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(54) Method and device for raising or grinding fabrics particularly tubular fabrics

(57) Method and device for raising or grinding fabrics (20), wherein the device comprises a plurality of raising/grinding cylinders (18, 118) associated with at least one drawing cylinder (12) at inlet and at least one drawing cylinder (13) at outlet, which are able to define the winding tension of the fabric (20) on the raising/grinding cylinders (18, 118); each drawing cylinder (12, 13) comprises at least two parts (12a, 12b; 13a, 13b) able to be driven independently of the other, and to cooperate with a relative fabric (20), or with a different face (21, 22) of the same fabric (20), in order to make it wind with a desired tension on at least one of the raising/grinding cylinders (18, 118).

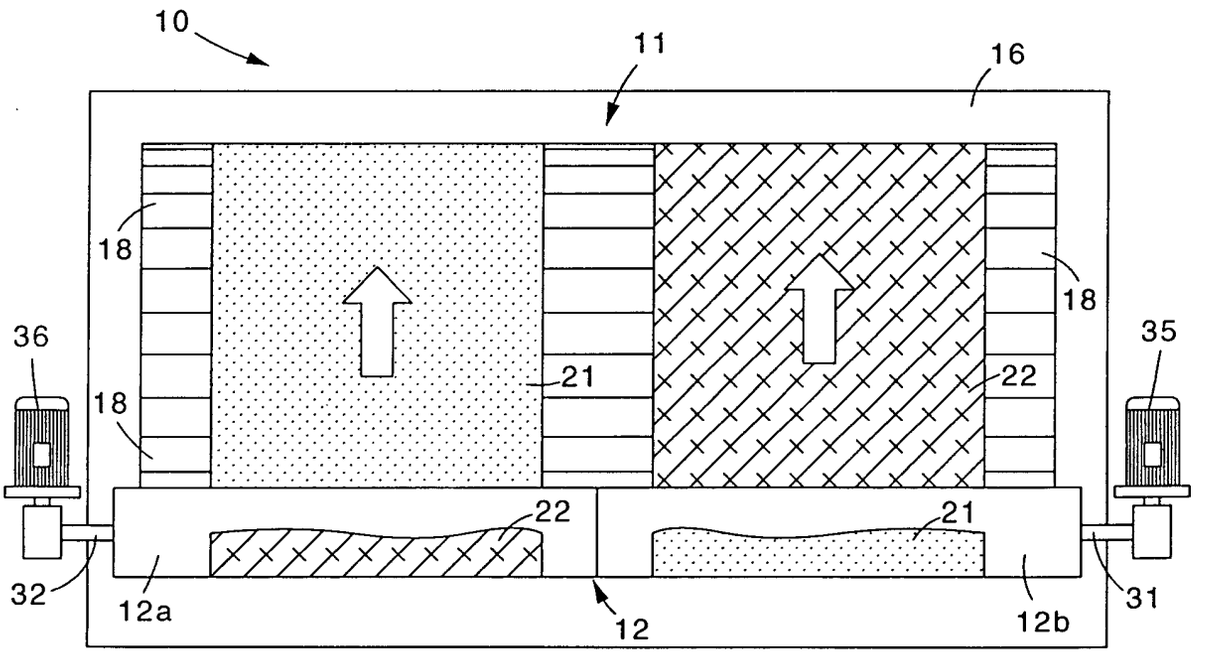

fig. 2

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Description

FIELD OF THE INVENTION

[0001] The invention concerns a method and the relative device for raising or grinding fabrics, particularly, but not only, tubular fabrics.

[0002] The invention is applied in the field of textile finishing, on raising or grinding machines of the type with a rotary drum or barrel, or on grinding machines with a plurality of rotary cylinders lined with abrasive material located in horizontal, vertical or mixed lines.

BACKGROUND OF THE INVENTION

[0003] The state of the art includes various methods for raising or grinding tubular fabrics, particularly knitwear fabrics. A first method provides to work first one face of the tubular fabric, to unload the fabric from the machine, to rotate the fabric and then to return it to the machine in order to work the second face.

[0004] This method entails a certain difficulty in keeping the two faces of the fabric distinct and in preventing strips of fabric remaining unraised, in the second pass, or strips of fabric which have already been raised in the first pass from coming into contact with the drum, which gives unsatisfactory raising results.

[0005] Another method provides to use a machine with two drums, wherein one face of the fabric is made to pass on a first drum, while the second face is made to pass on a second drum to work the fabric front and back. In this case, there is no risk of the tubular fabric rotating since it is constantly controlled and tensioned inside the machine by guide and stretching rollers provided for this purpose.

[0006] In the case of a double machine, it is possible to work two tubular fabrics simultaneously, for example one on the right side of the drum and one on the left side. With this solution, raising/grinding machines are used more widely and with greater efficiency since a tubular fabric normally occupies on the drums a height which is about half that occupied for raising open fabrics. This solution is, however, not very convenient because it is difficult to manage two fabrics on the same drum simultaneously.

[0007] At present, the most widely used solution is to work one face of the tubular fabric on one side of a machine with one or two drums, to remove it from the machine and then make it pass on a "turnpiece" device which not only turns it but also moves it from one side of the machine to the other, in order to work the second face.

[0008] In this way, the second face of the tubular fabric is worked on one side of the machine which is different from that on which the first face of the fabric is worked. This makes possible to use the whole height of the machine and to reduce the danger of the tubular fabric rotating, since it is constantly controlled on the width by guide rollers and by stretching devices supplied for this purpose.

[0009] This solution makes it necessary for the fabric to be fed to the raising/grinding machine always from the same side both for the first and also for the second pass on the drum.

[0010] In this pass, particularly in the case of raising, the fabric shrinks and lengthens, even quite considerably. Moreover, the "turnpiece" device which turns the fabric from one side to the other is resistant to the sliding of the fabric and tends to increase the length even more.

[0011] It is difficult to manage and control this lengthening in the machine, both in the first and especially in the second pass on the drum; in fact the drawing cylinders located at the inlet to and outlet from every drum, since they are alone, cannot simultaneously assume basic and relative velocities such as to satisfy the tension required by the working necessities, simultaneously and on the same drum, of the two faces of the tubular fabric. This therefore entails the need for the fabric to be tensioned so as to have a compromise between the two working passes.

[0012] The present Applicant has devised and embodied this invention to overcome these shortcomings and to obtain further advantages as will be shown hereafter.

SUMMARY OF THE INVENTION

[0013] The invention is set forth and characterized essentially in the respectively main claims, while the dependent claims describe other characteristics of the invention.

[0014] The purpose of the invention is to improve the conditions in raising and/or grinding operations on machines with a drum or with in-line working cylinders, allowing on the one hand to improve the efficiency of the machines working over the whole height of the drum and/or working cylinders, and on the other hand to guarantee optimum tension and control of the fabric during the simultaneous passage of its two faces on the working cylinders.

[0015] Hereafter, the description will concern mainly the application to machines with a rotary drum, although the concepts expressed can be transferred also to machines with working cylinders in horizontal, vertical or mixed lines.

[0016] The invention is applied on raising and/or grinding machines substantially of a conventional type, including a rotary drum on which a plurality of working cylinders, also rotary and lined with raising and/or abrasive material, are mounted, and including at least two drawing cylinders, arranged respectively at inlet to and outlet from the rotary drum, in order to define the winding tension of the fabric on the working cylinders.

[0017] The invention is advantageously applied in working tubular fabrics, but the teaching can be used in the working of open fabrics too.

[0018] In accordance with the purpose indicated above the invention provides to make two different fabrics, or different faces of the same fabric, pass on the same raising/grinding drum, which cooperates with drawing cylinders made in at least two parts which are driven and controlled independently from each other.

[0019] According to the invention, a first fabric, or the first face of a fabric, is kept under tension between the inlet and outlet of the drum, on two corresponding parts, for example the right, of the two drawing cylinders; the second fabric, or the second face, is kept under tension between the other corresponding parts of the drawing cylinders, for example the left.

[0020] It comes within the field of the invention that every drawing cylinder is divided into three, four or more parts, driven independently from each other, in order to guide and tension corresponding three, four or more fabrics on the same drum.

[0021] With this solution it is therefore possible to continuously and simultaneously raise both one face and the other of the fabric on the same raising drum, ensuring a precise and individual control of the tension of both said faces. This ensures that every fabric, or every face, can be controlled individually even when the two fabrics are worked simultaneously on the same raising/grinding drum.

[0022] As a further advantage, the invention makes possible to simultaneously work two fabrics or two faces advancing in opposite directions along the drum, since each fabric is fed and tensioned independently of the other.

[0023] Moreover, the tension of the fabric can be controlled precisely even outside the machine, for example at the outlet of the turnpiece, and at inlet to the second pass, so as to prevent the accumulation of fabric between one pass and the other over the drum.

[0024] As a further advantage, using a variable tensioning system in working the second face of the tubular makes possible to determine a slight rotation on the plane on which the fabric lies, so that the first face, already raised, can be made to slide slightly on both sides towards the raising drum. This allows to perform the raising operation even on the edges existing between one face of the tubular fabric and the other, which otherwise would remain unraised and the raising requirements would not be satisfied.

[0025] The invention also allows to work a fabric which is open along its whole height, by appropriately synchronizing the two or more parts of the drawing cylinders. This synchronisation can be achieved mechanically, electronically or electro-magnetically.

[0026] According to a variant, the two parts of the drawing cylinders are constrained/released by means of remote drive means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] These and other characteristics of the invention will be apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

Fig. 1	is a schematic side view of a raising or grinding device according to the invention;
Fig. 2	is an enlarged view from "A" of Fig. 1;
Fig. 3	is a schematic side view of a raising or grinding device with two drums according to the invention;
Fig. 4	is an enlarged view from "B" of Fig. 3;
Fig. 5	is a sectioned view of an enlarged detail of the drawing cylinder in Fig. 2;
Figs. 6 and 7	show two variants of Fig. 1.

DETAILED DESCRIPTION OF SOME PREFERENTIAL EMBODIMENTS

[0028] In the attached Figures, the number 10 indicates a raising or grinding device in its entirety for fabrics 20 according to the invention.

[0029] With reference to Figs. 1 and 2, the device 10 comprises a supporting and containing frame 16, a drum 11 which has on its periphery a plurality of rotating raising/grinding cylinders 18, two drawing cylinders, an inlet cylinder 12 and an outlet cylinder 13, and a turnpiece apparatus 14. The device 10 also comprises return rollers 15 able to define the path of the fabric 20 being worked.

[0030] In this case, the fabric 20 is of the tubular type and has a first face 21 and a second face 22 opposite the first.

[0031] The drum 11 is able to rotate, in one direction or the other, around its own axis, and the fabric 20 is brought into contact with the circumference of the raising/grinding cylinders 18 which carry out their action on the relative face of the fabric 20.

[0032] The winding tension of the fabric 20 on the drum 11 is determined by the relative velocity of the drawing cylinders 12 and 13.

[0033] The two cylinders 12 and 13 in this case are equal, and are each formed by two respective parts 12a, 12b and 13a, 13b, arranged coaxial and adjacent.

[0034] The following description refers for practical purposes only to the inlet cylinder 12; however, it must be understood that all the characteristics described can be directly transferred to the outlet cylinder 13 too.

[0035] The cylinder 12 comprises (Fig. 5) a main shaft 31 and a secondary shaft 32, coaxial to and outside the first. Each shaft 31 and 32 has one end connected to a corresponding drive member 35 and 36, each of which is suitable to impart to the relative shaft 31 and 32 a desired velocity and a desired direction of rotation independent of the direction of rotation and velocity of the other.

[0036] Each shaft 31 and 32 is connected by means

of a corresponding flange 33, 34 to a relative part 12a, 12b of the cylinder 12. The two parts 12a, 12b are made coaxial with the relative shafts 31, 32 by means of the bearings 39 and 40.

[0037] The two shafts 31 and 32 can be constrained together by means of a constraining device, for example an electric command or an electronic control, for example by means of a vectorial encoder or inverter, brushless motors or similar, so that the velocities of the two parts of the cylinder 12a, 12b are exactly equal, so as to allow to work even a single fabric 20 over its whole length.

[0038] In the embodiment shown in Fig. 5, the constraining element comprises electromagnetic clutches 38 which exclude transmission of one of the two motors to the relative shaft and which transmit command to the two shafts 31 and 32 by means of a single motor. According to another variant, the shafts 31, 32 are constrained by coupling elements of a mechanical type.

[0039] In cooperation with the respective motors 35, 36 and/or the half-shafts 31, 32, it is possible to include devices to control and regulate the tension, for example load cells, which can act in feedback on the motors themselves to keep the tension of the fabric 20 at a desired value.

[0040] The turnpiece apparatus 14 is arranged downstream of the cylinder 13, and is able to turn the fabric 20 through 180° along its longitudinal axis, and to move it sideways so that the fabric 20 can be rewound on the drum 11 to be worked on the face 22 too, using the free part of the drum 11.

[0041] The device 10 as described heretofore is used as follows.

[0042] A tubular fabric 20 is introduced into the device 10 with its first face 21 facing downwards, so as to be put into contact with the raising/grinding cylinders 18. The fabric 20 is positioned on one side of the machine, for example the right, and is controlled in its path around the drum 11 by the respective parts 12b, 13b of the drawing cylinders 12 and 13.

[0043] The relative velocity of the two cylinders 12, 13 allows to regulate the tension of the fabric 20 and, keeping said tension constant, to absorb the lengthening which the fabric 20 is subject to as a result of the action of the working cylinders 18, particularly in raising operations.

[0044] The fabric 20 is then made to exit from the device 10 and introduced into the turnpiece apparatus 14, such as is already known in the state of the art and therefore is not shown in detail in the drawings.

[0045] In the turnpiece apparatus 14 the fabric 20 is rotated through 180° and also displaced laterally towards the opposite side of the device 10, the left side. The fabric 20 is then made to re-enter the device 10 and brought into contact with the drum 11 substantially following the same path of the previous pass, with the difference that it is displaced laterally.

[0046] In this second pass the tension is controlled by means of the parts 12a and 13a of the cylinders 12 and 13, which can assume different speeds of rotation from the parts 12b, 13b. Such velocities are determined by working requirements which for the face 22 of the fabric 20 are generally different from those necessary for working the face 21.

[0047] In the second pass it is also necessary to make the fabric 20 rotate on the plane on which it lies, so that the raising or grinding operation is carried out on the edges of the fabric 20 too, and this is only obtained with an appropriate control of the tension.

[0048] In Figs. 3 and 4 we have an analogous solution to that described in Figs. 1 and 2, with the difference that the device 110 has two drums 11, 111 which are one above the other and generally equipped with raising cylinders 18, respectively 118, with clothings of a different type. The arrangement of the drums 11 and 111 allows a first face 21 of the fabric 20 to be put into contact first with the lower drum 111 and then with the upper drum 11; the fabric 20 is subsequently inserted into the turnpiece apparatus 14 where it is rotated through 180° and then made to re-enter, always on the same side, the device 110. Once it has re-entered the device 110, the fabric 20 follows the same path between the drums 111 and 11, but presenting its second face 22 to the raising cylinders 18.

[0049] After passing between the two drums 11 and 111, the fabric 20 can be discharged from the device 110 and stored.

[0050] According to a variant, the device 110 with two drums 11, 111 has the raising cylinders 18 and 118 which carry the same clothings; this allows to work the first face 21 on the lower drum 111 and the second face 22 on the upper drum 11. The fabric 20 is subsequently rotated by the turnpiece apparatus 14, displaced laterally and returned to the device 110 to work the second face 22 on the drum 111 and the first face 21 on the upper drum 11. This solution allows to eliminate possible defects due to irregularities in the clothings, since both faces of the fabric are worked in the same way both on the right part of the clothing and also on the left part.

[0051] It is obvious however that modifications and/or additions can be made to the devices 10 and 110 as described heretofore without departing from the spirit and scope of the invention.

[0052] The drums 11 can be associated, particularly in the case of grinding devices, with return rollers 37 (Figs. 6, 7), on which devices to detect the tension, such as load cells for example, can be mounted. According to another variant, cleaning brushes may be provided, of a standard type for raising, arranged below every drum 11 or 111 and able to clean the cylinders 18 ad 118.

[0053] It is also clear that, although the invention has been described with specific examples, a person of skill in the art will be able to achieve other equivalent forms, all of which shall come within the field and scope of this invention.

Claims

1. Method for raising or grinding fabrics (20) in a device comprising raising/grinding cylinders (18, 118) associated with at least one drawing cylinder (12) at inlet and at least one drawing cylinder (13) at outlet, said drawing cylinders (12, 13) defining the winding tension of said fabric (20) on said raising/grinding cylinders (18, 118), **characterized in that** at least two different fabrics (20), or different faces (21, 22) of the same fabric (20), are raised or ground simultaneously on at least one of said raising/grinding cylinders (18, 118), each of said different fabrics (20), or different faces (21, 22) of the same fabric (20), being made to cooperate with a respective different part (12a, 12b; 13a, 13b) of said drawing cylinders (12, 13), said parts (12a, 12b; 13a, 13b) being driven independently of each other.

2. Device for raising or grinding fabrics comprising a plurality of raising/grinding cylinders (18, 118) associated with at least one drawing cylinder (12) at inlet and at least one drawing cylinder (13) at outlet, said drawing cylinders (12, 13) being able to define the winding tension of said fabric (20) on said raising/grinding cylinders (18, 118), **characterized in that** each of said drawing cylinders (12, 13) comprises at least two parts (12a, 12b; 13a, 13b) able to be driven independently of the other, and each able to cooperate with a relative fabric (20), or with a different face (21, 22) of the same fabric (20), in order to make it wind with a desired tension on at least one of said raising/grinding cylinders (18, 118).

3. Device as in claim 2, **characterized in that** each of said drawing cylinders (12, 13) comprises two half-shafts (31, 32) arranged one inside the other in coaxial fashion, each of said half-shafts (31, 32) being able to be connected at one end to a corresponding drive member (35, 36), said drive member (35, 36) being able to impart to the corresponding said half-shaft (31, 32) a velocity and a direction of rotation independent of the other (32, 31).

4. Device as in claim 3, **characterized in that** each of said half-shafts (31, 32) is connected by means of a corresponding flange element (33, 34) to one of said parts (12a, 12b; 13a, 13b) of the relative drawing cylinder (12, 13).

5. Device as in claim 3 or 4, **characterized in that** said half-shafts (31, 32) can be selectively constrained to each other.

6. Device as in claim 5, **characterized in that** the constraint is achieved by a constraining device (38) arranged in proximity with the free end of one of the two half-shafts (31, 32).

7. Device as in claim 6, **characterized in that** said constraining device (38) comprises electromagnetic clutches.

8. Device as in claim 6, **characterized in that** said constraining device is of an electric type.

9. Device as in claim 6, **characterized in that** said constraining device comprises mechanical-type couplings.

10. Device as in claim 2, **characterized in that** a turn-piece apparatus (14) is arranged downstream of said drawing cylinder (13) arranged at outlet, in order to turn over and laterally displace said fabric (20).

11. Device as in claim 2, **characterized in that** cleaning brushes are provided to clean said raising/grinding cylinders (18, 118).

12. Device as in claim 2, **characterized in that** detachment rollers (37) are included in an intermediate position between said raising/grinding cylinders (18, 118).

13. Device as in claim 12, **characterized in that** said detachment rollers (37) are associated with devices to detect the tension.

14. Device as in claim 13, **characterized in that** said devices to detect the tension comprise load cells.

15. Device as in any claim from 2 to 14 inclusive, **characterized in that** said raising/grinding cylinders (18, 118) are arranged on the periphery of a rotary barrel or drum (11, 111).

16. Device as in any claim from 2 to 15 inclusive, **characterized in that** said raising/grinding cylinders (18, 118) are arranged in vertical, horizontal or mixed lines.

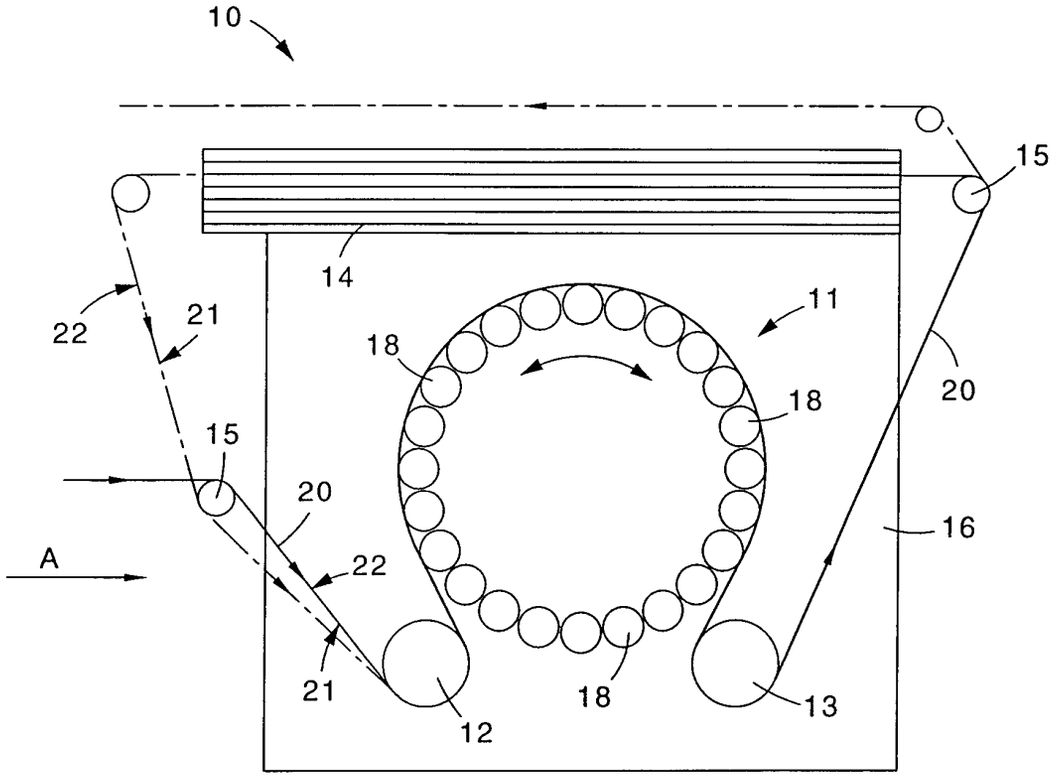
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fig. 1

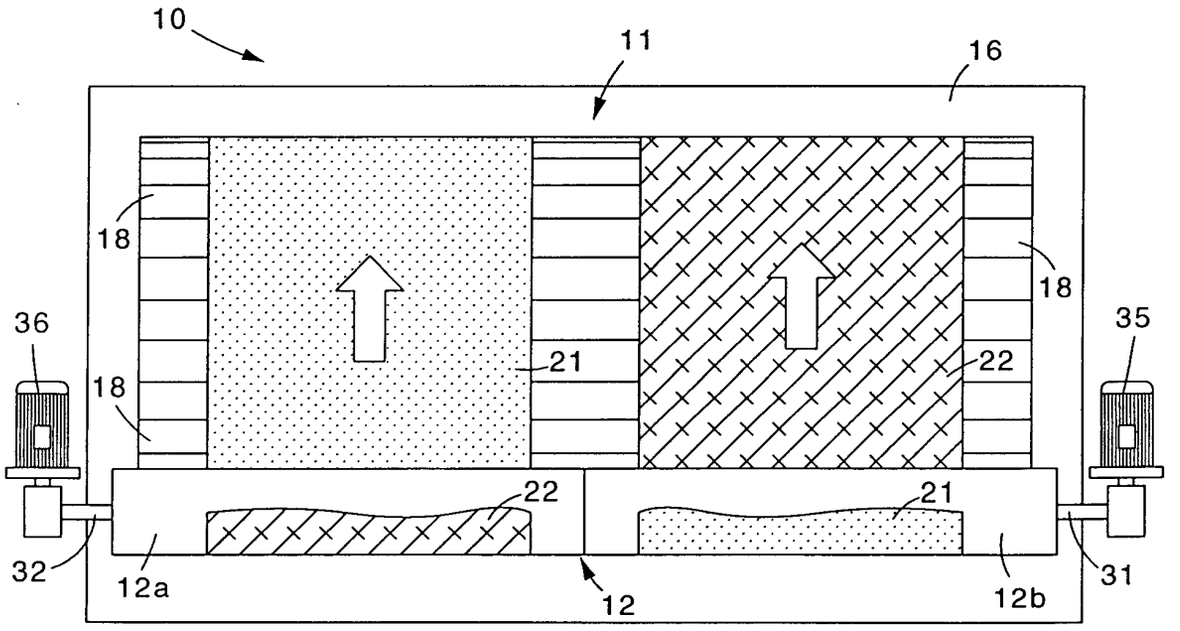
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fig. 2

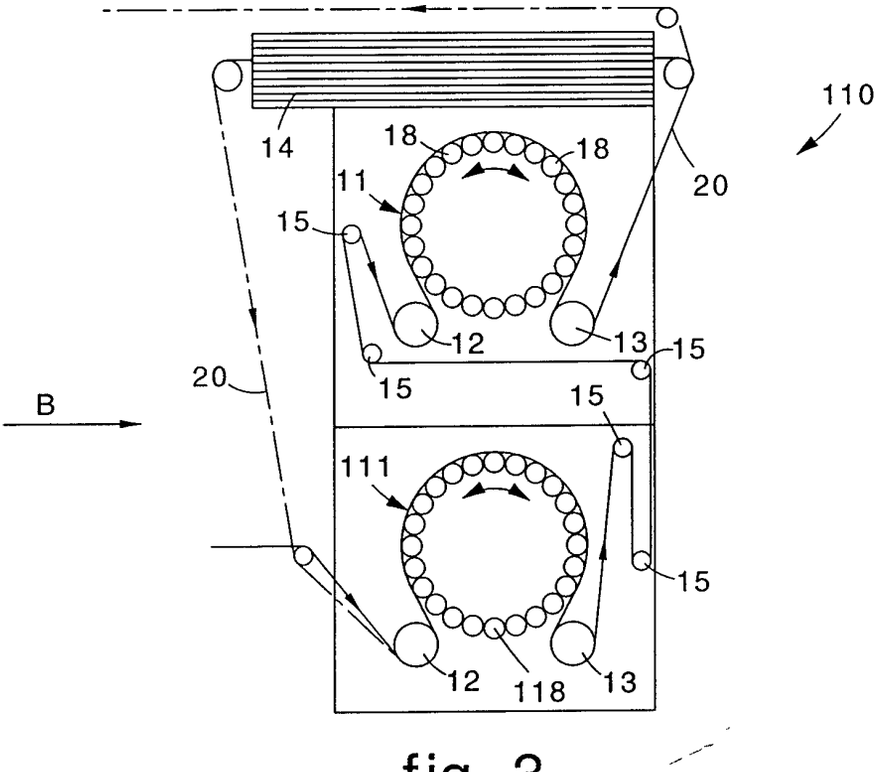
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fig. 3

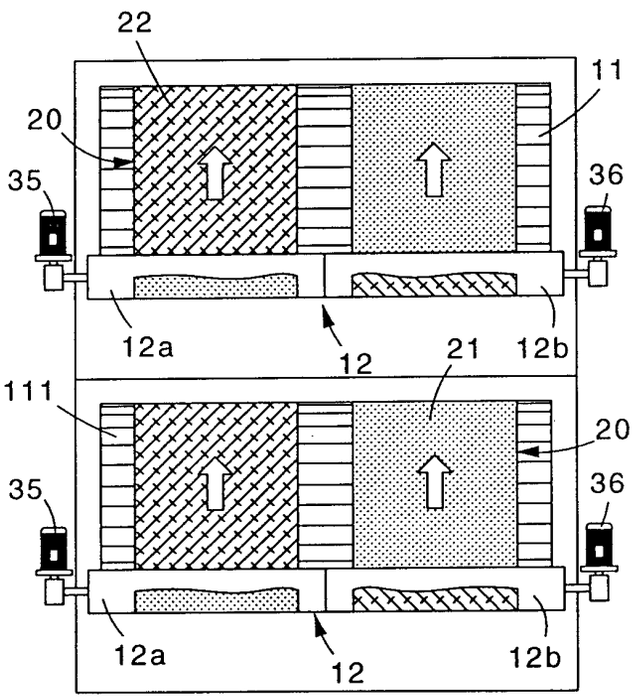
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fig. 4

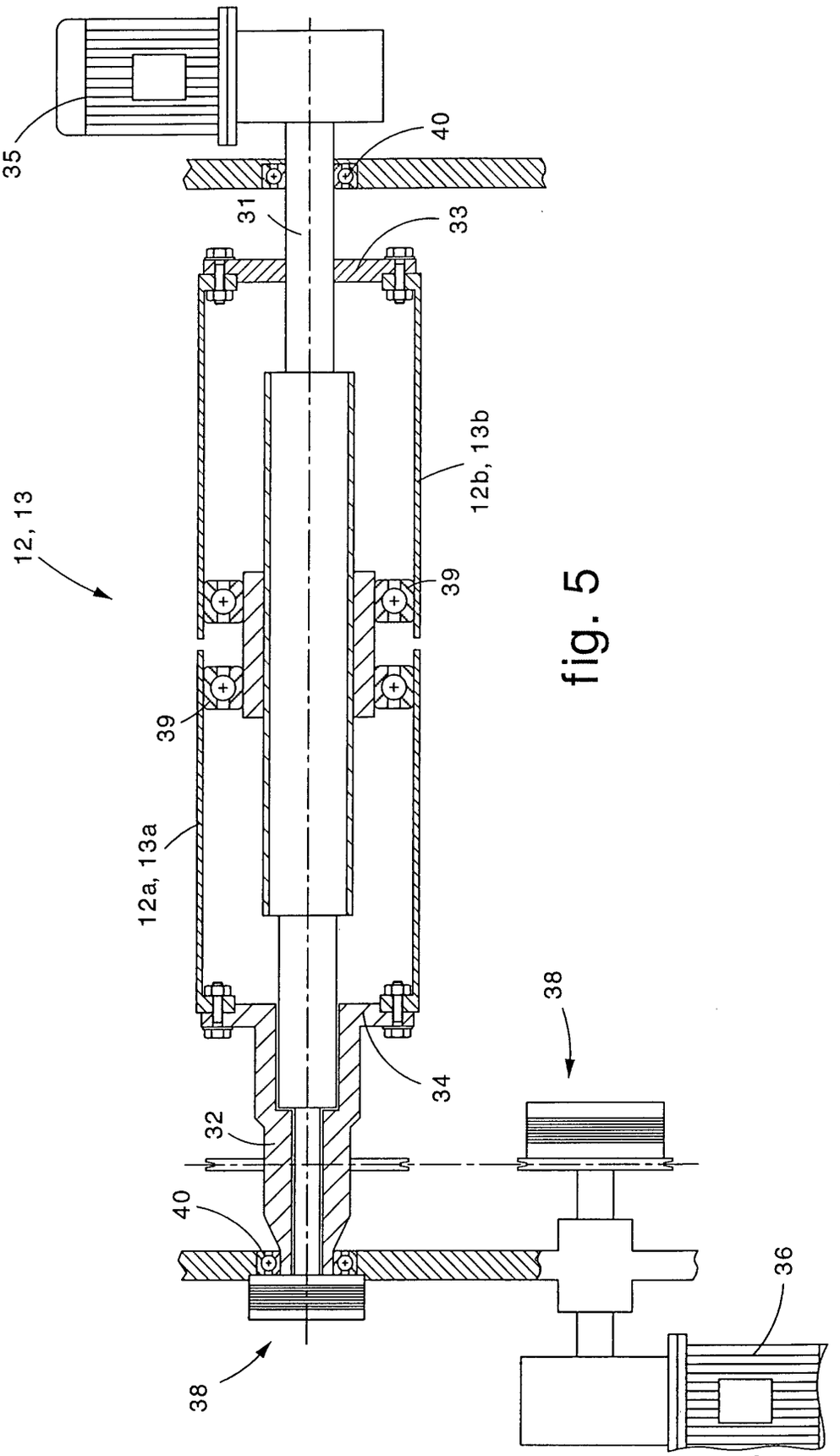

fig. 5

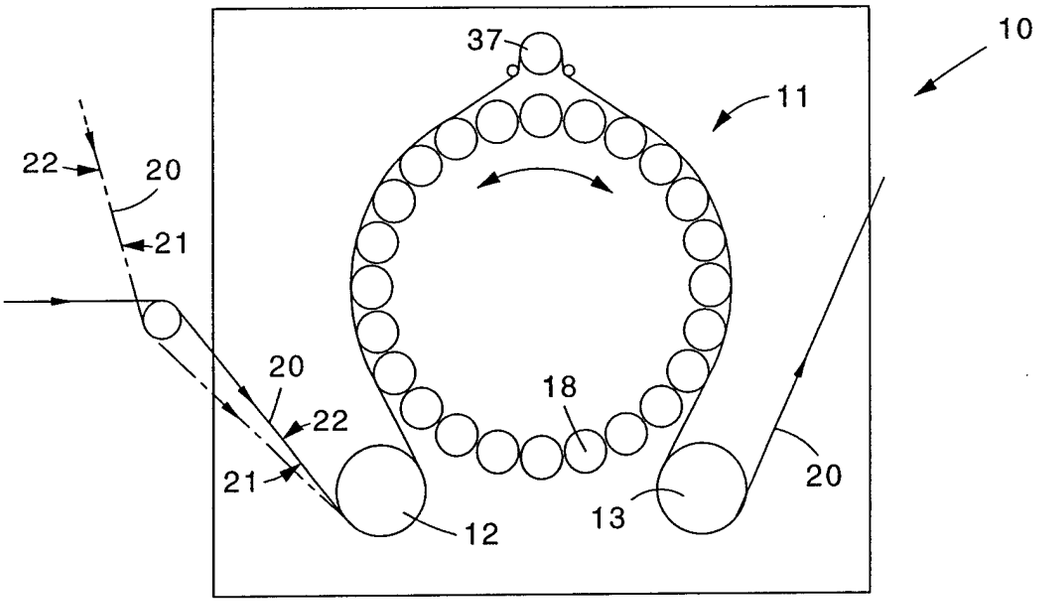
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fig. 6

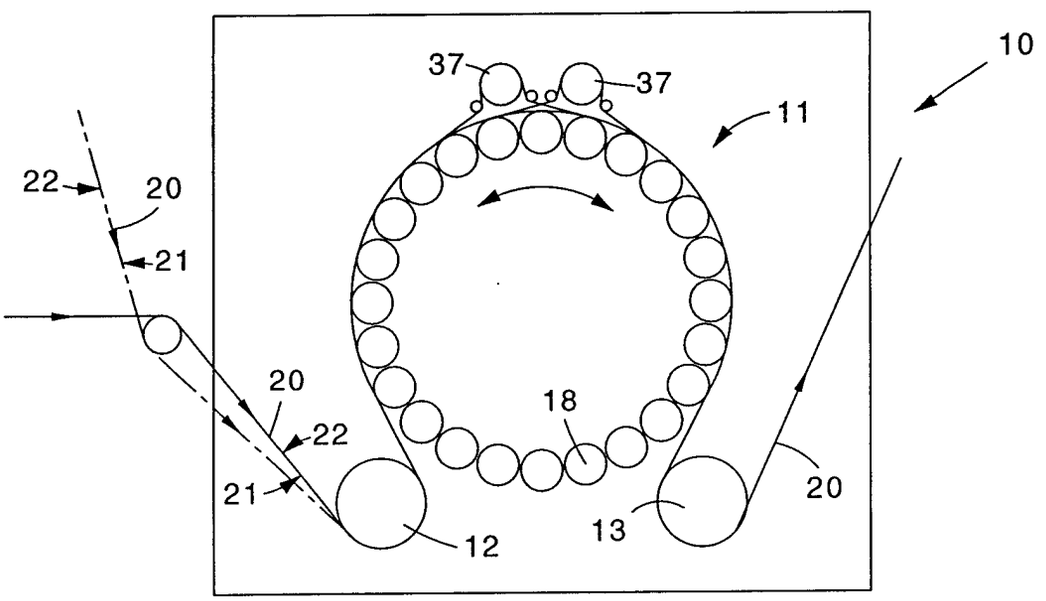
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fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 02 02 1565

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)
A	EP 0 088 431 A (COSTRUZIONE MECCANICHE DI MICHELE LAMPERTI S.P.A.) 14 September 1983 (1983-09-14) * page 5, line 2 - line 13 * * page 8, line 9 - line 13 *	1,2,12, 15	D06C11/00
A	EP 0 649 927 A (SPEROTTO RIMAR S.P.A.) 26 April 1995 (1995-04-26) * column 2, line 24 - column 3, line 10 *	1,2,11, 15	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D06C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 February 2003	Goodall, C

CATEGORY OF CITED DOCUMENTS

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07-02-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0088431 A	14-09-1983	IT 1193058 B	02-06-1988
		AT 31094 T	15-12-1987
		DE 3374702 D1	07-01-1988
		EP 0088431 A1	14-09-1983
		ES 8407122 A1	16-11-1984
EP 0649927 A	26-04-1995	IT MI931862 A1	28-02-1995
		DE 69320966 D1	15-10-1998
		DE 69320966 T2	22-04-1999
		DE 69321231 D1	29-10-1998
		DE 69321231 T2	06-05-1999
		DE 69321232 D1	29-10-1998
		DE 69321232 T2	29-04-1999
		EP 0649927 A2	26-04-1995
		EP 0649928 A2	26-04-1995
		EP 0649929 A2	26-04-1995
		ES 2121935 T3	16-12-1998
		ES 2121936 T3	16-12-1998
		ES 2121937 T3	16-12-1998
		US 5517736 A	21-05-1996
		US 5528804 A	25-06-1996
		US 5526557 A	18-06-1996

EPO FORM P0459

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