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(54) INSTALLATION FOR THE OPTICAL INSPECTION OF BOBBINS

(57) A facility for the optical inspection of yarn packages comprising package conveyor means apt to make discrete stops for the introduction of packages (1) into an inspection box (2) provided with a plurality of optical-sensing devices (3, 4, 5) to scan the external surface of said packages (1), for such a purpose moving the package (1) or part of the optical-sensing devices (3, 4, 5) together with associated light sources or arranging a plurality of stationary light sources being apt to be selectively activated within said inspection box (2), said packages (1) being in said facility arranged on replaceable, removable carriers adaptable to the characteristics of said packages and mounted on a plurality of platforms (6) associated to said conveyor means, each platform (6) carrying a package (1) to be inspected and comprising one or more amply-dimensioned recesses (7) provided to allow package (1) to fall within the field of view of an optical-sensing device (3) situated below the plane of said platform (6).

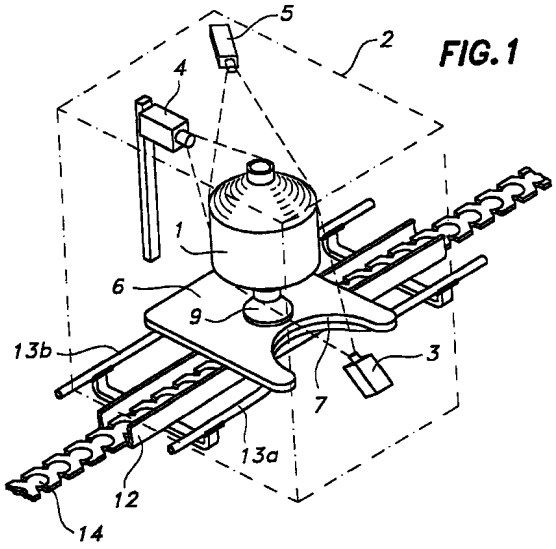

FIG. 1

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Description

Technical Field

[0001] The present invention concerns a facility for the optical inspection of yarn packages of the type comprising package conveyor means being apt to make discrete stops and provided to introduce packages into at least one inspection box provided with a plurality of optical-sensing devices and means to move said packages within said inspection box in order to present all sides of the packages to the field of view of the optical-sensing devices, for the purpose of detecting possible defects presented by the packages through the processing of the images captured by said optical-sensing devices.

Background of the Invention

[0002] Several facilities of this type are known in the prior art, and among them can be cited those of patents US 5,138,151 and DE-A-42 11 985, both by Murata Kikai K. K., disclosing an endless-band conveyor on top of which bobbin carrier plates of circular shape are deposited whose diameter exceeds the band width, said bobbin carrier plates on their upper surface integrating a carrier holding a bobbin with its package. Said conveyor band passes through the inside of an inspection box provided with a plurality of optical-sensing devices oriented in different directions. Within said inspection box a number of rollers engage the peripheral edges of the bobbin carrier plate of circular shape laterally protruding from the conveyor band. One of said rollers is a motor-driven roller whereas the rest are freely-rotatable rollers, one of them being mounted at a fixed position whereas others are fitted to a spring-biased movable arm. This roller assembly is provided to position the bobbin carrier plate, guide it in a rotational motion around its own axis, and bring about said rotational motion by virtue of the friction of the motor-driven roller against the periphery of the plate.

[0003] These facilities present several drawbacks: firstly the bobbin carrier plate together with the corresponding package suffers from a lack of stability, especially along the stretches covered during the transportation, due to the fact that the conveyor band must necessarily be narrower than the bobbin carrier plate in order to allow the access of the guiding and driving rollers, this being aggravated by the fact that the carrier must maintain the package at a considerable height if the lower surface of the package is to be allowed to fall within the field of action of an optical-sensing device situated at a low position. On the other hand, due to the fact that at the moment of the inspection the positioning, guiding and rotational driving of the package are carried out through the periphery of the bobbin carrier plate of circular shape serving as the base, with the lower surface of said plate being rotated against the conveyor band, all possible nonuniformities in the rotation of said plate are transmitted in a magnified way to the areas of the package being more distant from said plate thus causing possible tremblings that are very undesirable for the correct optical inspection being desired.

[0004] The above-mentioned patents do also disclose a method used by the system for the detection of defects through the processing of the images acquired by the optical-sensing devices. Patent application PCT/ES97/00070 of this same applicant can also be cited as regards this aspect.

[0005] The object of the present invention is to provide a facility for the optical inspection of yarn packages of the type mentioned above having means to convey a package and position it in an area equipped with accessories for the acquisition and processing of images of the surface of said package thereby overcoming the drawbacks presented by the current facilities, i.e. providing the system with stability and reliability, and facilitating besides the acquisition of images of the lower portion of the package.

Summary of the Invention

[0006] This object is attained according to the invention by providing conveyor means apt to convey a plurality of amply-dimensioned, mutually spaced bobbin carrier platforms apt to be fitted to said conveyor means both through a solid and a detachable attachment. In a central area of each platform a bobbin carrier is provided comprising a carrier member provided with a centering base. This carrier member is interchangeable in correspondence with the different package types and sizes, and it can be fitted to a shaft fitted to the platform in a freely rotatable arrangement. Said shaft is associated to an element apt to be engaged by a motor-driven rotational motion transmission situated in stopping areas within one or more inspection boxes provided with a plurality of optical-sensing devices and light sources situated at different positions.

[0007] In an alternative exemplary embodiment the package remains stationary in the inspection area whereas an assembly of optical-sensing devices or of optical-sensing devices together with light sources revolves around the package in order to thus cover all its surface.

[0008] An important characteristic of the platform consists in the presence of at least one amply-dimensioned recess provided at an edge of said platform thus allowing the package to be during the inspection situated within the field of view of at least one optical-sensing device situated below the plane of said platform. This allows to inspect the lower surface of the package without having to lift it too much above the plane of the platform.

[0009] This shooting process can be carried out with one only inspection camera or as per a split process through the use of several adjacent, consecutive cameras separated by distances matching the discrete

stops made by the conveyor system, all said cameras being housed in one only enclosure.

[0010] Another essential characteristic of the system lies in the fact that each stopping area of each inspection box is provided with a centering member, the system being apt to clamp the bobbin of the package between said centering member and a centering base of the bobbin carrier, in such a way that when the rotational motion transmission is actuated the package is with its bobbin supported and guided at both ends thus effecting a very uniform and smooth rotational motion greatly favoring the acquisition of images on the part of the optical-sensing devices.

[0011] The bobbin carrier platform must not necessarily travel in a horizontal position, with the transported package in a vertical position, but in order to facilitate the inspection at least in a part of its travel it can adopt an inclined position thus also arranging the package in a correspondingly inclined position. This is possible thanks to the special configuration of the conveyor means and to the way the platforms are fitted to them.

[0012] In an exemplary embodiment the conveyor means form a circuit passing through one or more inspection boxes besides passing through other processing stations upstream or downstream from said inspection.

[0013] In another exemplary embodiment the conveyor means form a closed circuit passing through an enclosure comprising one or more inspection boxes, transfer means being provided to consecutively transfer the platforms together with the corresponding packages from one external conveyor line to an area of the closed circuit upstream from said enclosure, and from an area of said closed circuit downstream from the inspection to the external conveyor line.

[0014] In yet another exemplary embodiment the conveyor means form a linear circuit intercalated between two external conveyor lines or into one only line, including the passage through one or more inspection boxes, means being provided to transfer the platforms from one of the external lines to the linear circuit upstream from the inspection, and from the linear circuit to the other external conveyor line downstream from said inspection.

Brief Description of the Drawings

[0015] The invention will be described below referring to the enclosed drawings, it being understood that said drawings are merely illustrative and in no case shall be construed has having a limitative character.

[0016] In the drawings:

Fig. 1 is a perspective view schematically illustrating a facility of the invention with an exemplary embodiment of the conveyor means, only one inspection box having for better clarity been illustrated;

Fig. 2 is a cross-sectional view of an exemplary rotational motion transmission for the bobbin carrier of the facility of Fig. 1;

Fig. 2a is a detail plan-view of the exemplary transmission of Fig. 2;

Fig. 3 is a perspective view schematically illustrating one part of the facility of the invention with another exemplary embodiment of the conveyor means;

Fig. 4 is a cross-sectional view of an exemplary rotational motion transmission for the bobbin carrier of the facility of Fig. 3;

Fig. 4a is a detail plan-view of the exemplary transmission of Fig. 4;

Fig. 5 is a lateral view schematically illustrating the operation of the facility of the invention;

Fig. 6 is a plan-view of a layout as per a closed circuit arrangement of the facility of the invention;

Figs. 7 through 9 are cross-sectional views of several exemplary rotational motion transmissions for the bobbin carriers of the facility of the invention; and

Fig. 10 is a view of an alternative exemplary embodiment of a platform of those employed in the facility of the invention.

Detailed Description of the Invention

[0017] Firstly referring to Figs. 1 and 3 it can be seen that these figures show a facility for the optical inspection of yarn packages comprising package conveyor means apt to make discrete stops for the introduction of packages 1 into at least one inspection box 2 provided with a plurality of optical-sensing devices 3, 4, 5 situated at different positions as per an arrangement such as that described in the precited patent application PCT/ES97/00070 in order to scan all of the external surface of said packages 1 thus acquiring a series of images of different areas of said packages.

[0018] Said packages 1 are arranged on replaceable, removable carriers apt to be adapted to the characteristics of said packages, said carriers being mounted on a plurality of platforms 6 associated to said conveyor means, each platform 6 carrying a package 1 to be inspected.

[0019] Said platforms 6 comprise one or more amply-dimensioned recesses 7 (see also Fig. 10) in order to allow package 1 to fall within the field of view of an optical-sensing device 3 situated below the plane of said platforms 6 in the stopping area of said platforms within the inspection box or boxes 2.

[0020] Each of said removable carriers mounted on a corresponding platform 6 includes a bobbin carrier member 8 being replaceable, at least in part, in order to be adapted to the size of package 1. Said carrier member 8 is provided with a centering base 9, such as a tapered shape, adaptable to the bore of the bobbin 1a of the package. The discrete stops made by the conveyor

means situate platform 6 within inspection box 2 in such a way that said carrier member 8 included in said platform 6 does coaxially face a centering member 11 arranged within inspection box 2, the hollow bobbin 1a of the package being apt to be clamped between said centering base 9 of carrier member 8 and said centering member 11 either through an axial shift of carrier member 8 or through an axial shift of centering member 11 or through both at the same time.

[0021] In order to avoid vibrations or other motions the stopping areas within inspection box 2 can be provided with means to hold platform 6 during the shooting phase, said means also aiding a correct positioning.

[0022] According to an exemplary alternative embodiment the inside of the inspection box is provided with an assembly of optical-sensing devices possibly accompanied by light sources and fitted to a framework (not shown) apt to revolve around the package while this latter remains stationary, thus covering the outer surface of said package. This arrangement can be combined with the presence of two optical-sensing devices 3 situated at diametrically opposed positions below the plane of platform 6 in order to optically sense between the two of them the whole lower portion of package 1. Said platform 6 will be in this case provided with two recesses 7 coinciding with the positions of said optical-sensing devices 3, as can be seen in Fig. 10. In an alternative arrangement the assembly of the optical-sensing devices is attached to said revolving framework whereas an assembly of light sources are situated at stationary positions and are apt to be selectively activated in correspondence with the package area to be inspected.

[0023] In other exemplary embodiments the shooting is carried out by rotating the package around its own axis whereas the optical-sensing devices and the light sources remain stationary. For such a purpose carrier member 8 is apt to be inferiorly fitted to a shaft 10 fitted to platform 6 in a freely rotatable arrangement, said shaft 10 being apt to be engaged by a rotational motion transmission arranged in the stopping area of the inside of inspection box 2.

[0024] In an alternative arrangement said removable carrier does besides include retaining means provided to prevent the rotation of said carrier member 8 when platform 6 is in a position in which said rotational motion transmission is disengaged.

[0025] The following is a description of two exemplary embodiments of the conveyor means each of which is adequate for a different type of facility, as will be seen later on.

[0026] In a preferred exemplary embodiment said conveyor means comprise a guideway 12 made of an open-topped section serving as a guiding support for the circulation of a conveyor line formed by a flexible driving member such as a flat link chain 14 or a rope. Said platforms 6 are fitted to said conveyor line through their lower central part and spaced from each other and at each of their lateral ends are resting on a respective stationary slide-rod 13a, 13b parallel to said guideway 12. Platforms 6 are fitted to the conveyor line through solidly fastening elements or by means of a simple, detachable attachment as per a mutually fitting or a sitting arrangement.

[0027] In case of adopting the alternative in which the shooting is done with the packages rotating in front of stationary optical-sensing devices each platform 6 incorporates one of said recesses 7 at one of its lateral edges, one 13a of said slide-rods corresponding to the side having been provided with said recess 7 being interrupted or deviated in the stopping areas within inspection box 2, in such a way that an optical-sensing device 3 can be situated below the plane of platform 6 thus perfectly sensing a lower sector of the package.

[0028] In case of adopting the modality in which the package remains stationary with the optical-sensing devices revolving around it it has ben foreseen (see Fig. 10) to provide each platform 6 with two of said recesses 7 each of them being provided at one of the lateral edges of said platform, said two slide-rods 13a, 13b being in this case interrupted or deviated in the stopping areas within inspection box 2. Two stationary optical-sensing devices situated below the plane of platform 6 can this way cover the whole lower portion of the package (opposite 180° sectors).

[0029] In this exemplary embodiment (Fig. 1) of the conveyor means the transmission of the rotational motion to shaft 10 of the bobbin carrier is arranged above the level of platform 6 in the stopping area within inspection box 2 and can be carried out in different ways. For example in Figs. 2 and 2a the transmission includes a motor 15 driving a drive belt 16 being flat or toothed on the outside, a portion of said belt engaging a wheel 17 of said shaft 10 of platform 6 in the stopping area of inspection box 2. In another example (see Fig. 9) said transmission includes a motor 18 rotationally driving said centering member 11 of the inside of inspection box 2, said centering member being besides axially shiftable when actuated by a linear actuator to engage the bobbin of package 1.

[0030] Although this has not been illustrated in the drawings, said platform 6 is optionally attached to said conveyor line, and said guideway 12 and slide-rods 13a and 13b can be arranged in a transversally inclined position, in such a way that said platform 6 with said bobbin carrier member 8 carries out at least one part of its travel in a correspondingly inclined position, including the passage through one or more inspection boxes 2. Said inclination can be such that the package adopts an angle with respect to the vertical comprised between 0° and ±90°. This position can facilitate the arrangement of optical-sensing devices and light sources within inspection box 2.

[0031] In another exemplary embodiment illustrated in Fig. 3 said conveyor means comprise two parallel conveyor belts 19 spaced from each other and moving

in unison in one and the same plane in such a way as to provide bearing surfaces for the lateral ends of said platforms 6 to which they become attached thus conveying them. The attachment between belts 19 and platforms 6 takes place by friction between the mutually contacting areas or by means of an attachment as per a mutually fitting arrangement.

[0032] With this belt conveyor system and in a way similar to the alternative of the conveyor line described above, in case of adopting the shooting alternative in which the packages are rotated in front of stationary optical-sensing devices each platform 6 incorporates one of said recesses 7 at one of its leading or trailing edges thus being apt to allow said optical-sensing device 3 situated below the plane of platforms 6 and between said conveyor belts 19 to cover the whole lower portion of package 1 when this latter is rotated.

[0033] On the contrary, in case of adopting the modality wherein the package remains stationary whereas the optical-sensing devices revolve around it it has been foreseen (see again Fig. 10) to provide each platform 6 with two of said recesses 7, one at its leading edge and another one at its trailing edge, to thus make them apt to allow two of said optical-sensing devices 3 situated below the plane of platforms 6 and between said conveyor bolts 19 to cover two opposite sectors of the lower portion of package 1.

[0034] With this alternative for the conveyor means (Fig. 3) the rotational motion transmission is arranged below the level of platform 6 in the stopping area of the inside of inspection box 2.

[0035] An example of said transmission (Figs. 4 and 4a) includes a motor 20 driving a drive belt 21 being flat or toothed on the outside, a portion of said drive belt in the stopping areas of inspection box 2 engaging a wheel 22 attached to an end of shaft 10 projecting through the lower surface of platform 6.

[0036] Another exemplary transmission (see Fig. 7) includes a motor 26 rotationally driving a first wheel 27 apt to tangentially engage during the stops in the inspection box a second wheel 28 attached to the end of shaft 10 projecting through the lower surface of platform 6.

[0037] Yet another exemplary rotational motion transmission is provided (see Fig. 8) including a motor 23 rotationally driving a first tapered part 24 apt to axially engage a second tapered part 25 attached to an end of shaft 10 projecting through the lower surface of platform 6, said first tapered part 24 being besides apt to be axially shifted when actuated by a linear actuator.

[0038] Optionally in these examples in which the transmission is situated below the plane of platform 6 said shaft 10 of carrier member 8 is besides apt to be axially shifted as per a linear motion with respect to platform 6.

[0039] Fig. 6 illustrates an exemplary arrangement of an inspection line comprising a facility as per the invention wherein said conveyor means form a closed circuit 29 including the passage through an enclosure provided with one or more inspection boxes 2, transfer means having been provided to transfer said platforms 6 from said closed circuit 29 to an external conveyor line 30, or vice versa.

[0040] The facility can alternatively comprise a linear circuit (not shown) formed by said conveyor means 19 and intercalated between two external conveyor lines and including the passage through one or more inspection boxes 2, transfer means having been provided to transfer said platforms 6 from one of said external conveyor lines to said linear circuit upstream from the passage through inspection boxes 2, and from the linear circuit to the other of said external conveyor lines downstream from the passage through said inspection boxes.

[0041] In another exemplary arrangement said conveyor means form a circuit including the passage through one or more inspections boxes 2 besides the passage through other processing stations upstream or downstream from said inspection.

Claims

1. A facility for the optical inspection of yarn packages of the type comprising package conveyor means apt to make discrete stops for the introduction of packages (1) into at least one inspection box (2) provided with a plurality of optical-sensing devices (3, 4, 5) situated at different positions in order to scan all of the external surface of said packages (1) thus acquiring a series of images of different areas of said packages, for such a purpose moving either the package (1) or at least one part of said optical-sensing devices (3, 4, 5) together with associated light sources, or arranging a plurality of stationary light sources being apt to be selectively activated within said inspection box (2); characterized in that said packages (1) are arranged on replaceable, removable carriers adaptable to the characteristics of said packages and mounted on a plurality of platforms (6) associated to said conveyor means, each platform (6) carrying a package (1) to be inspected.

2. An inspection facility as per claim 1, wherein said platform (6) comprises one or more amply-dimensioned recesses (7) provided to allow package (1) to fall within the field of view of an optical-sensing device (3) situated below the plane of said platform (6) in the stopping area of said platforms within one or more of the inspection boxes (2).

3. An inspection facility as per claim 1 or 2, wherein an assembly of optical-sensing devices and light sources are attached to a support apt to be revolved in a controlled and concentric manner around the axis of the package when this latter is situated in the stopping area within inspection box (2).

4. An inspection facility as per claim 1, 2 or 3, wherein an assembly of optical-sensing devices are attached to a support apt to be revolved in a controlled and concentric manner around the axis of the package when this latter is situated in the stopping area within inspection box (2) whereas an assembly of light sources are situated at stationary positions and are apt to be selectively activated in correspondence with the package area to be inspected.

5. An inspection facility as per claim 3 or 4, wherein one or more optical-sensing devices (3) together with their associated light sources are besides situated at stationary positions below the plane of platform (6).

6. An inspection facility as per any of the preceding claims, wherein said removable carrier comprised on top of said platform (6) includes a bobbin carrier member (8) being replaceable at least in part to be thus adapted to the size of package (1) and being also provided with a centering base (9), such as a tapered shape, adaptable to the bore of bobbin (1a) of the package.

7. An inspection facility as per claim 6, wherein said carrier member (8) is apt to be inferiorly fitted to a shaft (10) fitted to platform (6) in a freely rotatable arrangement and apt to be engaged by a rotational motion transmission arranged in the stopping area of the inside of inspection box (2).

8. An inspection facility as per claim 6 or 7, wherein said conveyor means are apt to make said discrete stops in such a way that said carrier member (8) included on top of platform (6) is coaxially facing a centering member (11) arranged within inspection box (2), the hollow bobbin (1a) of the package being apt to be clamped between said centering base (9) of carrier member (8) and said centering member (11) of the inside of inspection box (2) either through an axial shift of carrier member (8) or through an axial shift of centering member (11) or through both at the same time.

9. An inspection facility as per claim 6, 7 or 8, wherein means are included in the stopping areas within inspection box (2) to hold platform (6).

10. An inspection facility as per claim 7, 8 or 9, wherein said removable carrier does besides include retaining means provided to prevent the rotation of said carrier member (8) when platform (6) is in a position in which said rotational motion transmission is disengaged.

11. An inspection facility as per any of the preceding claims, wherein said conveyor means comprise a guideway (12) made of an open-topped section serving as a guiding support for the circulation of a conveyor line having fitted to it through their lower central part said platforms (6) that are spaced from each other and at each of their lateral ends are resting on a respective stationary slide-rod (13a, 13b) parallel to said guideway (12).

12. An inspection facility as per claim 11, wherein platforms (6) are fitted to the conveyor line through solidly fastening elements or by means of a simple, detachable attachment as per a mutually fitting or a sitting arrangement.

13. An inspection facility as per claim 11 or 12, wherein each platform (6) incorporates one of said recesses (7) at one of its lateral edges, one (13a) of said sliderods corresponding to the side having been provided with said recess (7) being interrupted or deviated in the stopping areas within inspection box (2).

14. An inspection facility as per claim 11 or 12, wherein each platform (6) incorporates two of said recesses (7) being each of them provided at one of the lateral edges of said platform, said two slide-rods (13a, 13b) being in this case interrupted or deviated in the stopping areas within inspection box (2).

15. An inspection facility as per any of claims 11 through 14, wherein said conveyor line is a flexible driving member such as a flat link chain (14) or a rope.

16. An inspection facility as per any of claims 11 through 15, wherein said rotational motion transmission is arranged above the level of platform (6) in the stopping area of the inside of inspection box (2).

17. An inspection facility as per claim 16, wherein said rotational motion transmission includes a motor (15) driving a drive belt (16) being flat or toothed on the outside, a portion of said belt engaging a wheel (17) of said shaft (10) of platform (6) in the stopping area of inspection box (2).

18. An inspection facility as per claim 16, wherein said rotational motion transmission includes a motor (18) rotationally driving said centering member (11) of the inside of inspection box (2), said centering member being besides axially shiftable when actuated by a linear actuator.

19. An inspection facility as per any of claims 11 through 18, wherein said platform (6) is attached to said conveyor line, said guideway (12) and slide-

rods (13a, 13b) being arranged in a transversally inclined position, in such a way that said platform (6) with said bobbin carrier member (8) carries out at least one part of its travel in a correspondingly inclined position, said inclination being such that the package adopts an angle comprised between 0° and ±90°.

20. An inspection facility as per claim 19, wherein said at least one part of the travel with platform (6) arranged in an inclined position includes the passage through one or more inspection boxes (2).

21. An inspection facility as per any of claims 1 through 10, wherein said conveyor means comprise two parallel conveyor belts (19) spaced from each other and moving in unison in one and the same plane in such a way as to provide bearing surfaces for the lateral ends of said platforms (6) to which they become attached thus conveying them.

22. An inspection facility as per claim 21, wherein the attachment between belts (19) and platforms (6) takes place by friction between the mutually contacting areas or by means of an attachment as per a mutually fitting arrangement.

23. An inspection facility as per claim 21 or 22, wherein each platform (6) incorporates one of said recesses (7) at one of its leading or trailing edges thus being apt to allow said optical-sensing device (3) situated below the plane of platforms (6) to be provided between said conveyor belts (19).

24. An inspection facility as per claim 21 or 22, wherein each platform (6) is provided with two of said recesses (7), one at its leading edge and another one at its trailing edge, thus being apt to allow two of said optical-sensing devices (3) situated below the plane of platforms (6) to be provided between said conveyor belts (19).

25. An inspection facility as per any of claims 21 through 24, wherein said rotational motion transmission is arranged below the level of platform (6) in the stopping area of the inside of inspection box (2).

26. An inspection facility as per claim 25, wherein said rotational motion transmission includes a motor (20) driving a drive belt (21) being flat or toothed on the outside, a portion of said drive belt in the stopping areas of inspection box (2) engaging a wheel (22) attached to an end of shaft (10) projecting through the lower surface of platform (6).

27. An inspection facility as per claim 25, wherein said rotational motion transmission includes a motor (23) rotationally driving a first tapered part (24) apt to axially engage a second tapered part (25) attached to an end of shaft (10) projecting through the lower surface of platform (6), said first tapered part (24) being besides apt to be axially shifted when actuated by a linear actuator.

28. An inspection facility as per claim 25, wherein said rotational motion transmission includes a motor (26) rotationally driving a first wheel (27) apt to tangentially engage a second wheel (28) attached to the end of shaft (10) projecting through the lower surface of platform (6).

29. An inspection facility as per any of claims 21 through 28, wherein said shaft (10) of carrier member (8) is besides apt to be axially shifted as per a linear motion with respect to platform (6).

30. An inspection facility as per any of the preceding claims, wherein said conveyor means form a closed circuit including the passage through one or more inspection boxes (2) besides the passage through other processing stations upstream or downstream from said inspection.

31. An inspection facility as per any of claims 1 through 29, wherein said conveyor means form a closed circuit (29) including the passage through one or more inspection boxes (2), transfer means having been provided to transfer said platforms (6) from said closed circuit (29) to an external conveyor line (30), or vice versa.

32. An inspection facility as per any of claims 1 through 29, wherein said conveyor means form a linear circuit intercalated between two external conveyor lines and including the passage through one or more inspection boxes (2), transfer means having been provided to transfer said platforms (6) from one of said external conveyor lines to said linear circuit upstream from the passage through inspection boxes (2), and from the linear circuit to the other of said external conveyor lines downstream from the passage through said inspection boxes.

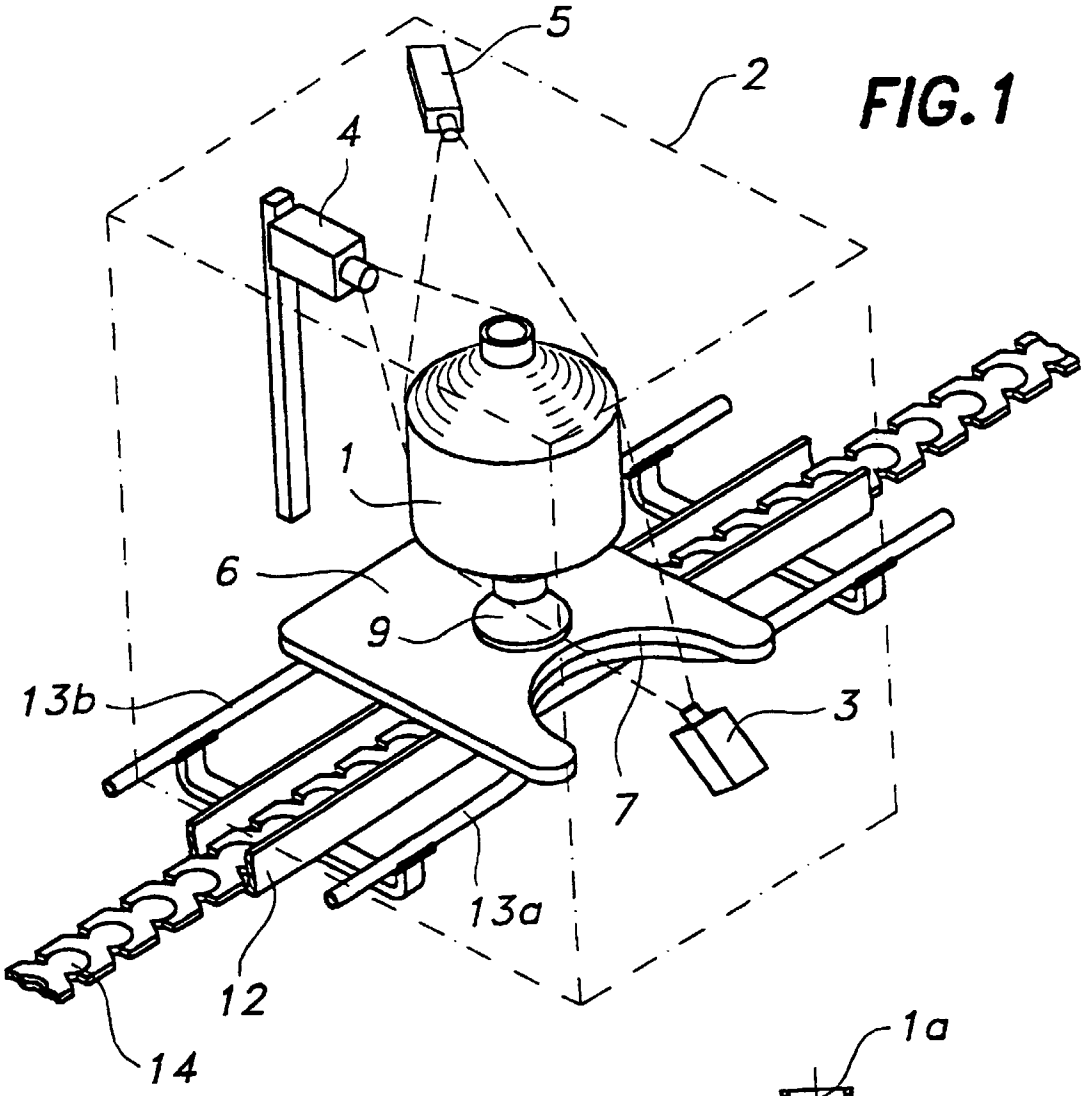

FIG. 1

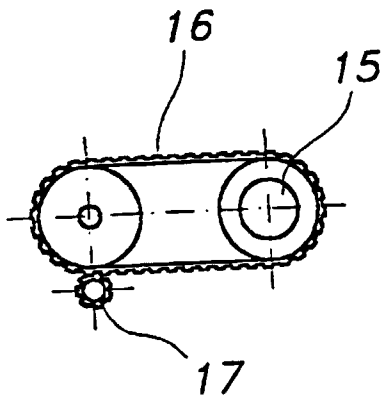

FIG. 2a

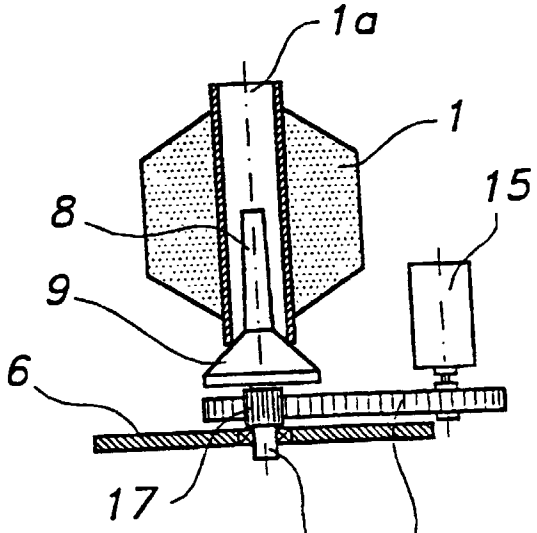

FIG. 2

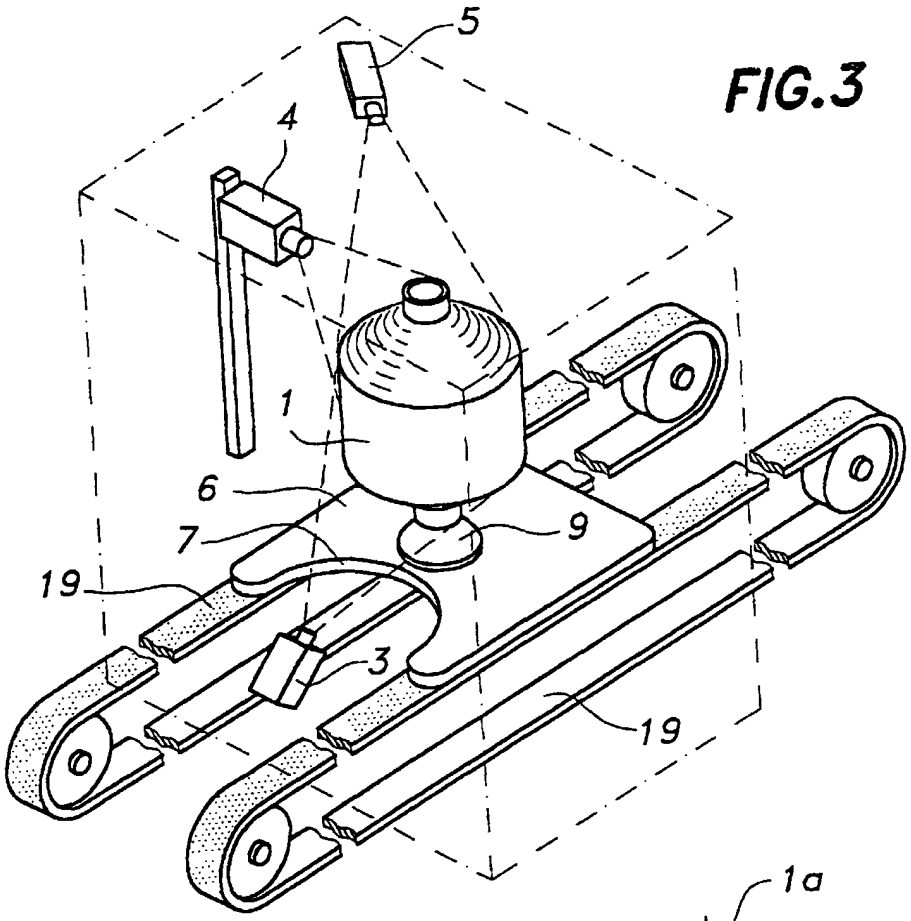

FIG.3

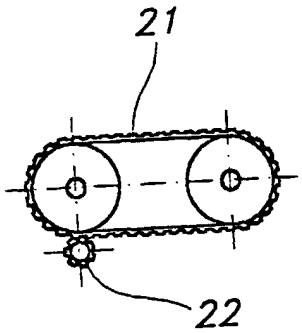

FIG.4a

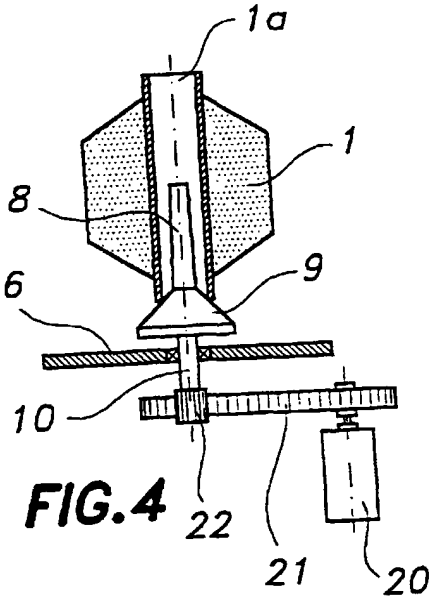

FIG.4

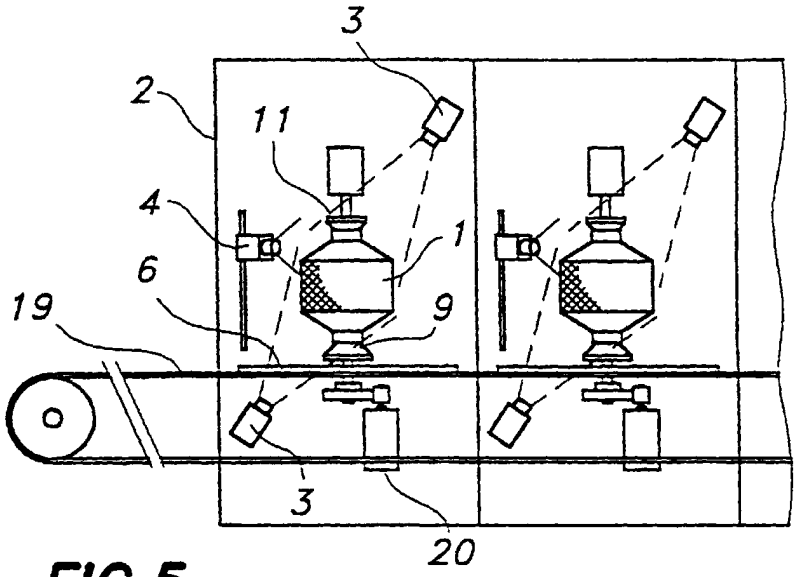

FIG.5

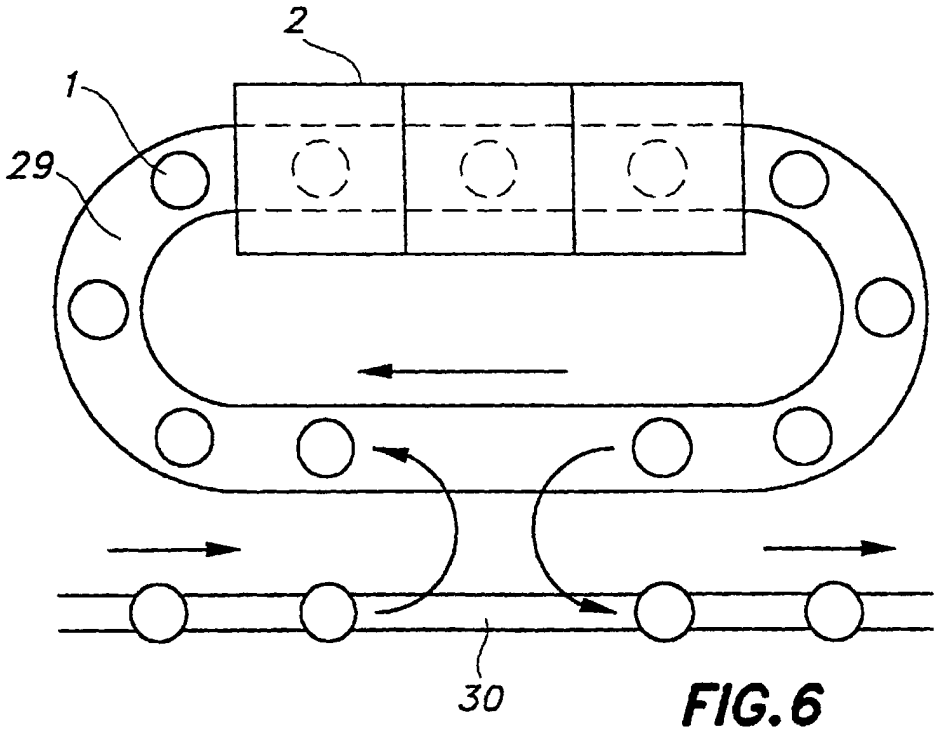

FIG.6

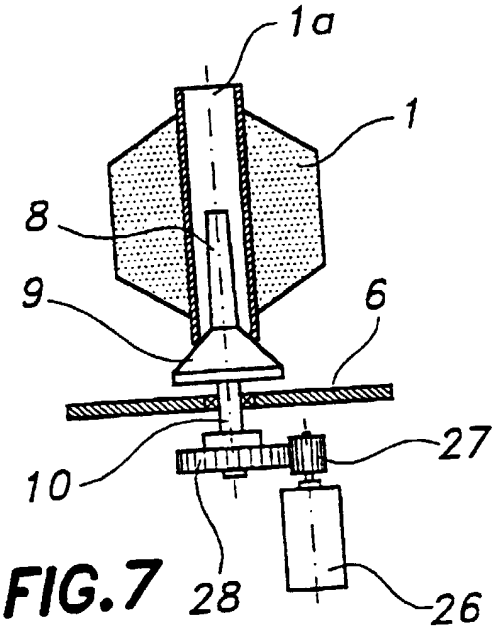

FIG.7

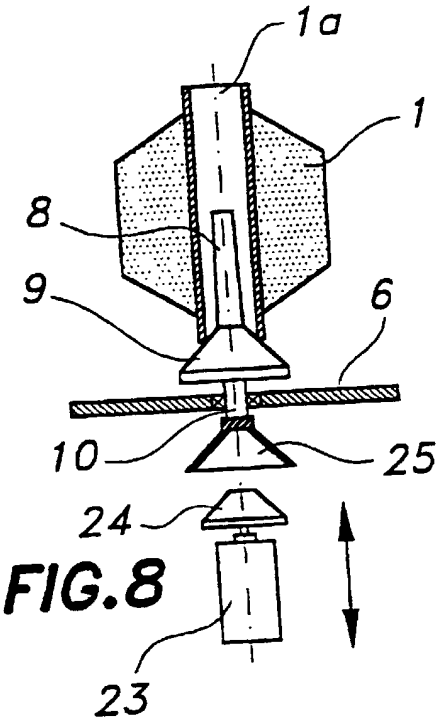

FIG.8

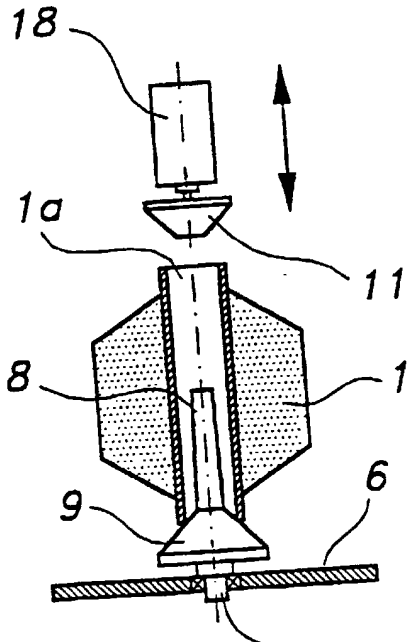

FIG.9

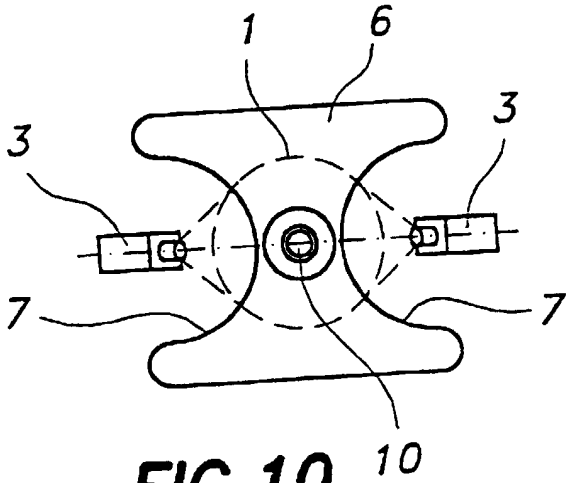

FIG.10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/ES 98/00269

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65H63/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 42 11 985 A (MURATA MACHINERY LTD) 15 October 1992 cited in the application	1,3-5
A	see figures 1-3	6-32
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 261 (M-514), 5 September 1986 & JP 61 086370 A (TORAY IND INC), 1 May 1986	1,3-5
A	see abstract	6-32
X	PATENT ABSTRACTS OF JAPAN vol. 097, no. 007, 31 July 1997 & JP 09 058930 A (KANEBO LTD), 4 March 1997 see abstract	1

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 June 1999	22.06.99

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Tamme, H-M

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INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/ES 98/00269

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 41466 A (COGNIVISION RESEARCH SL ;LLORENS CASTELLO ANTONI (ES); SANFELIU CO) 24 September 1998 cited in the application see figures	1

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INTERNATIONAL SEARCH REPORT

...formation on patent family members

Inter nal Application No
PCT/ES 98/00269

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4211985 A	15-10-1992	NONE	
WO 9841466 A	24-09-1998	NONE	

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