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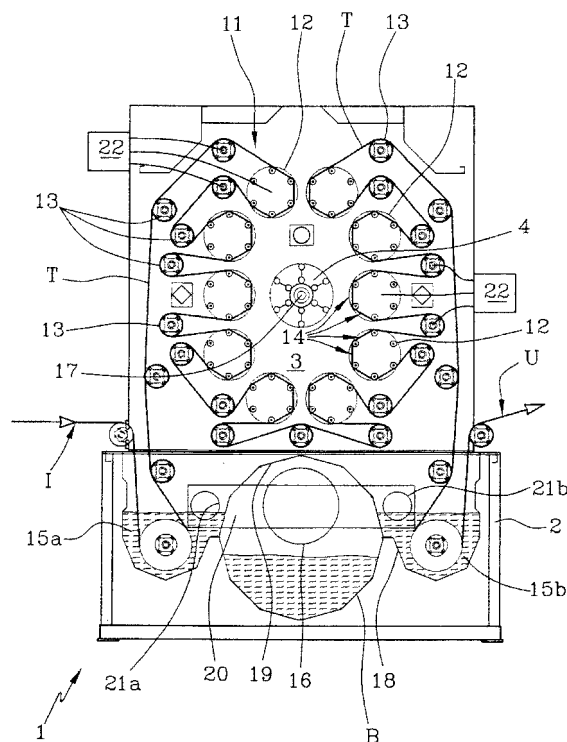
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(54) **Apparatus for textiles treatment**

(57) It is disclosed an apparatus for textiles treatment in which a supporting frame (2) internally defines at least one work environment (3) in which a rotor (4) is movable in rotation. Feeding means (5) sends a treatment fluid to said rotor, while actuating means (6) selectively sets it in motion; the fluid is spread by the moving rotor (4) inside the work environment towards the fabric. A management unit (7) correlates an operating parameter of the feeding means (5) (flow rate) with an operating parameter of the actuating means (6) (rotation speed of the rotor (4)) and ensures optimal operation of the apparatus in an automatic manner.

FIG 1



Description

[0001] The present invention relates to an apparatus for textiles treatment. In particular, the apparatus being the object of the invention can be used for high-hydrodynamic-efficiency water treatment of fabrics or textiles in general or also as a tigering unit for velvets and the like, and as a pre-washing and washing unit for textiles during the pre-treatment and fixing steps, after dyeing or printing.

[0002] It is known that there are on the market apparatuses intended for treatment of fabrics and in particular continuous and open-width washing of textiles.

[0003] Among the different known devices a high-efficiency apparatus has been conceived in which a rotor with high-speed rotating blades imposes a high movement energy resulting from pressure and peripheral speed of the rotor itself, to the water sent therein by means of a pump.

[0004] The water thus thrown along the useful length of the rotor impinges on a fabric in transit on a path at least partly surrounding the rotor itself.

[0005] In this way a hydrodynamic impact is produced on the fabric which is able to increase the washing efficiency of the unit as compared with other traditional methods.

[0006] While this type of apparatus briefly described above appeared to be innovative relative to traditional apparatuses, the same however has highlighted some aspects and/or operating limits that can be improved or overcome.

[0007] First of all setting of the rotor speed and of the amount of water admitted into said rotor are controlled in a manual and independent manner by an operator. Therefore a qualified operator is necessary, because rotation values of the rotor as well as flow rates of the fluid adapted to the fabric to be treated and to the type of treatment to be performed are required to be inputted in order to enable the apparatus to operate in an optimal manner.

[0008] However, due to the necessity to intervene on the apparatus during the different working steps, sometimes uncontrollable and now and then poor working results have been achieved.

[0009] In addition, it has been found that present apparatuses for textiles treatment are not very efficient as regards cleaning the waste-containing water, due to the geometric configuration of the collecting vat and the external positioning of the filter.

[0010] In addition, handling/movement of the transport and transmission cylinders carried out through belts appeared to be rather imprecise and susceptible of improvement under different points of view.

[0011] Furthermore, shaping of the rotor has proved to be of the greatest importance for optimisation of the hydrodynamic efficiency of the fluid exiting the rotor and it too appeared to be improvable under different points of view.

[0012] Accordingly, the present invention aims at solving all the drawbacks highlighted above.

[0013] A first aim of the invention is to make available an improved apparatus for treating textiles which is capable of optimising the operating parameters with particular attention to the number of revolutions of the rotor and the flow rate of the admitted fluid, depending on the working operations and the basic weight of the fabrics being treated.

[0014] Another aim of the invention is also to optimise the efficiency in cleaning the liquid containing impurities as well as improving pulling of the fabric within the apparatus.

[0015] It is a further aim of the invention to improve efficiency in the working operations carried out by the apparatus and mainly in the washing operations by improving the rotor conformation.

[0016] The foregoing and further aims that will become more apparent in the progress of the present description are substantially achieved by an apparatus for textiles treatment in accordance with the appended claims.

[0017] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment set out hereinafter with the aid of the accompanying drawings, in which:

- Fig. 1 is a diagrammatic front view partly in section of an apparatus in accordance with the present invention;
- Fig. 2 is a side view partly in section of the apparatus shown in Fig. 1;
- Fig. 3 is a section view of a transport cylinder provided with reels, used in the apparatus shown in Fig. 1;
- Fig. 4 is a diagrammatic view of a lower portion of the apparatus shown in Fig. 1.

[0018] With reference to the drawings, an apparatus for textiles treatment in accordance with the invention has been generally identified by reference numeral 1.

[0019] This apparatus will be suitable for use for different types of working operations during both the preparation step and the finishing step, after the high-quality finishing operations, as a tigering unit for pile textiles such as smooth or cord velvets and the like.

[0020] The apparatus in reference will be also usable with different treatment fluids such as cold or hot water containing possible chemical products suitable for the treatments in progress (soaps, detergents, sequestering agents, etc.).

[0021] As an alternative to water, and with particular systems for closing the external environment off, solvents could be used, should these treatment methods be required.

[0022] At all events and generally the apparatus will be suitable for defining continuous and open-width washing lines for textiles in which a fabric "T" will be introduced into the apparatus at an inlet station "I" and, after being

submitted to treatment, will come out of the apparatus through an outlet station "U".

[0023] From a structural point of view the apparatus for treating textiles will be generally provided with a supporting frame 2 capable of internally defining at least one work environment (see Fig. 1).

[0024] Within this work environment at least one rotor 4 will be present, which extends longitudinally along an axis 17 and is movable in rotation around the same axis.

[0025] The apparatus will also comprise feeding means 5 for supplying said rotor 4 with a treatment fluid. For instance, at least one pump 8 will be present, as well as one or more ducts 9 adapted to take the fluid into said rotor in varying flow rates and at defined pressures.

[0026] The rotor will be set in motion through suitable actuating means 6 capable of selectively driving it in rotation, depending on the desired speed on the rotor itself.

[0027] By way of example, said means 6 can be defined by at least one direct-current motor 10 running at varying revolutions or an inverter capable of sending the rotor, through a suitable transmission, the required power for setting it in rotation at a controlled and obviously varying speed.

[0028] A guide assembly 11 is then present and is disposed around the rotor in possibly modifiable configurations depending on current working requirements.

[0029] The guide assembly 11 is adapted to support, the fabric "T" to be worked inside the work environment 3 and at least partly around said rotor 4.

[0030] Generally the guide assembly 11 comprises a plurality of transport cylinders 12 and transmission cylinders 13 so that fabric "T" is guided along its path within the work environment 3 starting from the inlet station "I" and towards the outlet station "U".

[0031] As shown in Fig. 3, the transport cylinders 12 are cylinders provided with reels and have a structure defined by rest surfaces 12a for said fabric "T" alternated with free treatment regions 14 which the fabric can cross, said fabric being impinged on and passed through by the operating fluid.

[0032] Obviously, this configuration of cylinders 12 allows the cleaning capability of the apparatus to be improved.

[0033] Since generally the apparatus will be adapted to work textiles also having rather important selvages (even of thirty or more metres), a dragging system will be present which is adapted to ensure correct pulling of the fabric when in engagement with the guide assembly 11 and also adapted to allow dragging of the fabric itself without creating jamming or the like at the outlet station "U".

[0034] Generally, at least one electric motor 22 (a brushless motor) will be present which is adapted to operate a predetermined number of said transport cylinders 12 and/or transmission cylinders 13; in particular motor 22 will be able to control at least one cylinder and at most three cylinders.

[0035] Obviously the number of motors present will be

the same as that of the cylinder assemblies to be operated by each of them.

[0036] Advantageously, the apparatus is also provided with a management unit 7 adapted to correlate an operating parameter of the feeding means 5 with an operating parameter of the actuating means 6.

[0037] In particular, it has been found that the optimal treatment on a fabric is connected with the flow rate of the fluid within the rotor, the rotation speed of the rotor itself and the basic weight/type of fabric to be worked as well as the type of working operations to be carried out.

[0038] Therefore programming of the management unit 7 will be carried out in order to associate each operating parameter of the feeding means 6, with a corresponding operating parameter of the actuating means 5; in other words, setting of a parameter of the feeding means, and/or the actuating means involves automatic setting of the corresponding parameter of the actuating means or the feeding means.

[0039] Due to the possibility of managing a single parameter in such a manner that automatically the operating parameter of the other means is set, best operation of the apparatus is ensured. In fact, the management unit 7 can be defined by a PLC or also by a programmable CPU in such a manner that an operator can ensure optimal working by, for example, inputting the basic weight of the fabric entering the apparatus.

[0040] Automatically the management unit 7 is able to set the optimal number of revolutions of the rotor and also to set the optimal flow rate of fluid for that fabric.

[0041] By inputting a greater or smaller basic weight, the management unit will be able to automatically set greater/smaller flow rates and higher/lower rotation speeds correlated with each other and optimal for the type of treatment to be carried out.

[0042] Alternatively, it will be possible to input the type of working that once more will involve the optimal and automatic adjustment of the flow rate and rotor speed.

[0043] At all events it is to be noted that the controlled parameters could be different. By way of example and referring to the actuating means 6, it will be possible to control the electric power supply to motor 10, the rotation speed of same or also the power transmitted to rotor 4, as an alternative to the already mentioned rotation speed.

[0044] Vice versa, with reference to the operating parameters of the feeding means 5 it will be possible to manage pressure, percent opening of the valve, electric power supply or also pressure of the fluid exiting the rotor, as an alternative to the flow rate.

[0045] Due to the above, there will be an important simplification in carrying out management and operation of the apparatus, so that it will be possible to entrust also unskilled operators with this task.

[0046] As can be viewed from Figs. 1 and 2, the apparatus also comprises at least one and preferably two fluid-collecting vats 15a, 15b placed below rotor 4 and designed to receive the fluid and possible working bottoms such as impurities and fabric waste.

[0047] The two collecting vats 15a, 125b are placed at the opposite sides of the apparatus and extend longitudinally in a direction substantially parallel to the axis 7 of rotor 4. Then at least one filter 16 is centrally present and it is adapted to enable cleaning of the fluid collected in the vats.

[0048] Filter 16 too is such positioned that its axis is parallel to the rotor axis 17.

[0049] A bottom wall 18 having a three-dimensional extension defines the collecting vats 15a, 15b and a raised region 19 for separation between the work environment 3 and filter 16, the latter being therefore housed in a lower portion of the apparatus.

[0050] At least one conveying duct 20 (and in particular a conveying duct 20 for each of the collecting vats 15a, 15b) draws the fluid containing the working bottoms from an outlet opening 21a, 21b of the collecting vat placed to a predetermined height, so as to convey the fluid to filter 16.

[0051] The water to be cleaned, coming from the textiles washing apparatus, is conveyed into the drum F of the rotary filter by means of a sleeve L. The drum F is formed of a plate pierced with holes enabling the water to be filtered and fall into the recovery tank B while the dirt is retained at the inside thereof.

[0052] The perforated plate can have holes in the range of 0.7-0.8-1 mm, depending on the type of filtering capability it is wished to be obtained.

[0053] Rotation of drum F is given by a reduction motor A transmitting movement to a pinion gear C - gear wheel D pair and in this way the dirt is brought to the outside of a propeller E interlocked with the drum F.

[0054] The propeller E not only performs the function of transporting the dirt but also has the task of stopping the delivery flow of the water to be cleaned.

[0055] The filtered water contained in vat B and coming out of the exhaust opening N is recirculated by pump H and partly sent to the nozzle-carrying header G.

[0056] The function of header G is to keep drum F clean by means of nozzles; in this way the water is always able to fall into the recovery tank B without the plate holes being clogged, so that any interruption for cleaning operations is made useless.

[0057] Perfect rotation of drum F is ensured by the particular construction involving a guide crown M in engagement with drum F and resting on two lip wheels I.

[0058] The filter construction material is generally stainless steel so that the filter can be also installed in the open being perfectly resistant to atmospheric agents.

[0059] Once the fluid gathered in the vat has been cleaned, the latter is sent to the feeding means 5 again and recirculated. The last-mentioned operation allows an important energy recovery above all in case of working operations with fluids at a temperature.

[0060] In this connection, the apparatus will be advantageously provided with a system for automatic control of the fluid temperature which is able to signal possible malfunctions, should the temperature be out of a normal-

operation range.

[0061] Advantageously, the apparatus can also have fluid-level sensors to ensure the presence of the optimal amount of fluid within the collecting vats 15a, 15b.

[0062] Finally, should the presence of hard water constitute a problem for good operation of the apparatus over time, it will be possible to provide devices of known type preventing lime formation and adapted to ensure cleaning of the different ducts.

[0063] After describing the apparatus mainly as regards its structure, operation of same as a whole is the following.

[0064] The open-width fabric enters the apparatus at an inlet station "I" and is guided along its path around the work environment 3 by the guide assembly 11.

[0065] At the inlet station "I" the fabric is introduced into the fluid-collecting vat 15a and is suitably wetted to ensure softness and workability of same.

[0066] The apparatus rotor is set in motion and through the appropriate orifices present on its periphery it ejects a high-speed fluid that impinges on the fabric passing through the work environment 3 particularly at the free treatment regions 14 of the cylinders provided with reels.

[0067] Passage of the appropriate fluid for instance can aim at forcedly washing the dirt by emulsion, also reaching the fibres' core where the dirt has been absorbed during the spinning or sizing steps.

[0068] Advantageously, beating cylinders could be present which are adapted to break the lattice defined by the glues (sizes) used during the weaving step.

[0069] Mechanical breaking of the lattice defined by the glue allows better removal of the aqueous sizes themselves during the washing step.

[0070] Once the working cycle has been completed new passage of the fabric inside the second collecting vat 15b is carried out and the fabric is then brought towards the outlet station "U" for subsequent process steps.

[0071] The invention achieves important advantages.

[0072] Due to the presence of a management unit capable of mutually correlating the operating parameters of the feeding means and of the actuating means in an automatic and programmable manner, an optimal and simpler control of the working process is allowed.

[0073] The geometric configuration of the collecting vats and the filter positioning allow better cleaning of the operating fluid and also energy recovery at the moment the fluid is sent back to the feeding pump.

[0074] Due to the rotor shape the washing process is optimised, while control of the transport cylinders through electric motors enables an optimal pulling action on the fabric and correct advancing in the production line to be ensured.

[0075] In addition, the apparatus allows all finishing operations on the fabric adapted to give the latter a more agreeable appearance and enabling it to meet the market requirements, to be carried out thereon with few modifications, which operations will give the fabric aesthetic

features (colour, feel, surface appearance) or mechanical-chemical features (shrinkage proofing, crease-proofing, non-inflammability, stain-proofing, water repellence, resistance to atmospheric and biological agents). On the other hand, other possible operations with the present apparatus are directed both to preparation of the fabric to dyeing and to acquisition of other performance and feel properties by the fabric after dyeing (finishing and high-quality finishing operations).

Claims

1. An apparatus for textiles treatment, comprising:

- a supporting frame (2) internally defining at least one work environment (3);
- at least one rotor (4) movable in rotation in said work environment (3);
- feeding means (5) for supplying said rotor with a treatment fluid;
- actuating means (6) interlocked with the rotor to selectively operate movement of same;

said fluid being spread by the moving rotor (4) inside the work environment (3) towards a fabric or textiles "T",

characterised in that it further comprises a management unit (7) adapted to correlate an operating parameter of the feeding means (5) with an operating parameter of the actuating means (6).

2. An apparatus as claimed in claim 1, **characterised in that** the management unit (7) is programmable for associating each operating parameter of the feeding means (5) with a corresponding operating parameter of the actuating means (6), setting of a parameter of the actuating means (6) or the feeding means (5) involving automatic setting of the corresponding parameter of the feeding means (5) or the actuating means (6).

3. An apparatus as claimed in claim 1, **characterised in that** said operating parameter of the feeding means (5) will be a flow rate, pressure, percent opening of a valve, electric power supply, pressure of the fluid exiting the rotor or the like, and preferably a flow rate.

4. An apparatus as claimed in claim 1, **characterised in that** said operating parameter of the actuating means (6) is a rotation speed of the rotor (4), an electric power supply of the motor (10), a rotation speed of the motor (10), and preferably the rotation speed of the rotor (4).

5. An apparatus as claimed in claim 1, **characterised in that** said feeding means (5) comprises at least

one pump (8) and one or more ducts (8) to carry the fluid to said rotor (4).

6. An apparatus as claimed in claim 1, **characterised in that** the actuating means (6) comprises at least one motor (10) and a suitable transmission adapted to set the rotor (4) in rotation to a controlled speed.

7. An apparatus as claimed in claim 1, **characterised in that** it comprises a guide assembly (11) placed in said work environment (3) at least partly around said rotor (4) and adapted to support the fabric "T" to be treated or worked.

8. An apparatus as claimed in claim 7, **characterised in that** the guide assembly (11) comprises a plurality of transport cylinders (12) and transmission cylinders (13), the fabric "T" being guided along its path within the work environment (3) by said cylinders starting from an inlet station ("I") towards an outlet station ("U").

9. An apparatus as claimed in claim 7, **characterised in that** the transport cylinders (12) have a structure defined by rest surfaces (12a) for the fabric "T" alternated with free treatment regions (14) where they are impinged on and at least partly passed through by the fluid.

10. An apparatus as claimed in claim 1, **characterised in that** it comprises:

- at least one fluid-collecting vat (15a; 15b) placed below said rotor (4) and designed to receive the fluid and possible working bottoms; and
- at least one filter (16) adapted to enable cleaning of the fluid gathered in said vat, the fluid being sent again to the feeding means (5), once cleaned.

11. An apparatus as claimed in claim 10, **characterised in that** it comprises two fluid-collecting vats (15a, 15b) placed at opposite sides of the apparatus and longitudinally extending in a direction substantially parallel to the axis (17) of the rotor (4), the filter (16) being located at a position interposed between said vats (15a, 15b), and the filter axis preferably being parallel to the rotor axis (17).

12. An apparatus as claimed in claim 11, **characterised in that** a bottom wall (18) of three-dimensional extension defines said collecting vats (15a, 15b) and a raised region (19) for separation between the work environment (3) and the filter (16).

13. An apparatus as claimed in claim 10, **characterised in that** it comprises at least one conveying duct (20)

adapted to draw the fluid with working bottoms from an outlet opening (21a; 21b) of the collecting vat (15a; 15b) placed at a predetermined height and to convey said fluid to the filter (16).

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- 14.** An apparatus as claimed in claim 8, **characterised in that** it comprises at least one electric motor (22) adapted to actuate a predetermined number of said transport (12) and/or transmission (13) cylinders, said motor (22) being preferably operated by at least one and at most three of said cylinders.

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FIG 1

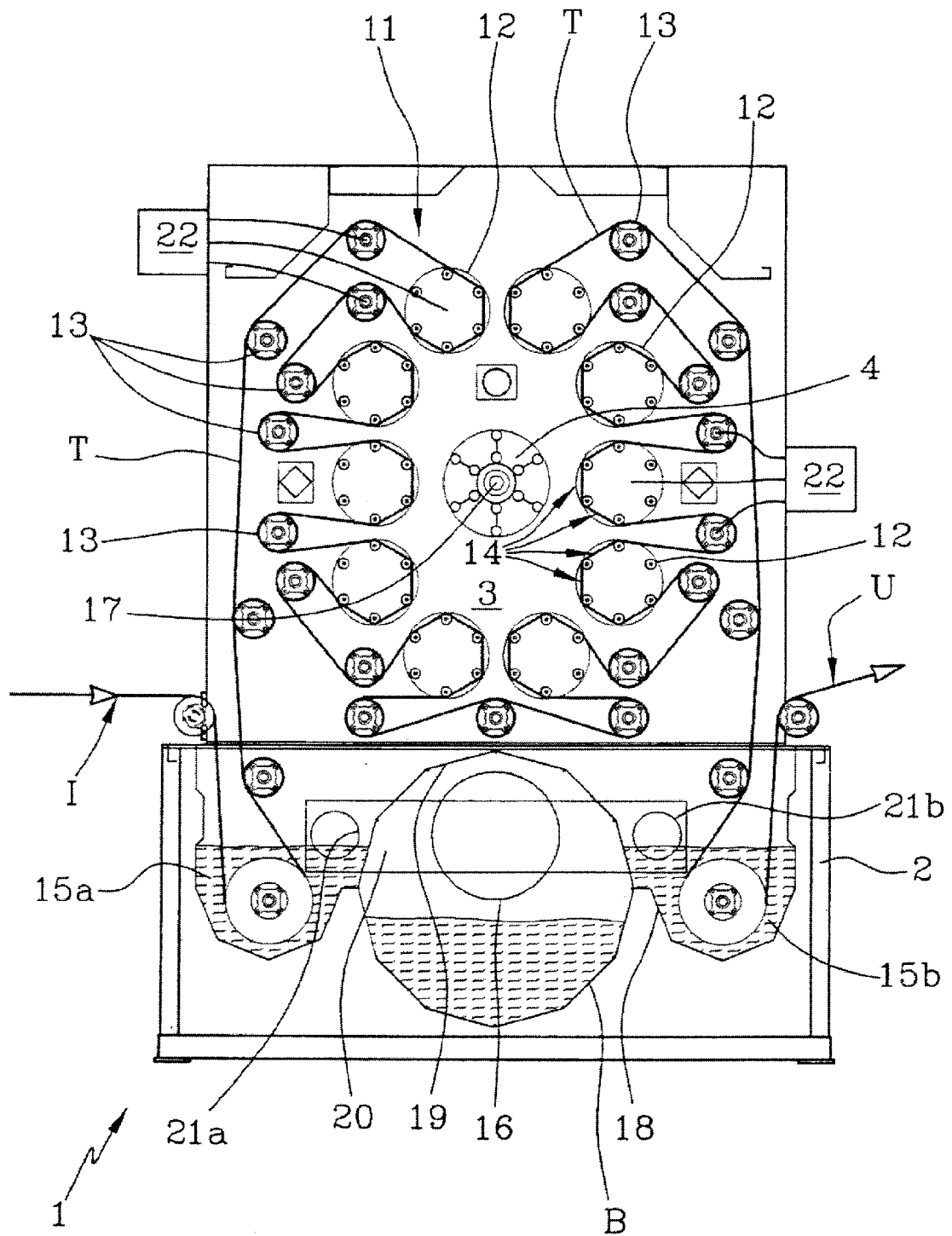


FIG 2

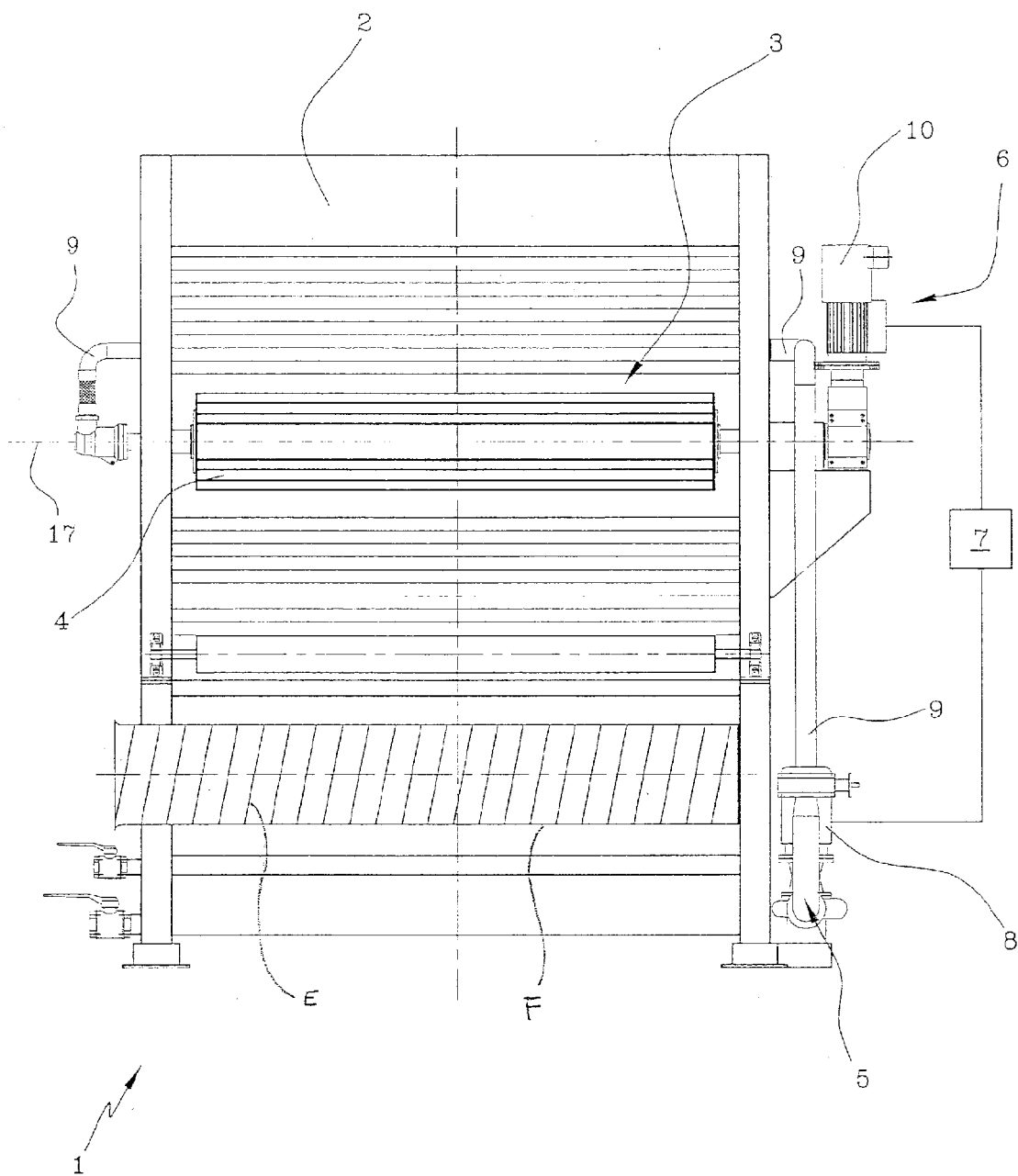
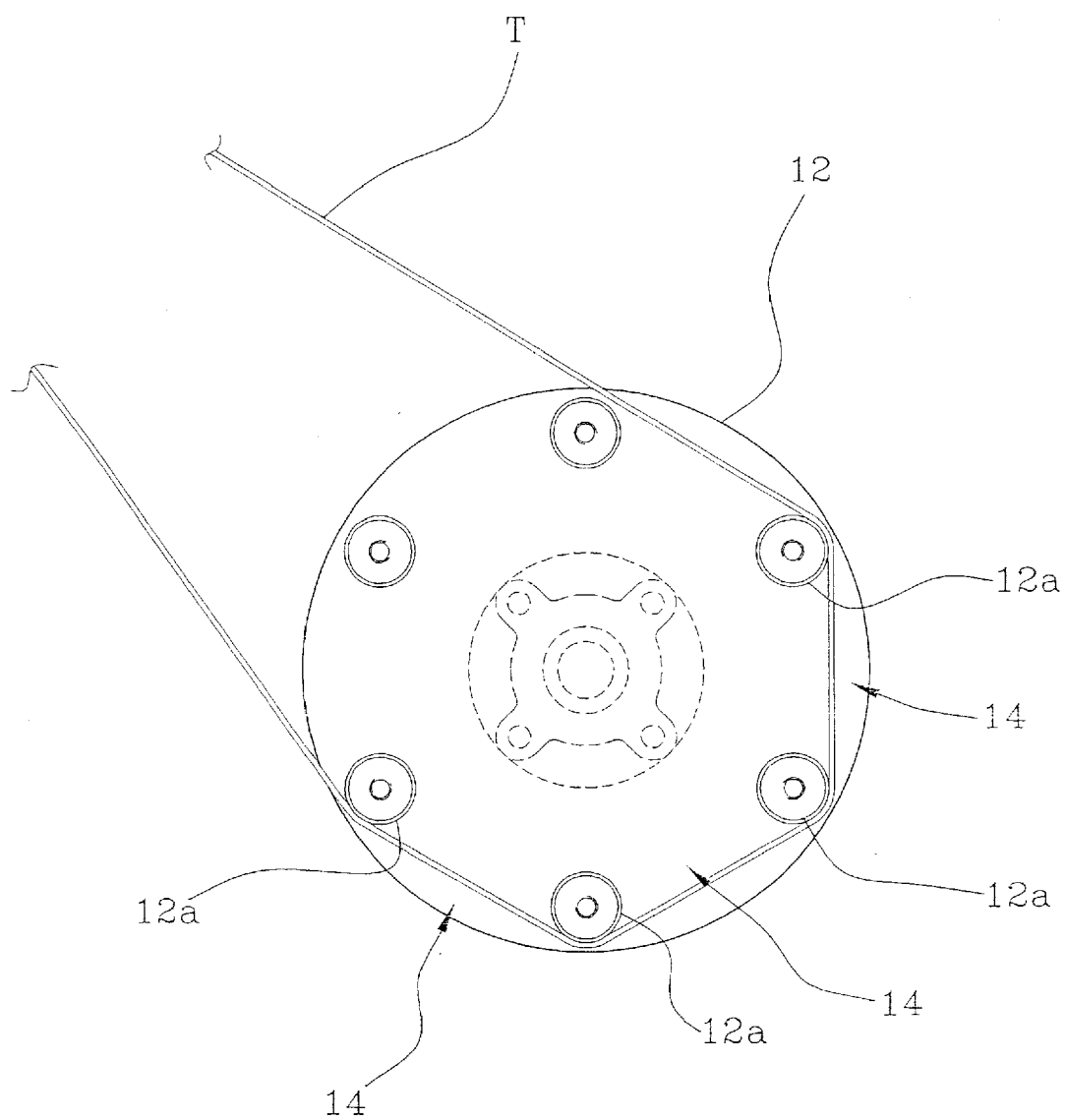


FIG 3



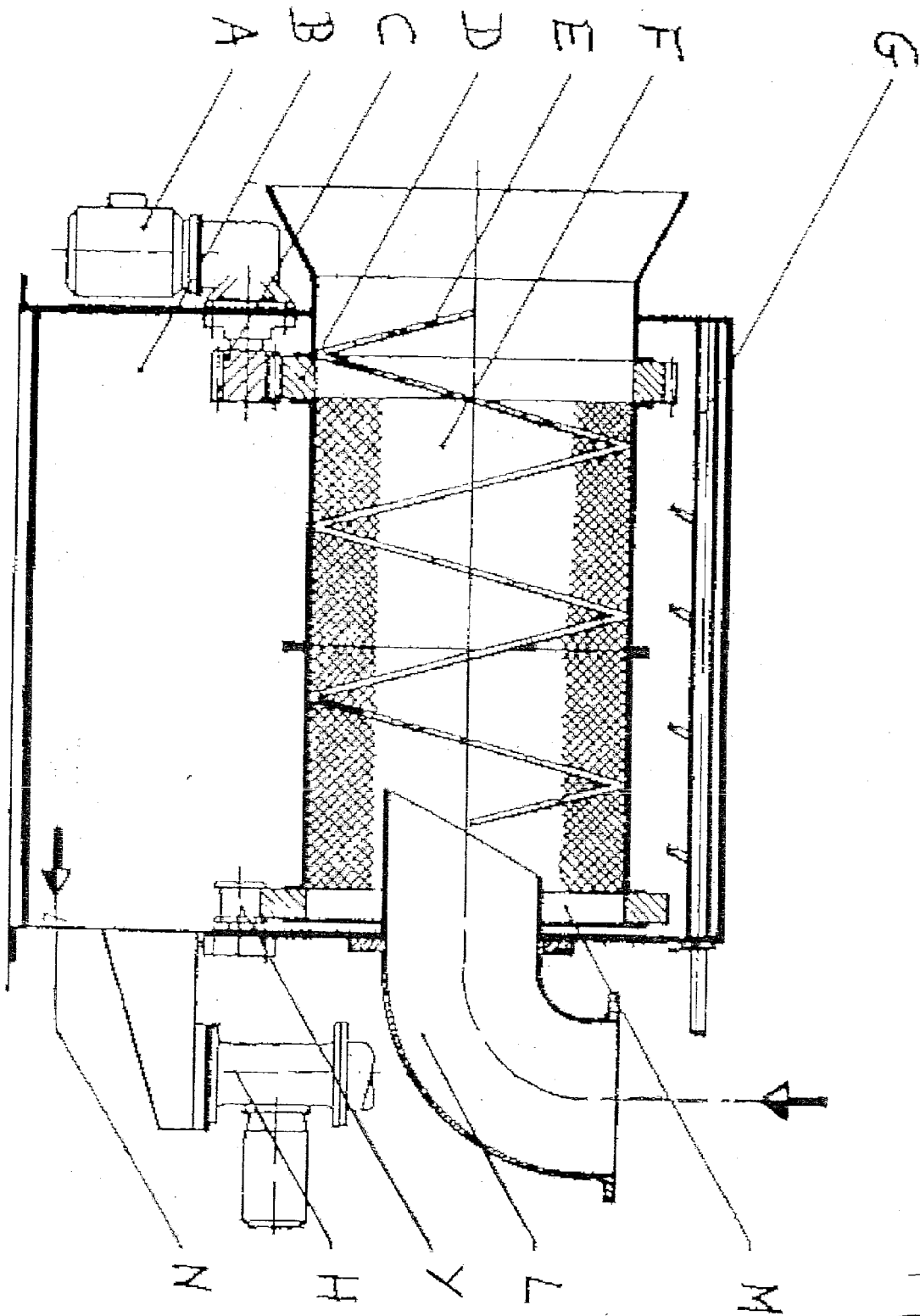


FIG. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 10 2286

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		22 July 2008	Bichi, Marco
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 10 2286

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The members are as contained in the European Patent Office EDP file on
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