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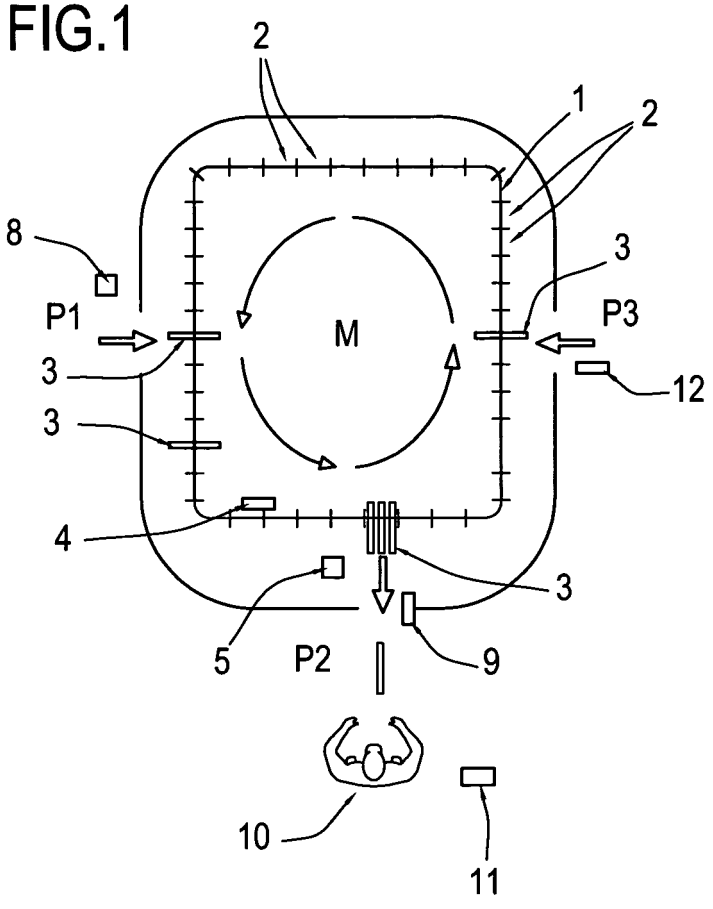
(54) **Device for the automatic return of clothing items**

(57) A device for the automatic return of clothing items (3) comprises a first door (P1) for hooking up items (3) on the belt conveyor (1), a second door (P2) for giving back items (3) to a user which are hooked up in the associated section (2), a motorization (M) for driving the belt conveyor, a processing unit (U) interfaced with a reader (8) and said motorization (M).

FIG.1



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Description

[0001] The object of the present invention is a device for the automatic return of clothing items.

[0002] Systems are known at present which comprise a belt conveyor on which clothing items are hooked up. The belt conveyor is subdivided into sections each of which being associated with a user, and each item is identified by an RFID chip.

[0003] In operation, the items are inserted on the belt conveyor by an operator who read them by means of an RFID reader in correspondence of a hooking door, and are collected afterwards by the user who identifies himself/herself by a card of his/her own.

[0004] Upon the user's identification, the belt conveyor moves as far as to take the section relevant to that user in front of a return door. At this point, one or more items are withdrawn from the section of the belt conveyor.

[0005] The dirty items are then returned to an acceptance door where a suitable reading antenna reads the items and selects them for delivery to the laundry.

[0006] From here, the cleaned items are again hooked up onto the belt conveyor by an operator.

[0007] The systems of known type has the drawback of being able to recognize the "item on belt conveyor" status only in the hooking step, and the "item in laundry" status in the returning step, but they are unable to discriminate whether a user has actually collected one or more items.

[0008] Stemming from this limits of the known systems is also the impossibility of establishing the frequence of use of an item and of providing statistical data, especially useful to such facilities as barracks and hospitals which require planning the supply and renewal of uniforms and dresses and monitoring, that is, tracing the presence and arrangement of items.

[0009] The object of the present invention is to overcome the above drawbacks and to provide an device for the automatic return of clothing items which is able to trace the displacements of said items.

[0010] These and other objects, which will appear more clearly by a reading of the detailed description that follows, are achieved, according to the present invention, by means of a device for the automatic return of clothing items according to the attached claims, further embodiments thereof being disclosed in the corresponding dependent claims.

[0011] The invention is illustrated herebelow in greater detail with reference to the accompanying drawings which represent an exemplary and non-limiting embodiment thereof. In the drawings:

Fig. 1 is a schematic top view of a system for a belt conveyor-operated handling of clothing items provided with a device according to the invention;
Fig. 2 shows schematically an item with RFID chip apt to be inserted in the system of Fig. 1;
Fig. 3 shows schematically a control unit of the system of Fig. 1; and
Fig. 4 shows the succession of readings by a direction sensor within a device according to the invention.

[0012] With reference to accompanying figures, a device according to the invention comprises a belt conveyor 1, subdivided into sections 2, each being associated with a user 10, on which a plurality of clothing items 3 can be hooked up, each of said items being provided with an identification code 7 (Fig. 2).

[0013] It is understood that, in place of the belt conveyor, chains or other suitable driving systems may be used.

[0014] The belt conveyor is driven by a motorization M operated by a processing unit U in order to move the sections 2 to the relevant position they must take up.

[0015] To this end, one or more doors are disposed around the belt conveyor 1 for handling the items.

[0016] In particular, provision is made for:

- a first door P1 for hooking up items onto the belt conveyor 1 by an operator provided with a first reader 8 interfaced with the unit U, to identify the clothing items of a given user 10 and insert them into the respective section 2 when the latter is located at the hooking door,
- a second door P2 for returning one or more items 3, already hooked up in the associated section 2, to the user 10.

[0017] Generally, provision is also made for a third door P3 to return dirty items 3, and a second reader 12 interfaced with the processing unit U, which is used by the operator to identify the clothing items given back to the user.

[0018] In operation, an operator uses the reader 8 to read one or more items, thereby causing the processing unit U to start the motorization M so as to bring the section 2, corresponding to a given user, in front of the hooking door.

[0019] When said user wants to collect one or more items, has only to face the return door P2 and identify himself/herself by means of an identification system 11 (such as a magnetic card, for example) interfaced with the unit U, the latter starting the motorization to bring the section 2 associated with that user in front of the return door P2 from which the same user can withdraw the items 3.

[0020] The unit U also runs a data bank DB for registering the locations of the items 3 in stock.

[0021] According to the invention, an identification sensor 4 is provided along the belt conveyor 1, for example in proximity of the door P2 or at any other position, said sensor being interfaced with the processing unit U and able to identify which items are present in the section 2 after a return step.

[0022] Advantageously, it is thus possible to update

the data bank DB and inform the system about which items 3 are actually removed from the collection section 2 and handed over to the user, and which items are still on the belt conveyor.

[0023] Moreover, should the sensor 4 read also codes of items 3 belonging to adjacent sections 2, the processing unit U would be able to ignore such information by limiting the processing to items pertaining to the section of concern.

[0024] Preferably, the identification code 7 is an RFID chip, and said first and second readers 8, 12 and said sensor 4 are RFID antennas, it is understood however that suitable different identification technologies may be used such as those relating to bar codes or other.

[0025] In case of RFID technologies, in order to prevent inerferences between sensors associated with belt conveyors 1 close to each other, provision may be made for having the antenna 4 activated only when necessary, that is, the moment the withdrawal section 2 is read, thereby avoiding that the contemporary activation of more antennas will generate interference and reading errors.

[0026] According to a further aspect of the invention, the device may comprise a transit-detecting sensor 5 disposed in correspondence of said return door P2 and interfaced with the unit U to identify and detect the transit of items 3 through the door P2 when the user takes out one or more items.

[0027] In combination with the transit-detecting sensor 5, provision may also be made for a direction sensor 9, also disposed in correspondence of the return door P2, to detect the direction of passing items 3, that is to detect whether the latter are passing through the door P2 to be hooked up or be returned to the user.

[0028] Preferably, also the sensor 5 is an RFID antenna able to read the chips present on items 3, and the direction sensor 9 comprises a pair of optical detectors A, B interfaced with the processing unit.

[0029] Schematically shown in Fig. 4 are the successive variations of status of sensors A, B upon possible different circumstances, assuming that the sensor A is close to the belt conveyor and the sensor B close to the user.

[0030] For example, upon the withdrawal step, there will be activation, in succession, only of A (the item moves from the belt conveyor 1 to the door P2), then of both A and B (the item is in front to both the detectors), then only of B (the item 3 is exiting) and, finally, both sensors being deactivated (the item has been taken out).

[0031] On the basis of these readings, the processing unit is thus able of establishing the location of item 3 as identified by the transit-detecting sensor.

[0032] It is understood that the use of the transit-detecting sensor 5 and of direction sensor 9 may also be provided both in combination and as an alternative to the use of the identification code 4, in order to trace the position of items 3.

[0033] The invention as above disclosed is evidently suited for industrial application. However, it will be appreciated that equivalent modifications could be made without departing from the scope of the inventive idea. Moreover, all the parts may be replaced by technically equivalent elements.

Claims

1. Device for the automatic return of clothing items (3) comprising:

   - a belt conveyor (1) for handling a plurality of clothing items, each item being provided with an identification code (3) and distributed into belt sections (2) each of which being associated with a user;
   - a first door (P1) for hooking up the items (3) onto the belt conveyor (1);
   - a first reader (8) to identify the clothing items of a user and insert them into the respective section (2) located at the hooking door (P1);
   - a second door (P2) for returning items (3), hooked up into the associated section (2), to a user (10) standing at the return door (P2);
   - a belt conveyor's motorization (M) to drive the sections (2) into a control-operated motion;
   - a processing unit (U) interfaced with said reader (8) and said motorization (M), **characterized in that** it comprises identification means (4) disposed in proximity of the belt conveyor (1) for identifying the items (3) present into the section (2).

2. Device according to claim 1, comprising a transit-detecting sensor (5) disposed in correspondence of said return door (P2) for detecting the transit of items (3) through said door (P2).

3. Device according to any of the preceding claims, comprising a direction sensor (9) disposed in correspondence of said return door (P2) for detecting the transit direction of items (3) through said door (P2).

4. Device according to claim 3, wherein said direction sensor (9) comprises a pair of optical detectors (A, B) interfaced with said unit (U).

5. Device according to any of the preceding claims, wherein said identification code of items (3) is an RFID chip and said first reader (8) comprises an RFID antenna.

6. Device according to any of the preceding claims, wherein said identification code of items (3) is an RFID chip and said identification means (4) comprise an RFID antenna.

7. Device according to any of the preceding claims, comprising a third door (P3) for the return of items (3) and a second reader (12) for the identification of clothing items handed back to a user standing at the return door (P3).

8. Device according to any of the preceding claims, comprising means (11) for identifying the user (10) standing at the return door (P2).

9. Device according to claim 8, wherein said means (11) for identifying the user (10) comprise user's identification card and a cards reader interfaced with said processing unit (U).

10. Device for the automatic return of clothing items (3) comprising:

- a belt conveyor (1) for handling a plurality of clothing items, each item being provided with an identification code (3) and distributed into belt sections (2) each of which being associated with a user;
- a first door (P1) for hooking up the items (3) onto the belt conveyor (1);
- a first reader (8) to identify the clothing items of a user and insert them into the respective section (2) located at the hooking door (P1);
- a second door (P2) for returning items (3), hooked up into the associated section (2), to a user (10) standing at the return door (P2);
- a belt conveyor motorization (M) for driving the sections (2) into a control-operated motion;
- a processing unit (U) interfaced with said reader (8) and said motorization (M), **characterized in that** it comprises a transit-detecting sensor (5) located in correspondence of said return door (P2) for detecting the transit of items (3) through said door (P2) and a direction sensor (9) disposed in correspondence of said return door (P2) for detecting the transit direction of items (3) through said door (P2).

FIG.1

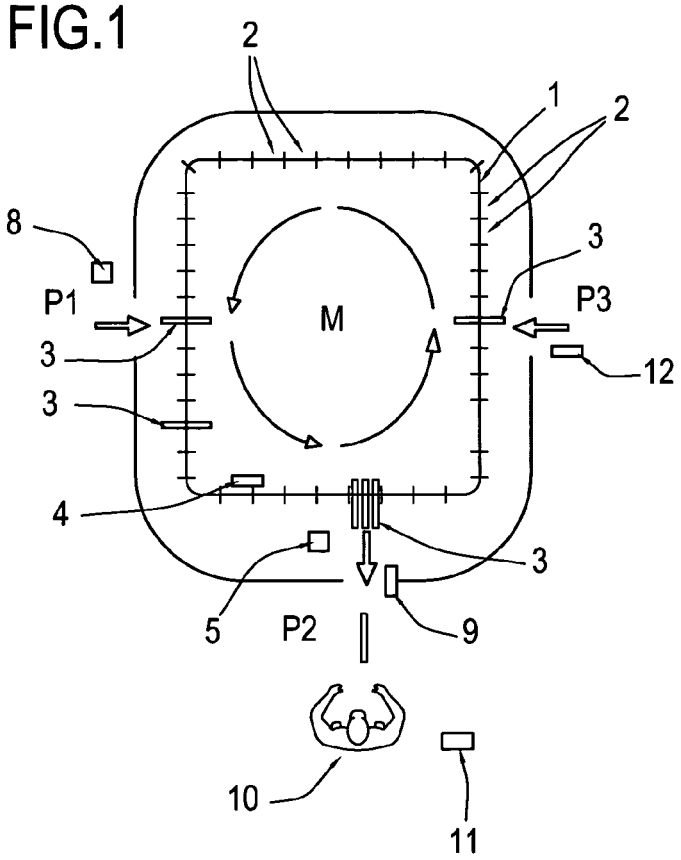


FIG.2

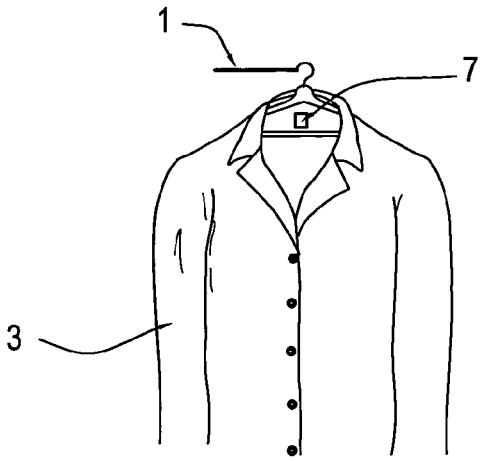


FIG.3

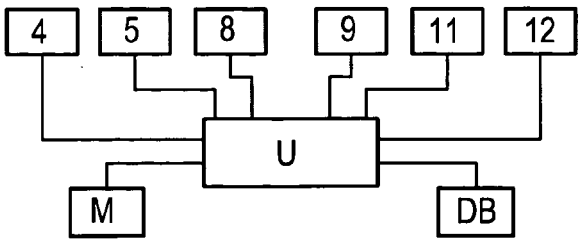
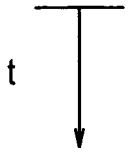


FIG.4



A	B	
1	0	
1	1	Collected items
0	1	
0	0	

A	B	
0	1	
1	1	Returned items
1	0	
0	0	

A	B	
1	0	
1	1	Items still on the belt conveyor
1	0	
0	0	

A	B	
0	1	
1	1	Items in the user's hands
0	1	
0	0	

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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 2093

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 009 991 A (ANDERSON WILLIAM J [US]) 4 January 2000 (2000-01-04) * column 3, line 18 - column 4, line 18 * * abstract; figures 1,8 *	1,10	INV. D06F93/00 D06F95/00
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A	US 4 991 719 A (BUTCHER R E [US] ET AL) 12 February 1991 (1991-02-12) * column 3, line 24 - column 4, line 53 * * figure 1 *	1,10	
A	WO 96/29267 A (METRIC INTERCONVEYOR AB [SE]; NEUGEBAUER KARL [SE]; HANSEN ANDERS L [U) 26 September 1996 (1996-09-26) * page 2, lines 13-23 * * page 4, lines 5-29 *	1,10	TECHNICAL FIELDS SEARCHED (IPC) B65G D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 September 2009	Weinberg, Ekkehard

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 2093

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