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(54) Apparatus and method for drying/finishing garments

(57) In a first aspect, the present invention provides an apparatus for drying and/or finishing garments, the apparatus including monitoring means for monitoring at least one characteristic of each garment and speed adjustment means which, in use, are usable to adjust the speed at which the garments move through a drying/finishing chamber to a speed determined according to the at least one characteristic.

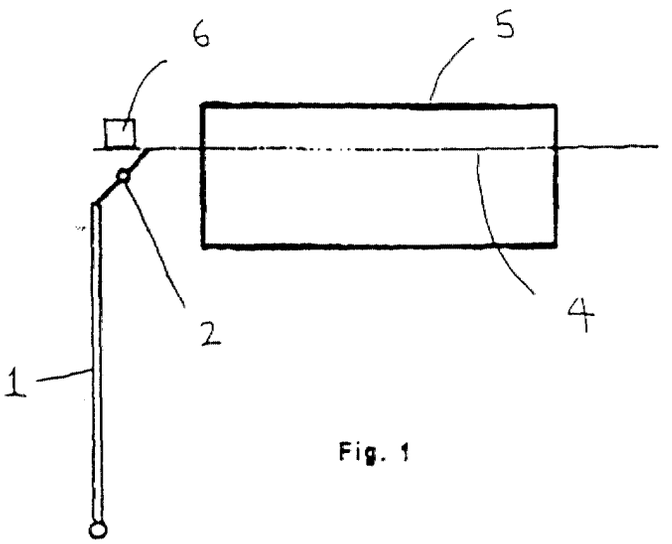

Fig. 1

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Description

[0001] This invention relates to a method and apparatus for drying and/or finishing garments. In particular, this invention relates to an apparatus and method for drying and/or finishing garments on an industrial scale where large numbers and types of garments must be dried and/or finished

[0002] At present, in order to dry garments on an industrial scale, the garments are conveyed through a drying chamber. The speed of the garment conveyer is set in advance by an operator who assesses the number of garments and selects an appropriate speed.

[0003] However, this is not ideal as selection of the speed of the conveyor does not take into account the fact that the garments may be of a mixed garment construction and/or fabric type and/or weight. Thus, clothes containing little fluid will remain in the chamber for longer than necessary and garments containing large volumes of fluid will not remain in the chamber for a sufficient length of time and may exit the chamber not sufficiently dry or finished.

[0004] The present invention aims to ameliorate the problems associated with the prior art.

[0005] Accordingly, in a first aspect, the present invention provides an apparatus for drying and/or finishing garments, the apparatus including monitoring means for monitoring at least one characteristic of each garment and speed adjustment means which, in use, are usable to adjust the speed at which the garments move through a drying/finishing chamber to a speed determined according to the at least one characteristic.

[0006] In a preferred embodiment, the apparatus further includes sorting means for sorting the garments according to the at least one characteristic such that the garments are divided according to the at least one monitored characteristic.

[0007] In a particularly preferred embodiment, the apparatus further includes a plurality of conveying means for conveying garments at a speed adjustable by the speed adjustment means independently to a speed determined according to the at least one characteristic.

[0008] In another particularly preferred embodiment, the apparatus includes a drying and/or finishing chamber, a plurality of conveying means for conveying garments through the chamber, monitoring means for monitoring at least one characteristic of each garment prior to entry of each garment into the chamber and sorting means for sorting the garments according to the at least one characteristic prior to entry of each garment into the chamber such that the garments are divided between the plurality of conveying means according to the at least one monitored characteristic, and speed adjustment means for adjusting the speed of each respective conveying means independently to a speed determined according to the at least one characteristic.

[0009] This preferred embodiment allows garments to be segregated and divided between the conveying means such that each respective conveying means preferably carries garments having substantially the same monitored characteristic(s). The monitored characteristic(s) determine the speed of each respective conveying means, for example, high weight measurements indicating high fluid content and therefore determining a slow conveying means speed. This has the advantage that the time that each garment spends inside the drying and/or finishing chamber more accurately reflects to required time in order to achieve effective drying and/or finishing.

[0010] In an alternative preferred embodiment, the apparatus includes a drying and/or finishing chamber, monitoring means for monitoring at least one characteristic of each garment prior to entry of each garment into the chamber, conveying means for conveying garments through the chamber, and speed adjustment means for substantially continuously varying the speed of the conveying means according to the monitored at least one characteristic.

[0011] This preferred embodiment allows for continuous variation of the speed of the conveying means through the chamber such that the time that each garment spends inside the drying and/or finishing chamber more accurately reflects to required time in order to achieve effective drying and/or finishing. In the prior art, the time that each garment spends inside the chamber is determined by an average value of the monitored characteristic that determines the speed of the conveying means in advance without continuous variation of the speed being possible and thus not allowing for the mixture of different characteristics.

[0012] In a second aspect, the invention provides a method for drying and/or finishing garments including:

1) monitoring at least one characteristic of each garment; and
2) conveying the garments through a drying/finishing chamber at a speed determined according to the at least one characteristic.

[0013] In a preferred embodiment, the method includes :

1) monitoring at least one characteristic of each garment;
2) sorting the garments according to the at least one characteristic;
3) dividing the garments between a plurality of conveying means according to the monitored at least one characteristic;
4) conveying the garments through a drying/finishing chamber(s); and
5) adjusting the speed of each respective conveying means moving, determined according to the at least one characteristic.

[0014] In another preferred embodiment, the method

includes:

1) monitoring at least one characteristic of each garment; and
2) conveying the garments through a drying/finishing chamber, the conveying means moving at a substantially continuously varying speed determined according to the at least one characteristic.

[0015] In preferred embodiments the monitoring means measures the weight of each garment prior to entry of the garment into the drying and/or finishing chamber. The weight of the garment will give an indication of the water or other cleaning fluid contained by the garment i.e. heavy garments will contain large amounts of water or drying fluid whereas lighter garments will contain less fluid.

[0016] Preferably, the monitoring means includes a load cell for measuring the weight of each, individual garment.

[0017] In an alternative embodiment, the monitoring means monitors the garment construction and/or type of fabric of the garments. Different fabrics absorb different amounts of fluid and thus a measurement of the fabric type and/or garment construction will give an indication of the amount of water or other cleaning fluid present in the garment.

[0018] Preferably, in embodiments where the garment construction and/or fabric type is monitored by the measuring means, (although this principle could be applied to other embodiments) each garment is provided with an identifier containing information about garment construction and/or fabric type. For example, the identifier may be a bar code, transponder or electronic tag which can be attached to each garment or a hanger carrying the garment at any stage of the cleaning process prior to the garment reaching the monitoring stage. In preferred embodiments, the identifier is attached to each garment and then the information gained from the identifier is stored in a transponder on the hanger (called a "mother hanger") carrying the garment.

[0019] In yet a further embodiment, the monitoring means monitors the nature of the garment, for example whether the garment is a dress, skirt, shirt, etc. Again, this information can be determined by the monitoring means by use of identifiers such as bar codes, transponders or electronic tags attached to each garment.

[0020] The monitoring means may be positioned at any point in the cleaning process prior to the drying and/or finishing step. However, in the case where the monitored characteristic is weight, this monitoring step preferably occurs after the contact of the garment with the water or other cleaning fluid. The at least one characteristic may be monitored at more than one point in the process.

[0021] In embodiments having sorting means, the sorting means is preferably provided at a point after the monitoring means in the cleaning process. The sorting means preferably sorts the garments according to the characteristic(s) monitored by the monitoring means.

[0022] Preferably, the sorting means includes a switch gate which assigns each garment to one of a plurality of conveying means such that all garments with substantially the same monitored characteristic are assigned to the same conveying means.

[0023] In preferred embodiments, the conveying means convey the garments into and through the drying and/or finishing chamber. Each conveying means can move at a speed selected independently from the other conveying means.

[0024] The speed of each respective conveying means is preferably determined by the characteristic monitored by the monitoring means. For example, heavy garments, containing substantial amounts of water or other cleaning fluid will be conveyed on conveying means moving at a speed sufficiently slow that the garments are adequately dried/finished on exit from the drying and/or finishing chamber. Lighter garments, containing lower amounts of water or other cleaning fluid will be conveyed by conveying means moving at a faster speed as these garments will require less time within the drying and/or finishing chamber in order to be dried/finished.

[0025] The monitored at least one characteristic may also be used to determine other conditions in the drying and/or finishing chamber. For example, the monitored characteristic could be used to determine the process speed, the temperature and the air flow inside the chamber.

[0026] In preferred embodiments, the conveying means carry garments at an angle of 30 to 60°C , more preferably 40 to 50° and most preferably at 45° to the direction of movement of the conveying means.

[0027] Advantageous embodiments of the invention are described below with reference to the schematic drawings in which:

Figure 1 shows a first embodiment of the invention for drying and/or finishing garments.

Figure 2 shows a second embodiment of the invention for drying and/or finishing garments.

Figure 3 shows a third embodiment of the invention for drying and/or finishing garments.

[0028] The embodiment shown in Figure 1 includes a feed conveyor, 1, onto which all garments are loaded subsequent to cleaning of the garments using water or another cleaning fluid. After, cleaning has occurred, the garments on the feed conveyor proceed to the monitoring means, 2. The monitoring means measures the weight of each garment. The garments are carried to the drying and/or finishing chamber on conveying means,4. The conveying means,4, then convey the garments through the chamber,5, at a speed which is continuously

adjusted by the speed adjustment means, 6, according to the weight value monitored by the monitoring means, 2.

[0029] As each garment enters the chamber, or at any other suitable time, the speed of the conveyor is adjusted according to the value of the previously monitored characteristic.

[0030] By continuously varying the speed of the conveying means through the chamber, it is possible to enclose each garment inside the drying and/or finishing chamber for the optimum period of time so that each garment exits the chamber perfectly dried and/or finished.

[0031] The embodiment shown in Figure 2 includes a feed conveyor, 1, onto which all garments are loaded subsequent to cleaning of the garments using water and/or another cleaning fluid. After, cleaning has occurred, the garments on the feed. conveyor proceed to the monitoring means, 2. The monitoring means measures the weight (or other appropriate property) of each garment and then the sorting means, 3, assigns each garment to one of two conveying means, 4a, 4b, which convey the garments into and through the drying and/or finishing chamber, 5.

[0032] The sorting means 3, assigns each garment to one of two conveying means, 4a, 4b, according e.g. to the weight measured by the monitoring means. For example, all garments above a predetermined weight will be assigned to one conveyor, e.g. 4a, and all garments below the predetermined weight: will be assigned to the other conveying means, 4b. Thus, on entry into the drying and/or finishing chamber, the garments will be divided into two streams, in this example a stream consisting of heavy garments and a stream consisting of lighter garments.

[0033] The conveying means, 4a, conveying the heavy garments will move through the chamber at a slower speed than the conveying means,4b, conveying the lighter garments.

[0034] The average value of the weight of each stream of garments detected by the monitoring means will determine the exact speed of each respective conveying means. The higher the average weight of the heavy garments, the more slowly the conveying means conveying the heavy garments will move. Similarly, the more quickly the conveying means conveying the lighter garments will move.

[0035] The third embodiment as shown in Figure 3, includes two points at which for example the fabric type and construction of each garment is monitored. The fabric type and construction of each garment is stored as a bar code on each garment and is monitored by the monitoring means, 2a.

[0036] The garments are then sorted by the sorting means, 3 which assigns each garment to one of two feed conveyors, 1, depending on the fabric type and construction of each garment. The garments are cleaned (apparatus not shown in Figure 3). The garments then proceed to the second monitoring means, 2b, where the fabric type and construction of each garment is again monitored in order to allow the speed adjusting means , 6, to select the speed of each conveying means independently according to the fabric type and construction of the garments on each respective conveying means.

[0037] The thicker the fabric and/or higher the cotton content, then the more cleaning fluid will have been absorbed and the garments will preferably remain in the drying and/or finishing chamber for a longer period of time. This is achieved by using a slow conveying means speed through the chamber. The garments having thinner fabric and/or a lower cotton content will absorb less water or other drying fluid and will therefore require a shorter period inside the drying and/or finishing chamber. This is achieved by using a faster conveying means speed.

[0038] These embodiments are merely given by way of example and the invention is not limited to the apparatus shown in the Figures.

Claims

1. An apparatus for drying and/or finishing garments, **characterised in that**, the apparatus includes monitoring means (2) for monitoring at least one characteristic of each garment and speed adjustment means (6) which, in use, are usable to adjust the speed at which the garments move through a drying/finishing chamber (5) to a speed determined according to the at least one characteristic.

2. An apparatus according to claim 1 including sorting means for sorting the garments according to the at least one characteristic such that the garments are divided according to the at least one monitored characteristic.

3. An apparatus according to claim 1 or claim 2 including a plurality of conveying means for conveying garments at a speed adjustable by the speed adjustment means independently to a speed determined according to the at least one characteristic.

4. An apparatus according to any one of claims 1 to 3, wherein the speed adjustment means is usable for substantially continuously varying the speed of the conveying means according to the monitored at least one characteristic.

5. A method for drying and/or finishing garments including:

   1) monitoring at least one characteristic of each garment; and
   2) conveying the garments through a drying/finishing chamber (5) at a speed determined ac-

cording to the at least one characteristic.

6. A method according to claim 5 including:

3) sorting the garments according to the at least one characteristic;
4) dividing the garments between a plurality of conveying means according to the monitored at least one characteristic;
5) adjusting the speed of each respective conveying means moving, determined according to the at least one characteristic.

7. A method according to claim 5 wherein the step of conveying is done at a substantially continuously varying speed determined according to the at least one characteristic.

8. A method according to any one of claims 5 to 7 wherein the monitoring means measures the weight of each garment prior to entry of the garment into the drying and/or finishing chamber.

9. A method according to any one of claims 5 to 7 wherein the monitoring means monitors the garment construction and/or type of fabric of the garments.

10. A method according to claim 9 wherein each garment is provided with an identifier containing information about garment construction and/or fabric type.

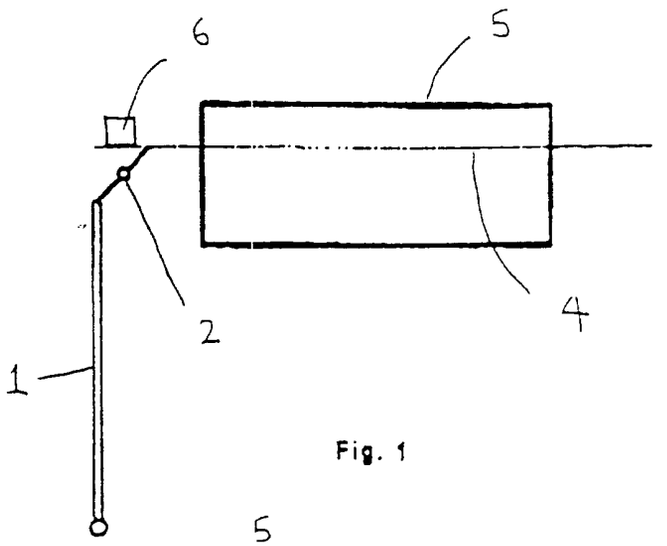

Fig. 1

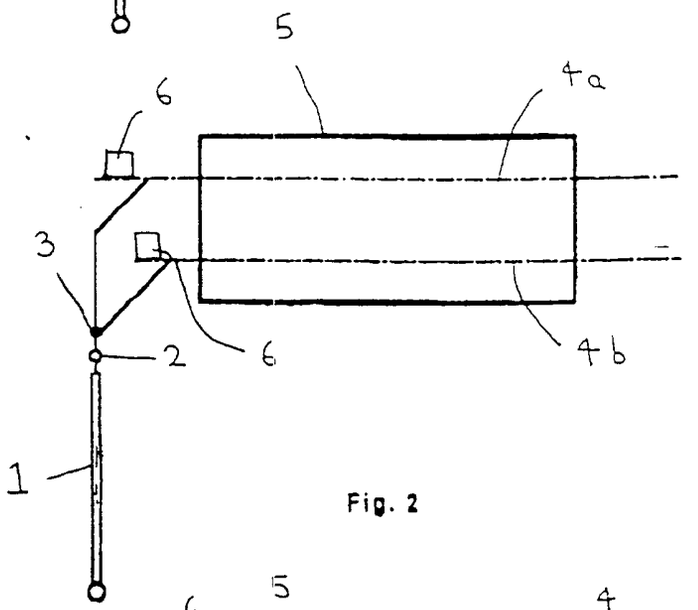

Fig. 2

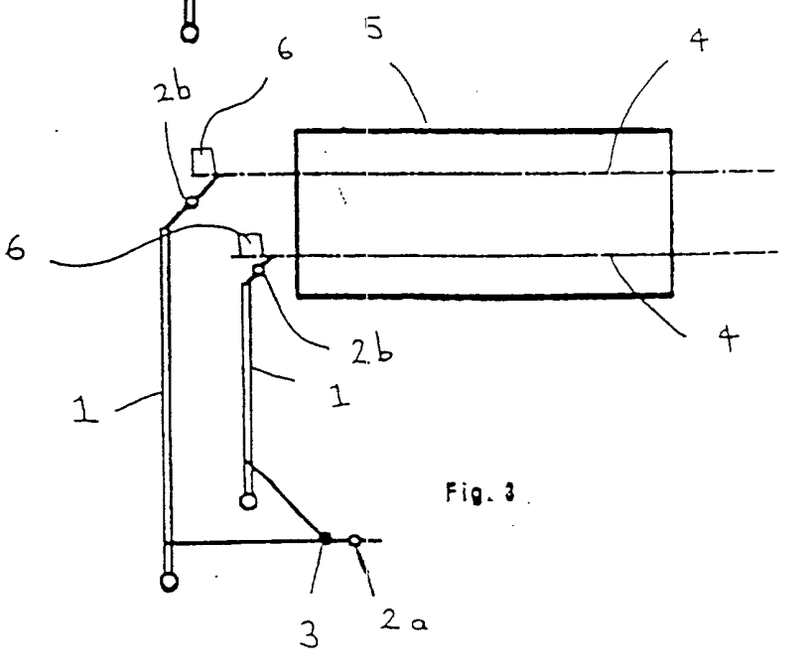

Fig. 3