According to the invention, it is preferable to have between 2 and 16 brushes, advantageously between 6 and 10.

[0023] In a first embodiment, all the brushes are moved synchronously in the same direction of rotation, clockwise or anti-clockwise, with a speed adjustable for example between 200 and 2000 rpm. According to a variant, the brushes are made to rotate in groups in opposite directions, for example a first group of brushes rotates clockwise and a second group of brushes rotates anti-clockwise.

[0024] The drum can also be driven clockwise or anti-clockwise, at an adjustable speed preferably between 5 and 150 rpm. It comes within the field of the invention to achieve any type of combination of the direction of rotation of the drum and that of the brushes, or the groups of brushes.

[0025] According to a characteristic of the present invention, in an intermediate position between each of the brushes there are means able to generate a transverse stretching/tensioning of the fabric in order to prevent it from shrinking, and to eliminate or prevent the formation of creases or curling of the edges which can form due to the tension transmitted by the abrasive action of the brushes. Moreover, the means are able to support the fabric so that it does not penetrate excessively between the brushes.

[0026] In one embodiment of the invention, said stretching and tensioning means consist of small shafts with spiral threadings, associated with means able to make them rotate, on which the fabric is taken into contact in the intermediate segment between one brush and the other.

[0027] According to a variant, the stretching means consist of rollers on which a spiral is wound, made of steel wire or of profiles of a different conformation, substantially of a conventional type.

[0028] According to another variant the stretching means consist of staves, bars, rollers or cylinders, fixed and rotating solid with the drum, including on their surface a threading or a spiral made of steel wire. In this case the fabric is stretched thanks to the difference between the speed of the fabric kept under tension between the means located at inlet to and outlet from the drum, and the speed of rotation of the drum itself.

[0029] In a further variant, said stretching/tensioning means consist of fixed staves or bars with a plane surface the purpose of which is to support the fabric and hold it still in a transverse direction to the direction of feed, so that no wrinkles are formed at the edges.

[0030] The device according to the invention provides means to draw the fabric arranged at inlet to and outlet from the rotary drum and equipped with systems to regulate the drawing action, so as to adapt it to different characteristics of the fabric and different working conditions. According to a variant, the systems to regulate the drawing action comprise load cells.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The attached drawings, given as a non-restrictive example, show a schematic view of a preferential embodiment of the invention. In the drawings:

- fig. 1 is a schematic view of a brushing device according to the invention;
- fig. 2 shows a detail of an abrasive brush used in the device in fig. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0032] The brushing device for wet fabrics 11 according to the invention is denoted generally by the reference number 10.

[0033] It comprises a rotary drum or barrel 12 on whose periphery abrasive brushes 14 are mounted, in this case six, also rotary. The drum 12 is arranged inside a grinding chamber 25.

[0034] The drum 12 can rotate anti-clockwise (15a) or clockwise (15b), just as the brushes 14 can rotate individually, in groups or all together, both anti-clockwise (16a) and clockwise (16b).

[0035] The brushes 14 (fig. 2) comprise a central shaft 19, associated with relative drive means (not shown), and a lining 20 consisting of thin and long abrasive filaments, for example made of nylon or other synthetic material, or of horsehair, bristle, metal or other suitable material.

[0036] In an intermediate position between two adjacent abrasive brushes 14 there are stretching/tensioning means 21, in this case consisting of fixed staves or plates; the function of the stretching/tensioning means 21 is both to hold the fabric 11 axially stationary, so that no wrinkles are formed at the edges, and also to support the fabric 11 so that it does not penetrate excessively into the abrasive lining 20 of the brushes 14.

[0037] The drum 12 is associated with an inlet drawing roller 18a and an outlet drawing roller 18b, possibly associated with systems to regulate the drawing action, not shown here, for example load cells.

[0038] Before entering the drum 12 and into contact with the brushes 14, the fabric 11 is sent to an impregnation tub 13 into which it is immersed in order to be wet. According to a variant not shown here, it can be wet by a spray or shower system or other similar system.

[0039] According to another variant, spray systems 24, shower systems or similar are present in cooperation with the circumference of the drum 12 in order to wet the fabric 11, or keep it wet, during its travel around the drum 12.

[0040] In the embodiment shown here, a spray-type dispenser 24 is shown in cooperation with the brushes 14 in the segment where the fabric 11 is not gripped; the function of the spray-type dispenser 24 is to remove from the abrasive filaments 20 dust, waste, threads, fibers and other things that remain gripped on the brushes 14, and also to dampen the abrasive brushes 14 before contact with the fabric 11.

[0041] At outlet from the impregnation tub 13 there is a squeezing assembly with rollers 17 which serves to eliminate the excess water and to reduce the humidity of the fabric 11 to a desired value before the start of the brushing.

[0042] The impregnation tub 13 is equipped with guide and transport rollers 26 which determine the path in which the fabric 11 is immersed inside the tub 13.

[0043] The impregnation tub 13 can also be associated with heating means 27, and/or can include means to add and dose additives such as softeners, resin-based substances or suchlike so as to achieve particular treatments and effects on the fabric 11.

[0044] The fabric 11 emerging from the drum 12 is picked up by the outlet drawing roller 18b and sent in this case to a rinsing tub 22.

[0045] The rinsing tub 22, in an embodiment not shown here, can be replaced by spray- or shower-type rinsing devices. It can also cooperate with heating devices and/or devices to add desired softening and/or treating substances. It also includes guide and transport rollers 26 which possibly determine (the line of dashes in fig. 1) a path of at least partial immersion inside in order to carry out the rinsing operation.

[0046] In cooperation with the rinsing tub 22 there is an assembly to regulate the humidity, comprising squeezer rollers 23a, 23b. The humidity of the fabric 11 at outlet can thus be regulated to a desired value and suitable for the subsequent treatments to which the fabric 11 has to be subjected.

[0047] Downstream of the rinsing tub there may be a drying assembly (not shown here).

Claims

1. Finishing method for textile material made of cotton, wool, synthetic fibers or suchlike, **characterized in that** it provides that a fabric (11) is first subjected to a wetting or damping step and then to a brushing step performed by making said fabric (11) pass on rotary abrasive brushes (14) mounted on a rotary drum (12), there being from 2 to 16 rotary abrasive brushes (14) and having a lining (20) consisting of long, thin and flexible abrasive filaments, the brushing step being followed by a step of squeezing the fabric (11) in order to regulate its humidity content and to remove the excess water.

2. Method as in claim 1, **characterized in that** the wetting or damping step is carried out by immersing said fabric (11) at least partly into an impregnation tub (13) arranged upstream of said drum (12).

3. Method as in claim 1 or 2, **characterized in that** the wetting or damping step is carried out by hitting said fabric (11) with jets or sprays of liquid upstream of said drum (12) or during the passage of the fabric (11) along said drum (12).

4. Method as in any claim hereinbefore, **characterized in that** said wetting or damping step is associated with at least a squeezing step in order to regulate the humidity of the fabric (11) before the treatment with said rotary abrasive brushes (14).

5. Method as in any claim hereinbefore, **characterized in that** said wetting and damping step is carried out with pure water.

6. Method as in any claim from 1 to 4 inclusive, **characterized in that** said wetting and damping step is carried out with water to which products such as softeners, resin-based substances or otherwise have been added.

7. Method as in any claim hereinbefore, **characterized in that** said drum (12) is made to rotate clockwise or anti-clockwise at a speed of between 5 and 150 rpm.

8. Method as in any claim hereinbefore, **characterized in that** said brushes (14) are made to rotate individually, in groups or all together, clockwise or anti-clockwise, at a speed of between 200 and 2000 rpm.

9. Finishing device for textile material made of cotton, wool, synthetic fibers or otherwise, **characterized in that** it comprises wetting and damping means (13) of a fabric (11), brushing means arranged downstream of said wetting and damping means (13) and comprising a rotary drum (12) which has on its circumference from 2 to 16 rotary abrasive brushes (14) equipped with a lining (20) consisting of long, thin and flexible abrasive filaments, and a squeezing assembly (23a, 23b) arranged downstream of said rotary drum (12) and able to regulate the content of water and humidity of the fabric (11) emerging from the brushing treatment.

10. Device as in claim 9, **characterized in that** said long, thin and flexible abrasive filaments (20) are made of synthetic material such as nylon or suchlike.

11. Device as in claim 9, **characterized in that** said long, thin and flexible abrasive filaments (20) are

made of horsehair, bristles, metal or other similar or comparable material.

12. Device as in claim 9, **characterized in that** said wetting and damping means comprise at least an impregnation tub (13) inside which the fabric (11) is at least partly immersed before being sent to the drum (12).

13. Device as in claim 9, **characterized in that** said wetting and damping means comprise delivery means (24) to deliver jets or sprays of liquid, arranged upstream of said drum (12) or in cooperation with the periphery thereof.

14. Device as in claim 13, **characterized in that** said impregnation tub (13) is associated with squeezing means (17) in order to regulate the content of water and humidity of the fabric (11) entering said drum (12).

15. Device as in claim 13, **characterized in that** said impregnation tub (13) is associated with heating means (27).

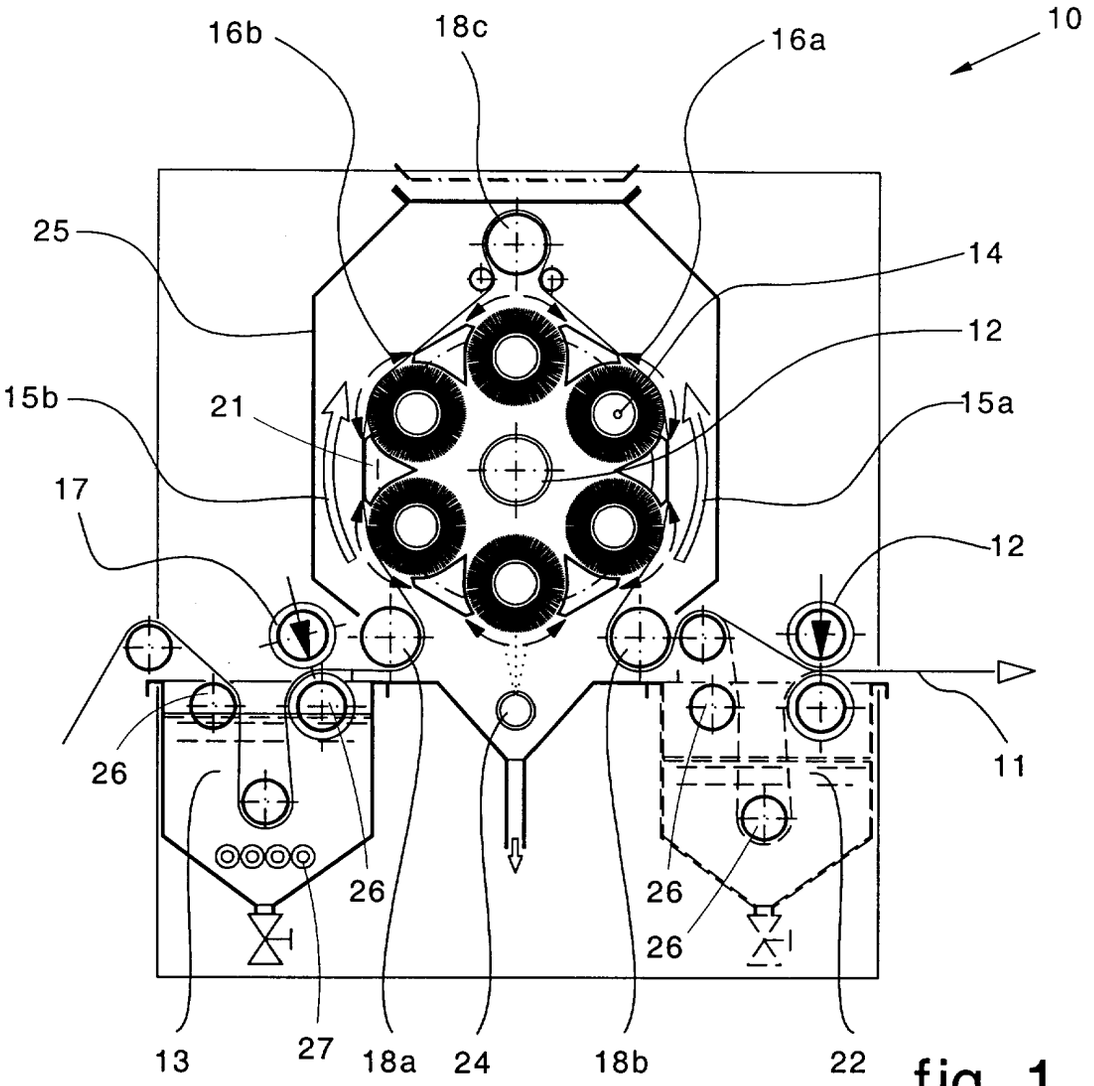
16. Device as in claim 9, **characterized in that** said squeezing assembly (23a, 23b) downstream of said drum (12) is associated with rinsing means (22).

17. Device as in any claim from 9 to 16 inclusive, **characterized in that** in an intermediate position between one of said brushes (14) and the adjacent one there are stretching/tensioning means (21) able to prevent curling of the edges and to support the fabric (11) in the segment between two adjacent brushes (14).

18. Device as in claim 17, **characterized in that** the stretching/tensioning means (21) comprise rotary shafts.

19. Device as in claim 17, **characterized in that** said stretching/tensioning means (21) comprise fixed staves or bars with a substantially plane surface.

20. Device as in claim 9, **characterized in that** said rotary drum (12) is arranged in a grinding chamber (25).


10
16b
18c
16a
25
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18a
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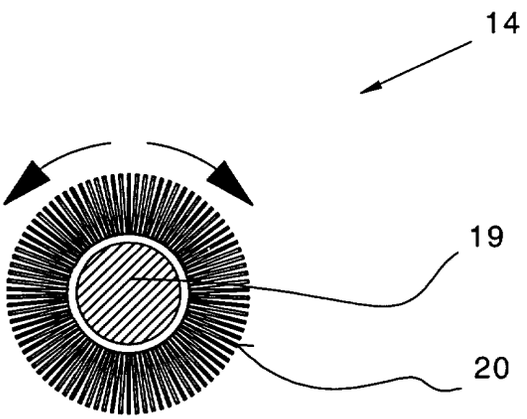
fig. 1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19
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fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 03 10 4642

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	WO 99 01602 A (SCORTEGAGNA BRUNO ;LAFER SPA (IT)) 14 January 1999 (1999-01-14) * page 13; claims 1-6,10,13; figure 1 *	1-20	D06C11/00
D,Y	EP 1 072 713 A (LAFIN SRL) 31 January 2001 (2001-01-31) * claims 1-9,23-25; figure 1 *	1-20	
A	BE 1 009 823 A (GEVAERT BANDWEVERIJ NAAMLOZE V) 2 September 1997 (1997-09-02) * claims 1,10; figure 1 *	1,9	
A	GB 796 452 A (US RUBBER CO) 11 June 1958 (1958-06-11) * claims 1,5; figure 1 *	1,9	
A	EP 0 620 307 A (SPEROTTO RIMAR SPA) 19 October 1994 (1994-10-19) * claims 1,2,5,8,11; figure 1 *	1,9	
A	EP 0 665 318 A (SPEROTTO RIMAR SPA) 2 August 1995 (1995-08-02) * claims 1-4,8,12,15,16 *	1,9	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D06C D02J D06B B06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 April 2004	D'Souza, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 10 4642

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15-04-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9901602 A	14-01-1999	IT UD970116 A1	30-12-1998
		AT 224970 T	15-10-2002
		AU 7671098 A	25-01-1999
		DE 69808309 D1	31-10-2002
		DE 69808309 T2	31-07-2003
		EP 1007776 A1	14-06-2000
		ES 2185168 T3	16-04-2003
		WO 9901602 A1	14-01-1999
EP 1072713 A	31-01-2001	IT UD990141 A1	19-10-2000
		EP 1072713 A2	31-01-2001
BE 1009823 A	02-09-1997	BE 1009823 A3	02-09-1997
GB 796452 A	11-06-1958	NONE	
EP 0620307 A	19-10-1994	US 5392499 A	28-02-1995
		EP 0620307 A1	19-10-1994
		DE 69307125 D1	13-02-1997
		DE 69307125 T2	03-07-1997
		ES 2097434 T3	01-04-1997
EP 0665318 A	02-08-1995	IT 1269484 B	01-04-1997
		BR 9500342 A	17-10-1995
		DE 69520380 D1	26-04-2001
		DE 69520380 T2	30-08-2001
		EP 0665318 A2	02-08-1995
		ES 2155869 T3	01-06-2001
		PT 665318 T	30-08-2001
		US 5636534 A	10-06-1997

EPO FORM P0459

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