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(54) **Laundry sorting apparatus**

(57) A laundry prewash sorting apparatus comprising

- a plurality of compartments, said compartments configured to hold textile articles;
- an aperture to deposite textile articles into the apparatus;
- sorting means configured to sort the deposited articles into one of the compartments, said articles provided with an identifier holding article parameters;

whereby the apparatus comprises a sensor configured to read said identifier, and the sorting means sorts the deposited articles based on article parameters read by the sensor.

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Description

[0001] The present invention relates to the field of laundry appliances, in particular to a laundry prewash sorting apparatus.

[0002] Consumer households are generally increasing in complexity as the number of household articles, appliances and size of households increase. Managing this complexity may cost more time than desired and there is an increasing need for a smart apparatus. One tedious task is sorting laundry prior to the cleaning process. Errors may lead to undesirable results such as the proverbial red sock among a white wash load. Therefore, it is desirable to provide a laundry prewash sorting apparatus. Prewash is intended to mean that the laundry articles are in need of treatment, whereby treatment is as defined below but is preferably a cleaning process.

[0003] Surprisingly, laundry apparatus is provided according to claim 1 that overcomes one or more of the drawbacks mentioned above.

[0004] These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilised in any other aspect of the invention. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. Other than in the experimental examples, or where otherwise indicated, all numbers expressing frequencies or conditions used herein are to be understood as modified in all instances by the term "about". Where the term "comprising" is used in the specification or claims, it is not intended to exclude any terms, steps or features not specifically recited. All documents cited are in relevant part, incorporated herein by reference.

Detailed description of the invention

[0005] The term "textile article" as used herein is typically a garment but may include any textile article such carpets, rugs, upholstery, curtains, linen. Textile articles include - but are not limited to - those made from the following fibre types: natural fibres such as cotton, wool, linen, hemp, silk and man made fibres such as nylon, viscose, acetate, polyester, polyamide, polypropylene elastomer, natural or synthetic leather, natural or synthetic fur and mixtures thereof. To avoid any confusion when the term "fibre type" is used in the singular, it is also intended to encompass mixtures of different fibre types. Thus, the fibre type of a textile article may be 60% polyester and 40% cotton.

[0006] The "article parameter" is intended to mean any parameter useful to optimise the treatment of the textile article including - but not limited to - at least one of the group consisting of fibre type, colour, history of treatment (e.g. number of washes), dye type and mix-

tures thereof. Preferably,

[0007] The term "treatment parameter" as used herein is intended to mean any parameter used to optimise a treatment to obtain an optimal treatment result. The treatment parameter comprises at least one of the group selected from the treatment type, amount and type of treatment agent, treatment temperature and treatment period.

[0008] The treatment may be any process suitable for cleaning, conditioning, drying, ironing sorting, or otherwise maintaining or enhancing the appearance, function or condition of the textile article, provided that in least some cases it is useful to sort the textile articles because different textile articles may need different treatment parameters to obtain an optimal result. The treatment includes but is not limited to pretreating, cleaning, conditioning, drying, de-wrinkling, perfuming, ironing, storing and mixtures thereof. Cleaning includes aqueous wash processes but also dry cleaning processes. Conditioning may include any treatment not principally intended for cleaning such as softening or refreshing.

[0009] The laundry prewash sorting apparatus according to one aspect of the invention comprises

- a plurality of compartments, said compartments configured to hold textile articles;
- an aperture to deposit textile articles into the apparatus;
- sorting means configured to sort the deposited articles into one of the compartments, said articles provided with an identifier holding article parameters;

whereby the apparatus comprises a sensor configured to read said identifier, and the sorting means sorts the deposited articles based on article parameters read by the sensor.

[0010] The sorting apparatus comprises a plurality of compartments, preferably at least two, more preferably at least three. For convenience the compartments may be coded by any symbol useful for distinguishing said compartments such as a pictogram, colour, name or mixtures thereof. The compartments may be of the same size or of a different size or of an adjustable size. Any size useful for the present purpose may be chosen. Preferably, each compartment can hold up to 5 kg of textile articles. Smaller sizes may also be chosen for smaller households. The compartments may configured to be removable from the apparatus. In one embodiment a compartment may have the form of a removable drum of a washing machine configured to use a removable drum. Each compartment may be provided with an identifier. For example, when a compartment is a removable drum, the drum is preferably provided with an identifier and the washing machine is provided with a sensor configured to identify said identifier. In one embodiment, the compartment identifier may communicate information to the sensor to choose the optimal wash programme for

the textile article in said compartment. For example, all white cotton textile articles may be sorted into one removable drum whereby the removable drum is provided with an identifier whereby the identifier communicates to the sensor to use bleach and a temperature of 60°C or higher.

[0011] The identifier, for example, might comprise any combination of bar codes, radio frequency identification tags, data, chips, smart cards and the like whereby the sensor is configure to read said identifier. The sensor is preferably a wireless sensor. Wireless is intended to mean that the sensor can read the data from the identifier without physical contact. The identifier and sensor are preferably part of a passive, inductive magnetically-coupled radio frequency identification (RF ID) system. RF ID sensors are a preferred example of wireless sensors. The identifiers are located on the object to be identified and hold the article parameters. The identifiers comprise an electronic circuit like a microchip and an antenna (coupling element). The identifiers are small sophisticated radio transmitters and receivers. When the identifier which usually does not possess its own voltage supply, is not within the interrogation zone of a sensor it is passive. The identifier is only activated when it is within the interrogation zone of a sensor. They are powered by the RF field generated by the sensor. Upon being powered up, the identifier will continuously transmit, by damping the incoming RF power field, its data. A RF ID sensor typically comprises a radio frequency module (transmitter and receiver), a control unit and an antenna (coupling element) to the identifier. RF ID sensor has the following main functions: energising, demodulating and decoding the data on the identifier such as the article parameters and unique identification code. The sensor, using the antenna - also be referred to as a tuned antenna-capacitor circuit - emits a radio wave field. This is used to power up the identifiers. The information sent by the identifier must be demodulated. The encoded information may be decoded by the sensor's control unit. Such a control unit may also be part of a control centre. This information can then be used by a controlling processor. In both the sensor and the identifier, the antenna can be shaped and sized in different ways.

[0012] The sensor is preferably a wireless non-sequential sensor. A wireless non-sequential sensor is configured to identify multiple textile articles simultaneously, for example multiple textile articles placed simultaneously into the apparatus, each textile article being provided with an identifier, said identifier holding article parameters. For the present purpose simultaneously is intended to mean that a bundle of at least 2 textile articles can be placed into the apparatus together and identified. Identification is intended to mean that the sensor is able to read data stored on the identifier. Such a non-sequential sensor is preferably a radio frequency scanning device configured to operate at 13.56 MHz. Her frequencies may be used provided that the frequency is useful in the current application without disturbing other appliances. The non-sequential sensor preferably comprises an antenna incorporated into the circumference of the opening of the apparatus. The identifier is preferably configured to allow adding and/or deleting information stored on the identifier. This may be done a separate writer configured to add or delete information stored on the identifier. The writer may also be incorporated in the sensor.

[0013] The textile article is provided with an identifier, said identifier holding article parameters. The identifier is preferably configured to be read by the sensor and is preferably a radio frequency transponder configured for use at 13.56 MHz. The non-sequential sensor is preferably configured to read said identifier.

[0014] The aperture of the sorting apparatus is preferably closable with for example a lid and the aperture is usually large enough to let most textile articles pass for a convenient use. The size of the aperture may depend on the use of the apparatus. For a normal domestic use the aperture may between 0.1 m^2 and 1 m^2. The aperture may have any form such as circular or rectangular as long as it does not damage the textile articles placed into it.

[0015] The identifier preferably holds one or more article parameters such as the unique identification code, fibre type, dye type, colour, wash history and other parameters useful in the invention. In another embodiment the identifier holds the unique identification code of said article and the article parameters of said article are in an article parameter database wherein the article parameters are coupled to the unique identification code. The wash history of an article may be added either to the identifier or a database coupling the unique identification code to article parameters.

[0016] The sorting means may be any means suitable for sorting the textile articles into one of the compartments based on article parameters read by the sensor without damaging the articles. A preferred sorting means is a shoot. In one preferred embodiment, the sorting means sorts the deposited articles based the article parameters comprising at least the fibre type and the colour of said article. More preferably, the article parameters comprise at least the fibre type, dye type and the colour of said article. Preferably, the sorting means sorts the deposited articles into a plurality of groups, preferably at least two, more preferably at least three selected from the groups comprising for example "delicate", "cold colour", "hot white", hand wash and dry cleaning. "Delicate" may be the group textile articles which should be washed in a gentle wash cycle at a low temperature, minimising or avoiding aggressive treatment agents. Textile articles in this group are for example those identified by the sensor with article parameters such as wool or silk.

"Cold colour" is the group textile articles to be washed at about 40°C without bleach. Textile articles in this group are for example those identified by the sensor with

article parameters such as coloured cotton, polyester, and nylon.

"Hot white" is the group textile articles to be washed at about 60°C or higher with bleach effective amounts of bleach. Textile articles in this group are for example those identified by the sensor with article parameters such as white cotton. It is understood that these groups are only non-limiting examples. Other groups may be defined for example by the user. Another group may be textile articles that can only be dry-cleaned or washed by hand. Preferably, the number of compartments is equal to the number of groups the textile articles are sorted into.

[0017] In one embodiment, the sorting apparatus may be in communication with a control centre. Data from the sensor may then be communicated to the control centre. The control centre may be part of the sorting apparatus or separate from the sorting apparatus. Preferably, the control centre is an microprocessor comprising a set of executable instructions such as in the form of software, routines, programs, algorithms, code, logic and the like, which would, inter alia, facilitate the control of and communication between the different components. The control centre is preferably configured to process said article parameters into executable instructions to operate the sorting means for sorting the deposited articles into one of the compartments. The control centre is may be configured to compile an article list whereby said list comprises the thus identified textile articles and said article parameters.

[0018] According to one embodiment, the sorting apparatus comprises treatment means for treating the textile articles in said apparatus. The treatment may be any treatment useful to ameliorate or avoid undesirable effects. For example treatment means may comprise ventilation means for ventilating of one or more compartments, a dosing device for dosing a treatment agent, heating means for heating one or more compartments. Each compartment may have no, one or more treatment means which may be the same or different. For example, to avoid malodour a preferred treatment means is a dosing device and preferably the treatment agent is selected from fragrance, malodour control agent, odour neutraliser, preservative, biocidal compound and mixtures thereof.

[0019] According to one embodiment or more compartments are provided with a dosing device configured to dose at least one treatment agent or when more than one treatment agent is used select and dose the at least one treatment agent. The dosing device may be part of the compartment or a separate device connected to the compartment such that the treatment agent may be dosed. The dosing device may be a simple container which may be operated manually by the user. In a preferred embodiment, the compartment comprises a compartment sensor configured to sense the treatment result or the treatment agent. For example, the sensor may be a humidity sensor or a sensor to sense the level of a fragrance or malodour. The compartment sensor may be directly linked to the dosing device such that the information of the compartment sensor is directly fed back to the dosing device to optimise the treatment result.

[0020] In another embodiment, the compartment sensor is configured to communicate the sensed information to a control centre and the control centre is configured to optimise the treatment result. The treatment result may be the dryness of the textile article, the avoidance of bad smell, the level of a fragrance, malodour control agent, odour neutraliser and mixtures thereof.

[0021] The control centre may be in communication with a user interface. The user may then request a certain treatment result. The term "user interface" as used herein is intended to mean any interface useful to allow communication between the control centre and the user such as a computer, a personal digital assistant (PDA), a device with wireless application protocol programs (WAP) such as cell phone, auto computer or PDA, interactive TV, or an Internet appliance, or the like. User interface allows the user to interact with the control centre and, as will be understood, can take any of a virtually unlimited number of alternative and/or audio, visual and/or other communicative forms. In an exemplary embodiment, the user interface may comprise a computer system comprising a CPU, memory, a visual display device and an input means. In other cases the CPU functionality may reside in the control centre and the user interface may comprise a visual and/or auditive display and input means. Preferred input means comprise a keyboard or mouse or other means of input such as speech recognition, touch screen and/or visual input utilising a video camera.

[0022] The communication between the control centre and the different components or between the different components may be via communication means known in the art such as via a token ring, Ethernet, telephone modem connection, radio or microwave connection, parallel cables, serial cables, telephone lines, universal serial bus "USB", Firewire, Bluetooth, fiber optics, infrared "IR", radio frequency "RF" and the like, or combinations thereof.

[0023] A control centre may also be in communication with a knowledge system. The control centre may communicate the article list to a knowledge system via suitable communication means. In one preferred embodiment, the method further comprises the step of optimising the treatment and sorting of the textile articles in the apparatus based on the article list from the control centre and treatment rules from a knowledge system said knowledge system being configured to calculate treatment and sorting rules for obtaining optimal treatment and sorting results based on information retrieved from a treatment experience database said database comprising treatment parameters, article parameters and treatment results. The treatment experience database may comprise a historical part containing historical gen-

eral treatment results for given combination of treatment parameters and article parameters generated in laboratories. The treatment experience database may in addition comprise an actual part containing actual treatment results from recent treatments at consumers. The knowledge system is preferably configured to calculate treatment rules for obtaining optimal treatment and/or sorting results. There can be a number of ways to determine optimal treatment results for example by using algorithms. The algorithms would preferably comprise potential combinations of treatment parameters which have been designed with the system's intended application in mind, so that appropriate optimised operating conditions can be established that pertain to textile articles. Any conflicts or recommendations in the treatment programme may be communicated to the user via a user interface.

[0024] Via a suitable communication means, the knowledge system may communicate the treatment rules for a specific textile article or a set of textile articles to treatment programme interpreter which is configured to process the treatment rules into an optimal treatment programme said programme comprising a set of executable instructions. Programme interpreter sends the treatment programme to control centre which uses said programme to instruct treatment means and/or the sorting means. For a dosing device the instructions may be to dose a certain treatment agent at a particular time. The treatment programme interpreter may be part of the control centre of separate from the control centre.

[0025] In one aspect of the invention, the control centre is configured to communicate with a remote server via a suitable communication link such as internet. The knowledge system, treatment experience database and programme interpreter may be stored locally or at a remote server accessible via a suitable communication link such as internet. Either way, the knowledge system treatment experience database and programme interpreter may be updated from a remote server via suitable communication link.

[0026] The control centre may also be in communication with a washing machine. In one embodiment, one or more of the compartments holding on or more identified textile articles in the sorting apparatus may be placed directly into a washing machine configured to hold such a compartment. Said compartment may be a rotatable drum. Then the control centre alone or in combination with a knowledge system, treatment experience database and programme interpreter may optimise the treatment in the washing machine by communicating executable instructions to the washing machine to obtain optimal treatment results for the one or more identified textile articles in the compartment.

[0027] The dosing device may keep track of the inventory of the dosing device so the user may be warned in time via a user interface to order or add treatment agent. This can be done by summing up the used treatment agent over time knowing the starting amount. In

the alternative the dosing device may be provided with a weight or level indicator.

[0028] To avoid wet clothes deposited into the sorting apparatus to develop a bad smell, the treatment means may be a ventilation means and/or a heating means. This would help to keep the textile articles dry. According to one embodiment one or more compartment may comprise a sensor for sensing the humidity.

[0029] According to one embodiment, multiple articles may be placed into the apparatus and identified/read simultaneously by the sensor. For the present purpose simultaneously is intended to mean that a bundle of at least 2 textile articles can be placed into the apparatus together and identified.

Claims

1. A laundry prewash sorting apparatus comprising

    - a plurality of compartments, said compartments configured to hold textile articles;
    - an aperture to deposit textile articles into the apparatus;
    - sorting means configured to sort the deposited articles into one of the compartments, said articles provided with an identifier holding article parameters;

   whereby the apparatus comprises a sensor configured to read said identifier, and the sorting means sorts the deposited articles based on article parameters read by the sensor.

2. A laundry prewash sorting apparatus according to claim 1 whereby the sorting means sorts the deposited articles based the article parameters comprising at least the fibre type and the colour of said article.

3. A laundry prewash sorting apparatus according to claim 1 whereby the sorting means sorts the deposited articles into a plurality of groups, preferably at least two, more preferably at least three selected from the groups comprising "delicate", "cold colour", "hot white", hand wash and dry cleaning

4. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the apparatus comprises at least two compartments.

5. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the apparatus comprises a dosing means for dosing a treatment agent.

6. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the appa-

ratus comprises ventilation means for ventilation.

7. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the apparatus comprises heating means for heating at least part of the apparatus.

8. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the sensor is a non-sequential sensor.

9. A laundry prewash sorting apparatus according claim 8 wherein the non-sequential sensor is configured for use at 13.56 MHz.

10. A laundry prewash sorting apparatus according to any one of the preceding claims whereby the circumference of the aperture comprises the antenna of the non-sequential sensor.

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 02 08 0333

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)
X	DE 299 22 555 U (LAVATEC AG.) 31 August 2000 (2000-08-31)	1,4	D06F93/00
A	* page 8, line 5 - line 18; claim 1; figure 1 *	2,3	
A	EP 0 589 821 A (DANSK VASKERI TEKNIK) 30 March 1994 (1994-03-30) * page 1, line 1 - line 35 * * page 2, line 14 - line 41; figure 1 *	1-3,8-10	
A	GB 2 293 807 A (MARTIN KANNEGIESSER) 10 April 1996 (1996-04-10) * page 6, line 7 - line 12; claims; figures *	1-4	
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A	DE 197 49 702 A (L. KÜHNE) 29 April 1999 (1999-04-29) * abstract *	1,8-10	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D06F

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 April 2003	COURRIER, G

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

EPO FORM 1503 03.82 (P04C01)

European Patent
Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-4, 8-10

European Patent **Office**	**LACK OF UNITY OF INVENTION** **SHEET B**	**Application Number** EP 02 08 0333

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4,8-10

   Laundry apparatus with sorting means

2. Claim : 5

   Laundry sorting apparatus with means for dosing a treatment agent

3. Claim : 6

   Laundry sorting apparatus with ventilation means

4. Claim : 7

   Laundry sorting apparatus with heating means.

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 02 08 0333

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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24-04-2003

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