



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.06.2007 Bulletin 2007/24

(51) Int Cl.:
D06B 15/04 (2006.01)

(21) Application number: **06125408.2**

(22) Date of filing: **05.12.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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(30) Priority: **07.12.2005 IT UD20050208**

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(54) **Device and method to remove residual processing liquid from a fabric**

(57) Device (10) to remove residual processing liquid from a fabric (11). The device (10) comprises at least a chamber (18) suitable for the transit of the fabric (11)

emerging from treatment with the liquid and having inside it means (22) to deliver steam onto the fabric (11), and a suction unit (24,26) able to suck out from the fabric (11) the steam mixed with the residual processing liquid.

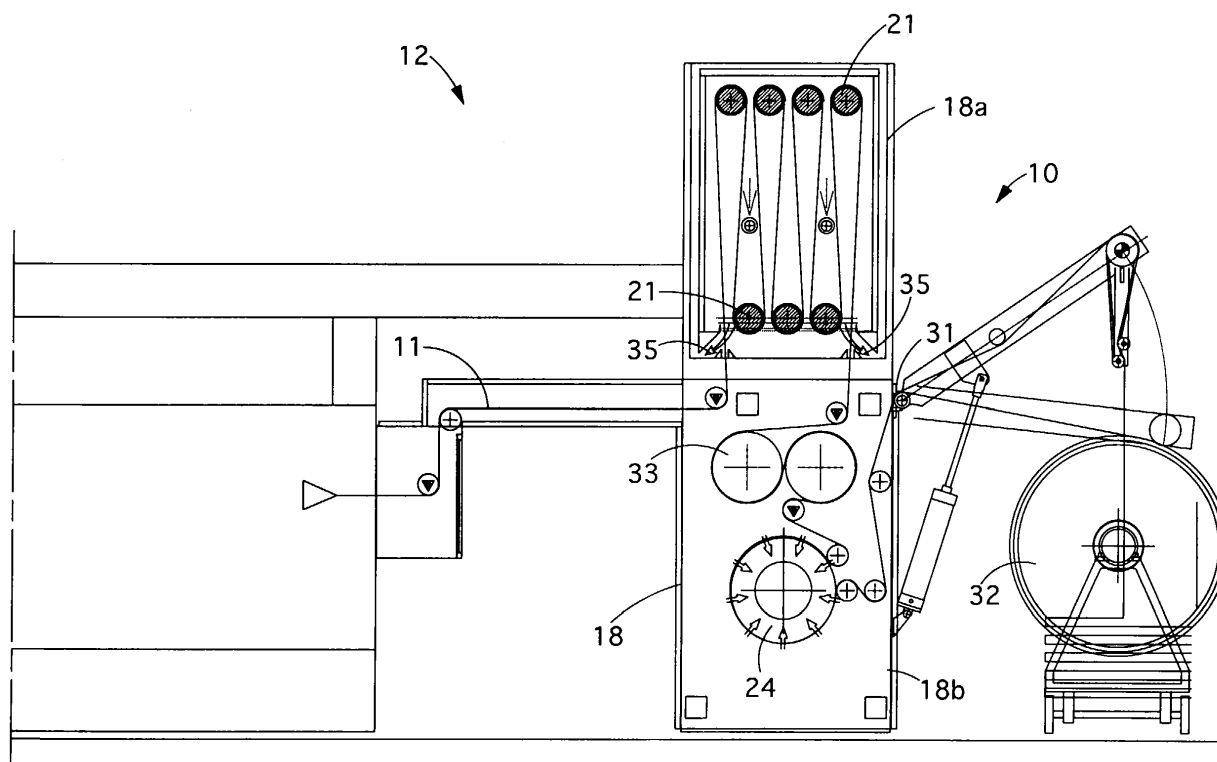


fig. 3

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a device and the relative method, used advantageously but not exclusively in the textile field, to remove the residual processing liquid from a fabric.

BACKGROUND OF THE INVENTION

[0002] In the textile field, particularly in the finishing of textile material, it is known to subject a fabric to a treatment in a processing liquid, for example liquid ammonia, in order to obtain particular effects, both aesthetic and of feel.

[0003] Normally, this treatment is performed continuously, making the fabric to be treated transit inside a tank containing the liquid ammonia and then sending it in sequence first to a section of chemical reaction to the ammonia, and then to a section to remove the processing liquid from the fabric, which is normally performed by heating the fabric and/or washing it in a water bath.

[0004] One disadvantage of this solution is that conventional processes for removing the liquid ammonia in any case leave residues of said liquid in the fabric, which causes not only a pungent odor but also a pollution of the environment, particularly of the air, for example in the warehouses where the fabric is stored.

[0005] Purpose of the present invention is to achieve a device and perfect a method which allow to remove the processing liquid from a fabric much more intensely and deeply.

[0006] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0007] The present invention is set forth and characterized in the main claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0008] In accordance with the above purpose, a device and a method according to the invention are used to remove the residual processing liquid, in particular but not only, ammonia, from a fabric.

[0009] According to a characteristic of the invention, the device comprises at least a chamber which is suitable for the transit of the fabric emerging from the treatment with the liquid and which has inside it a delivery means that, during a first step of the method, delivers steam towards a substantial part of at least one side of the fabric.

[0010] The device also comprises a suction means which, during a second step, sucks out from the fabric the steam delivered in the first step and mixed with the residual processing liquid.

[0011] According to a variant, the chamber in which the fabric transits during the first step is filled and/or saturated with steam and comprises its own suction means to suck out from the fabric at least a first part of steam mixed with the processing liquid.

[0012] In this way, treating the fabric with steam, the residual processing liquid is removed from the fabric together with the steam by means of the suction means, discharged from the chamber and conveyed for example to an abatement tower.

[0013] According to an advantageous solution, during said two steps, the chamber is kept in a slight depression with respect to external pressure, thus preventing the leakage of residual processing liquid and/or steam mixed therewith.

[0014] According to another advantageous solution, the device also comprises a heating means interposed between the delivery means and the suction means. Said heating means, during an intermediate step between said two steps, respectively delivery and suction, heats the fabric to dry it and hence to facilitate the discharge of the residual liquid by means of the suction means; the latter not only sucks in the liquid but also further dries the fabric and cools it.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a partly sectioned lateral view of a processing plant in which a device according to the present invention is inserted to remove the residual liquid from a fabric;
- fig. 2 is a lateral view of a variant of fig. 1.;
- fig. 3 is a lateral view of a second variant of fig. 1.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0016] With reference to fig. 1, a device 10 according to the present invention is used to remove the residual liquid ammonia from a fabric 11 in a processing plant 12.

[0017] The plant 12 comprises a feed cylinder 15 from which the fabric 11 to be treated is removed, which is guided inside a water-tight processing chamber 16 where it is impregnated, in any known manner, with liquid ammonia.

[0018] The device 10 comprises a removal chamber 18 disposed adjacent to the processing chamber 16 and connected to it by means of sealing cylinders 20 which allow the treated fabric 11 to transit from the processing chamber 16 into the removal chamber 18.

[0019] The device 10 also comprises a plurality of guide cylinders 21 disposed at least partly inside the re-

removal chamber 18 and able to guide the fabric 11 towards a plurality of delivery nozzles 22 which deliver steam, advantageously superheated, onto the fabric 11 so that it is impregnated.

[0020] The guide cylinders 21 also guide the fabric 11 impregnated with steam on the lateral surface of a suction cylinder 24, disposed in this case downstream of the delivery nozzles 22.

[0021] On the lateral surface a plurality of suction pipes are made, connected by means of a tube 25 to an aspirator 26, connected in turn to an abatement tower of a known type and not shown here.

[0022] When the fabric 11 passes over the lateral surface of the suction cylinder 24, the aspirator 26 absorbs the steam wet with ammonia from the fabric 11, and conveys it towards the abatement tower.

[0023] The aspirator 26 is connected by means of another tube 28 to the internal chamber 30 of the removal chamber 18 so as to absorb the vapors inside the compartment 30 and create a slight depression, thus reducing the risk of leakage of steam and/or ammonia.

[0024] The fabric 11 is then guided outside the removal chamber 18 through a sealing diaphragm 31 and is collected by a collection cylinder 32.

[0025] According to the variant shown in fig. 2, the delivery nozzles 22 are disposed on both sides of the fabric 11 in transit, so as to improve the penetration of the steam into the fabric 11.

[0026] Moreover, in this solution, the device 10 comprises a heating cylinder 33 located between the delivery nozzles 22 and the suction cylinder 24. The function of the heating cylinder 33 is to heat and dry the fabric 11, and with it the steam mixed with the ammonia, facilitating the removal thereof by means of suction.

[0027] In the embodiment disclosed in figure 3, wherein the same or equivalent parts as those previously disclosed have the same reference numbers as those indicated in figures 1 and 2, the delivery nozzles 22 of figures 1 and 2 are not present and are substituted for by a section of the chamber 18, numbered 18a, which is filled and/or saturated with steam. In section 18a, the running fabric 11, previously impregnated with the treatment liquid, for example liquid ammonia, is treated with the steam that fills or saturates the chamber, and runs alternately upwards and downwards along a plurality of guide cylinders 21.

[0028] In the lower part of section 18a there are suction means, indicated by the arrows 35, which suck out the steam wet with the ammonia from the fabric 11 and convey it towards an abatement tower, not disclosed.

[0029] After this first treatment, the fabric 11 is subjected, in a second section of the removal chamber 18, numbered 18b, firstly to the action of two heated cylinders 33, and then to the action of the suction cylinder 24, which completes the removal of the liquid ammonia mixed with the steam.

[0030] As said above, the action of the two heated cylinders 33 has the function to heat and dry the fabric 11,

facilitating the removal of the steam mixed with the ammonia by means of suction.

[0031] In the same way as disclosed above, the fabric 11 so treated is guided outside the removal chamber 18 through a sealing diaphragm 31 and is collected by a collection cylinder 32.

[0032] It is clear that modifications and/or additions of parts may be made to the device 10 as described heretofore, without departing from the field and scope of the present invention.

[0033] For example, it may be possible to use a greater number of suction cylinders 24 and/or heating cylinders 33 in order to further improve the removal of the processing liquid.

[0034] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of devices and methods to remove residual processing liquid from a fabric, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Device to remove residual processing liquid from a fabric (11), **characterized in that** it comprises at least a chamber (18) suitable for the transit of said fabric (11), emerging from treatment with the liquid and having inside it steam for impregnating said fabric (11), and suction means (24, 26) able to suck out from said fabric (11) the steam mixed with said residual processing liquid.
2. Device as in claim 1, **characterized in that** said chamber (18) comprises delivery means (22) able to deliver steam onto said fabric (11).
3. Device as in claim 1, **characterized in that** said chamber (18) comprises at least a section (18a) filled and/or saturated with steam.
4. Device as in claim 3, **characterized in that** said section (18a) of said chamber (18) comprises its own suction means (35) for sucking out from said fabric (11) at least a part of steam mixed with said residual processing liquid.
5. Device as in claim 2, **characterized in that** said delivery means (22) is able to deliver steam onto at least one side of said fabric (11).
6. Device as in claim 2, **characterized in that** said delivery means (22) is disposed in substantial proximity with said fabric (11) in transit.
7. Device as in claim 2, **characterized in that** said de-

livery means comprises a plurality of delivery nozzles (22) connected upstream to a steam generator.

8. Device as in any claim hereinbefore, **characterized in that** said suction means comprises at least a suction cylinder (24) on the lateral surface of which said fabric (11) is able to be guided. 5
9. Device as in claim 8, **characterized in that** the lateral surface of said suction cylinder (24) comprises a plurality of pipes connected to at least a suction element (26). 10
10. Device as in any claim hereinbefore, **characterized in that** at least a heating means (33) is located between either said steam delivery means (22) or said section (18b) saturated with steam, and said suction means (24) so as to heat said fabric (11) in transit and the steam mixed with said residual processing liquid. 15 20
11. Method to remove residual processing liquid from a fabric (11), wherein said fabric (11), emerging from a treatment with a liquid, is made to transit in a chamber (18), **characterized in that** it comprises a first step in which said fabric (11), while it transits inside said chamber (18), is subjected to a jet of steam or is made to pass in a chamber (18a) filled and/or saturated with steam, and a second step in which the steam mixed with said residual processing liquid is sucked out from said fabric (11). 25 30
12. Method a in claim 11, **characterized in that** it also comprises an intermediate step, performed between said first step and said second step, during which said fabric (11) is subjected to selective heating. 35

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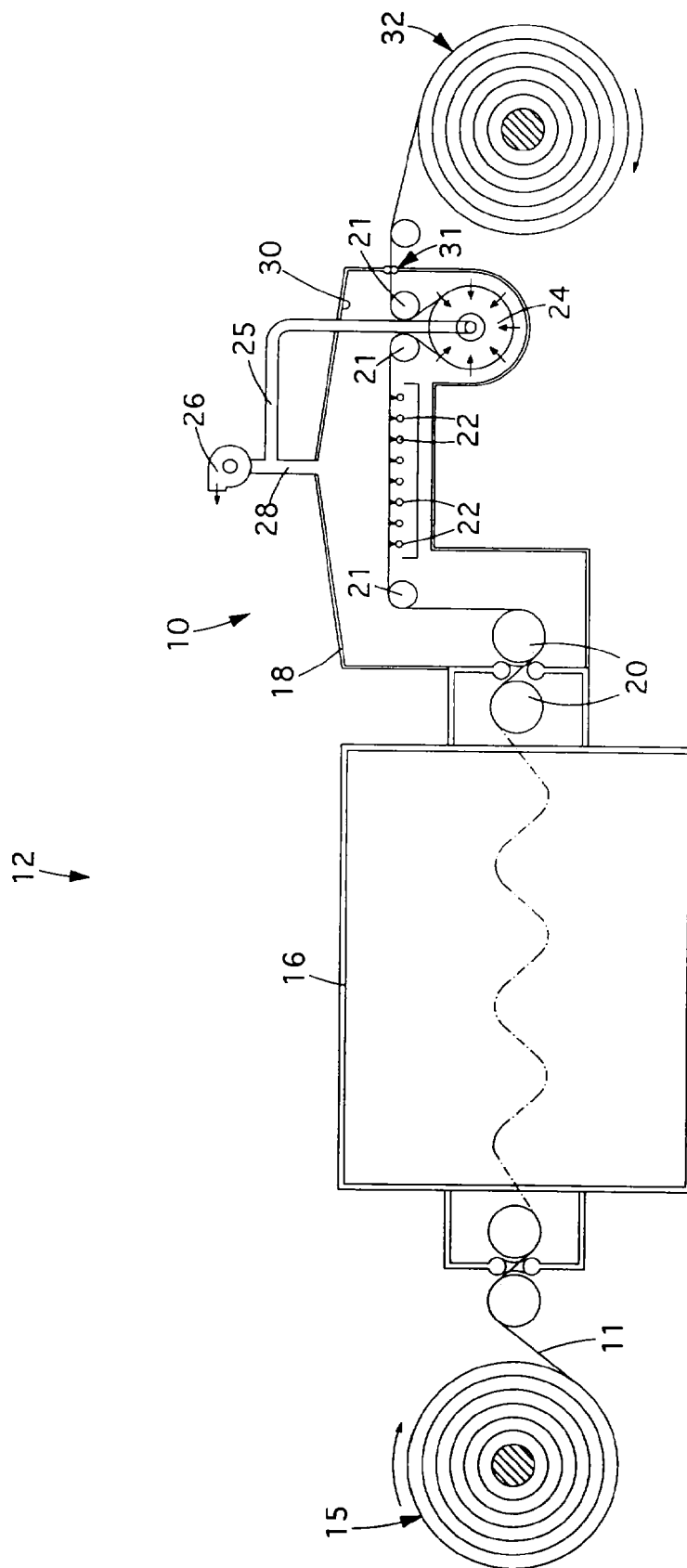


fig. 1

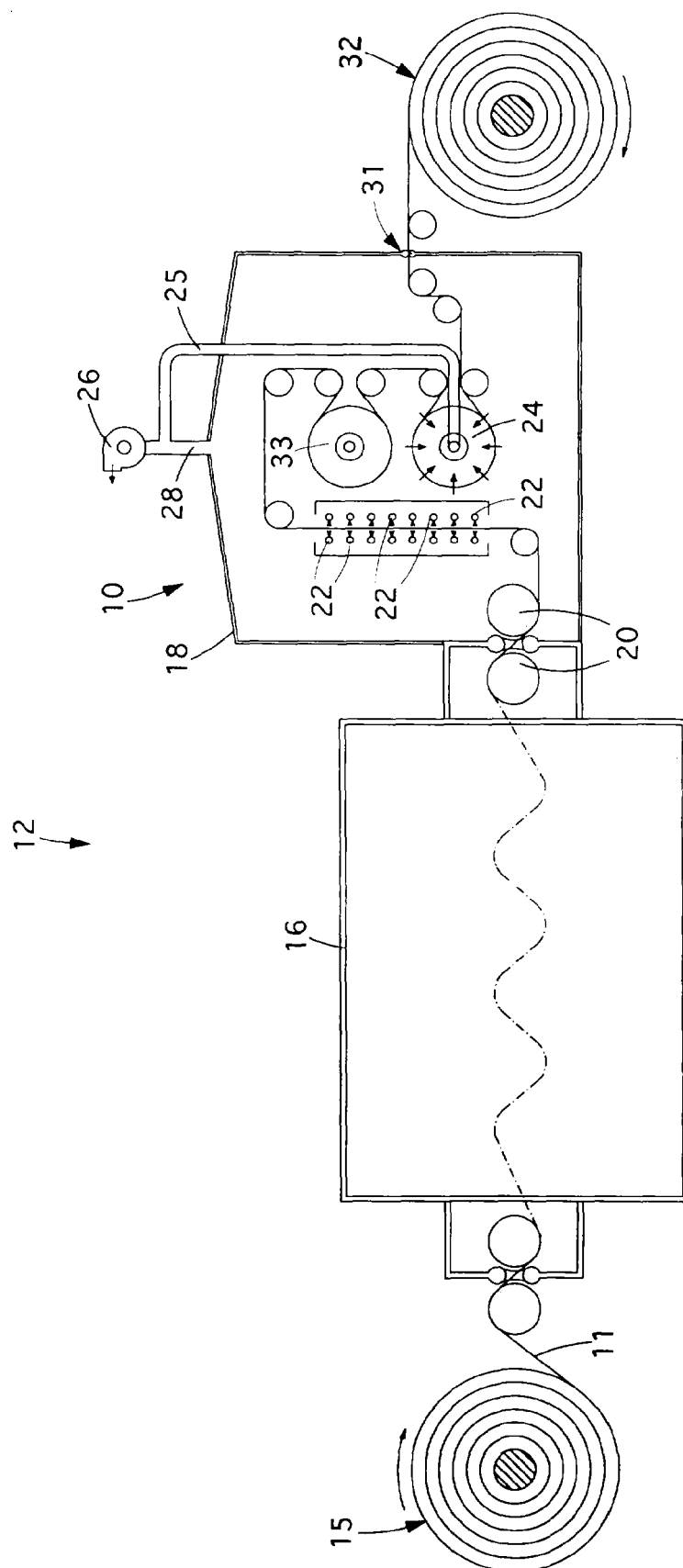


fig. 2

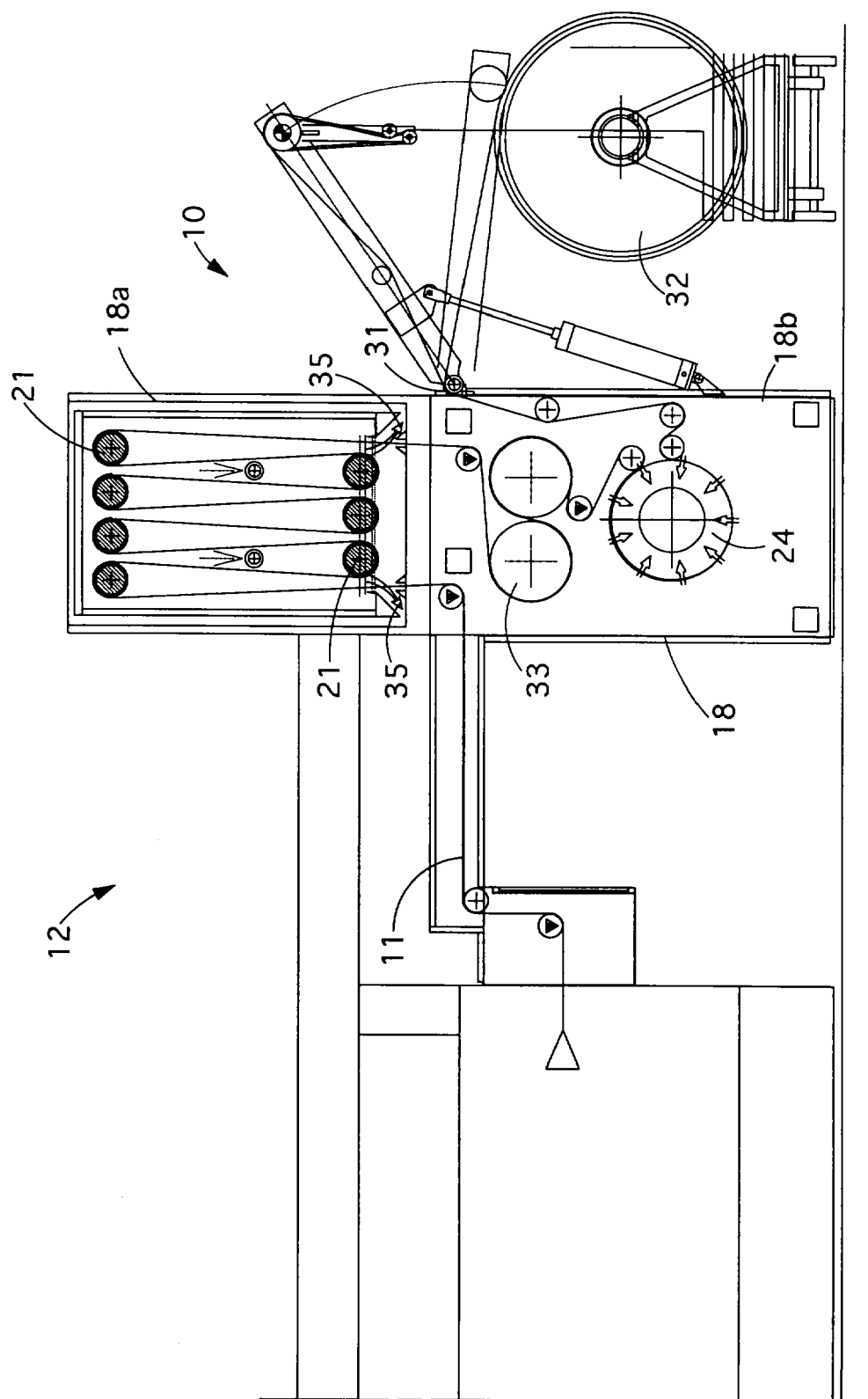


fig. 3