(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 520 784 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.04.2005 Bulletin 2005/14

(51) Int Cl.[7]: **B65B 9/02**

(21) Application number: **04425710.3**

(22) Date of filing: **24.09.2004**

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

(30) Priority: **30.09.2003 IT BO20030564**

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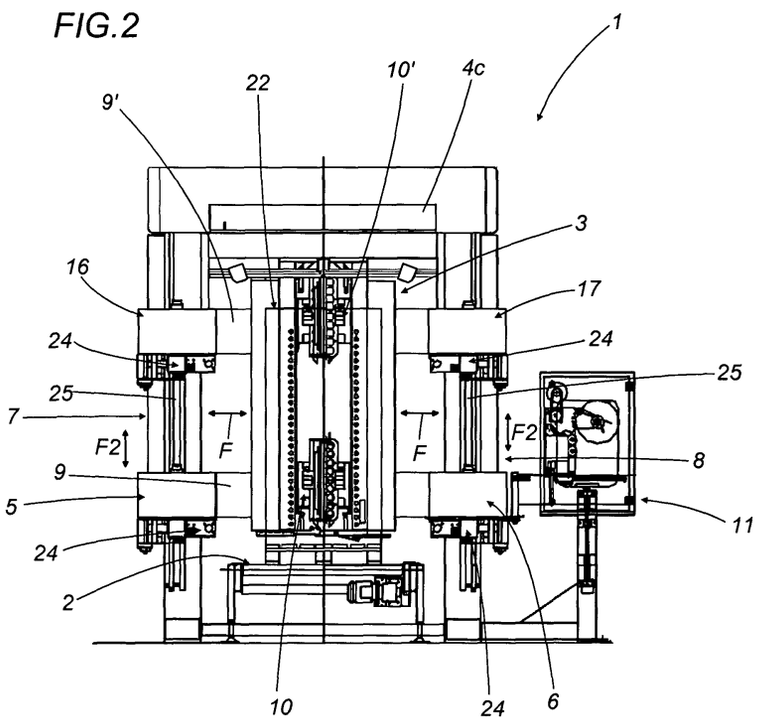
(54) Machine for banding groups of palletised products.

(57) A machine for banding individual, grouped or palletised products comprises at least: a conveyor (2), extending in a direction of feed (A), for transporting the products (3); a frame (4) mounted over the conveyor (2) and equipped with at least two rolls (5, 6) of film mounted on the frame uprights (7, 8) in such a way as to form a band of film (9, 9') positioned transversely relative to the uprights (7, 8) so as to intercept the front of the products (3) as they move forward; at least one unit (10) for sealing and cutting the film (9, 9'), supported by the frame (4) and mobile between an idle position, where the unit (10) is close to the uprights (7, 8), and a working position, where the unit (10) is away from the uprights (7, 8) so that it intercepts, seals and cuts the portion of film (9, 9') wrapped around the products (3). The machine (1) further comprises at least one unit (11) located in the vicinity of a section of the film band (9, 9') unwinding path (P) and designed to apply at least one distinctive code (C) to at least one part of the film band (9, 9').

FIG.2



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Description

[0001] The present invention relates to a machine for banding groups of palletised products, in particular palletised loads consisting of stacked products (such as, for example, but not restricted to, packs of bottles or other containers) to undergo intermediate processes and to be transported from one factory to another or from one processing station to another).

[0002] Machines of this type are used to wrap a band of material around a groups of palletised products stacked to a certain height and relatively light in weight, in such a way as to stabilise the stacks during transportation or normal handling in processing lines. Typically, the palletised load consists of bottle crates placed side by side and stacked in two or more layers.

[0003] To stabilise a load of this type, the banding machine wraps a first band of plastic film at a certain height in order to hold the stack together at the most unstable part of it (usually the top of the stack) which would be the first to topple during transportation.

[0004] Prior art machines that perform banding operations of this type comprise a portal frame whose uprights mount a pair of film rolls at a predetermined height. The film is unwound by suitable rollers in such a way that it is positioned transversely between the uprights to intercept the palletised load as the pallet moves under the portal frame on a conveyor.

[0005] The forward motion of the pallet, after its front end has come into contact with the band of film, causes the rolls to unwind so as to wrap the band around the sides of the products stacked on the pallet. As soon as the pallet has moved past the portal frame, it is stopped and a unit comprising a sealer and a cutter, mounted behind the uprights, runs along the back of the palletised load on suitable supports in a direction parallel to the rear face of the load in such a way that the band of film is wrapped right around the load.

[0006] In other words, the film forms a loop around the upper section of the palletised product load and, since the film used is usually stretch film, also has a tightening effect which holds the load together.

[0007] At this point, the section of the band at the back of the palletised load is sealed and, as soon as this has been done, the cutter cuts the band half way between the two sealed ends: that means the looped band wrapped around the palletised load is closed, sealed and cut off, while the seal keeps the two rolls joined to each other by the remaining film positioned transversely between the two uprights and ready to intercept the next palletised load moving forward on the conveyor, thus ensuring that the process is not interrupted.

[0008] An increasingly frequent requirement is for banding machines to apply to the palletised load a second band of film, lower down than the first and bearing a distinguishing mark, such as, for example, a label identifying the products transported, their factory of origin, or other information.

[0009] To make applications of this type possible, the following have been added to banding machines:

- a pair of rolls mounted on the uprights of the portal frame and designed to wrap a second band of plastic film, to which labels can be applied, at a fixed height relative to the uprights themselves; and
- a second sealer and cutter assembly similar to the first assembly, and independent of it, mounted close to the base of the portal frame and mobile in synchrony with the first assembly by means of two additional arms, designed to seal and cut the second band in the same way as the first.

[0010] This type of solution consists basically of a machine already well known in the trade used to apply a single band, with the simple addition of another pair of film rolls and a second, fixed, independent unit but without adapting its constructional philosophy to suit the new requirement.

[0011] This type of structure has several disadvantages which have been overcome in a new solution proposed by the same Applicant as the present (see Italian patent application BO2002 A000232), in which the two sealing and cutting units are supported by a single mounting unit that projects from the portal frame and that slides along the frame crossbeam to and from the idle and working positions of the units: this solution has made the sealing and cutting units extremely, practical and adaptable to any type of production line in which the portal frame is used.

[0012] This improvement has led to a widespread and increased use of labels applied to the plastic bands and bearing information such as product type, destination, origin, quantity, weight, etc.

[0013] The labels, usually placed on three sides of the palletised load, are applied to the plastic band at a station located downstream of the banding machine and equipped with independent label application means.

[0014] This type of configuration, however, tends to slow down the flow of the pallets that have already been banded to enable the labels to be applied and requires an independent, dedicated labelling station which increases the overall dimensions of the production line.

[0015] The present invention has for an object to overcome the above mentioned disadvantages by providing a machine for banding palletised products that has a very compact structure, and is equipped with units for sealing and cutting the plastic band and for applying alphanumeric characters, all mounted in a single station that is quick and easy to adjust and operates in highly synchronised fashion.

[0016] According to the invention, this object is achieved by a machine for banding individual, grouped or palletised products and comprising at least: a conveyor, extending in a direction of feed, for transporting the products; a frame mounted over the conveyor and equipped with at least two rolls of film mounted on the

frame uprights in such a way as to form a band of film positioned transversely relative to the uprights so as to intercept the front of the products as they move forward; at least one unit for sealing and cutting the film, supported by the frame and mobile between an idle position, where the unit is close to the uprights, and a working position, where the unit is away from the uprights so that it intercepts, seals and cuts the portion of film band wrapped around the products; the machine further comprises at least one unit located in the vicinity of a section of the film band unwinding path and designed to apply at least one distinctive code to at least one part of the film band.

[0017] The technical characteristics of the invention, with reference to the above objects, are clearly described in the claims below and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 is a side view, with some parts cut away to better illustrate others, of a machine according to the present invention for banding groups of palletised products;
- Figure 2 is a front view of the banding machine of Figure 1;
- Figure 3 is a top plan view of the banding machine illustrated in the figures listed above;
- Figures 4 to 6 are schematic top plan views illustrating a series of steps in the application of codes to a band placed round the groups of products in a machine according to the present invention.

[0018] With reference to the accompanying drawings, in particular Figures 1 to 3, the machine according to the invention, denoted in its entirety by the numeral 1, is used for banding, individual, grouped or palletised products.

[0019] More specifically, the machine is used, for example, for palletised stacks 3 of products which have undergone intermediate processes and have to be transported from one factory to another or from one processing station to another.

[0020] For example, and without restricting the scope of the invention, the machine is used for banding palletised loads which consist of bottle crates placed side by side and stacked in two or more layers and which necessitate a band of film to stabilise them at the top, and another band of film bearing a series of identification codes at the bottom.

[0021] The machine 1 comprises a conveyor 2, a frame 4, here in the form of a portal, and a pair of sealing and cutting units 10 and 10'. Obviously, the fact that it comprises two sealing and cutting units 10 and 10' is a non-restrictive example of the solution according to the invention.

[0022] More specifically, the conveyor 2 may consist of a roller conveyor or a conveyor belt extending in a direction of feed A and used to carry the pallets, each supporting a stack 3 of the aforementioned products.

[0023] The frame 4 is mounted over the conveyor 2 and is equipped, in this non-restrictive embodiment, with two pairs 5, 6 and 16, 17 of film rolls, each pair being mounted at a different height from the other on the uprights 7 and 8 of the frame 4.

[0024] The pairs of film rolls 5, 6 and 16, 17 are mounted in such a way as to form respective bands of film 9, 9' positioned transversely relative to the uprights 7 and 8 so as to intercept the front of the product stack 3 as it moves forward (see Figure 3).

[0025] The upper band 9' is designed to stabilise the stack 3, whilst the second band 9 usually has the twofold purpose of stabilising the stack 3 and presenting information or codes C relating to the products in the stack 3.

[0026] The units 10 and 10' for sealing and cutting the bands of film 9 and 9' are mounted, relative to the direction of feed A, at the back of the frame 4 and are mobile between:

- an idle position, where the units 10 and 10' are close to the uprights 7 and 8 (as shown in Figure 3); and
- a working position, where the units 10 and 10' are away from the uprights 7 and 8 so that each intercepts, seals and cuts a respective portion of the film bands 9 and 9' wrapped around the product stack 3 (as shown in Figure 2), leaving other portions of the bands 9 and 9' positioned transversely between the uprights 7 and 8 for the next stack 3.

[0027] Still with reference to Figure 2, the sealing and cutting units 10 and 10' are supported by a single mounting unit 22 that projects from the frame 4 and that slides along the crossbeam 4c of the latter to and from the idle and working positions (as indicated by the arrows F in Figures 1 and 2).

[0028] This structure is exhaustively described in Italian patent application BO2002 A000232 by the same Applicant as the present and will not therefore be described in further detail herein.

[0029] The rolls 5, 6 and 16, 17 are mounted on the uprights 7 and 8 and are equipped with rollers 23 for feeding and tensioning the respective bands of film 9 and 9' being unwound so as to keep the bands of film properly tensioned when they are intercepted by the product stack 3.

[0030] Each of the rolls 5, 6 and 16, 17 also has a carriage 24 coupled to a power driven worm screw shaft 25 that enables adjustment in both directions along the respective upright 7 and 8 (see arrows F2): this permits adjustment of the position of the bands 9, 9' on the stack 3 according to the height of the stack.

[0031] The banding machine 1 also comprises a unit 11, mounted in the vicinity of a section of the path P (shown in Figure 3) along which one of the two bands

of film - the one labelled 9 - is unwound and designed to apply at least one distinctive code C to at least one part of the band 9 itself.

[0032] The code C may be any type of label or similar device including any combination of alphanumeric strings, graphics, symbols or logos or any other alternative reference systems such as bar codes.

[0033] The unit 11 may be mounted in the vicinity of one of the film rolls 5 and 6 (in this case it is the lower pair and the roll is the one labelled 6). The unit 11 is equipped with a plurality of rollers 12 forming the unwinding path P and defining at least one straight section of film facing the unit 11: in this way, the codes C can be applied to the part of the band 9.

[0034] Similarly (see dashed line in Figure 1), the unit 11 may be mounted at the upper pair of rollers 16 and 17 so as to apply the codes C to the respective upper band 9' without thereby limiting the scope of the inventive concept.

[0035] As shown in the accompanying drawings, the unit 11 is mounted outside the frame 4, on one side of the frame 4.

[0036] As mentioned above, the pairs of rolls 5, 6 and 16, 17 can be adjusted in height in both directions and, for this purpose, the unit 11 is equipped with vertical drive means 13 allowing the band 9 and the code C application unit 11 to assume predetermined positions relative to each other.

[0037] Preferably, but without restricting the scope of the invention, the drive means 13 may synchronise the unit 11 with the lower pair of rolls 5 and 6.

[0038] The drive means 13 may, purely by way of example, comprise a beam mounting unit 14 for the unit 11, coupled with a worm screw shaft 15 that may be power driven or actuated manually by an operator in order to drive the unit 11 up and down in synchrony with the rolls 5 and 6 (see arrows F11 in Figure 1).

[0039] As regards the type of codes C applicable to the band 9, the unit 11 may consist of a customary labelling unit 11e equipped with means 11m, a kind of application pad, designed to apply at least one label C to the band of film 9.

[0040] The labelling unit 11e may apply labels C made of paper or plastic, depending on working requirements.

[0041] In an alternative embodiment, the code C application unit 11 may comprise means 11s (illustrated schematically in Figures 4, 5 and 6) for printing the codes C directly on the band of film 9 being unwound.

[0042] Obviously, the unit 11 is connected to a data processing and transmission system 30 (illustrated as a block in Figure 3) to enable the unit 11 to receive the codes C to be printed on the band 9.

[0043] Similarly, there may be means 31 for controlling the unwinding of the band 9 and activating the unit 11 in accordance with the parts of the band 9 on which the codes C have to be printed: in practice, the parts where the codes C are to be applied are decided in accordance with the size of the product stack 3 and, hence, the length of the band 9 unwound before the unit 11 is activated.

[0044] Thus, the codes C to be applied to the band 9 are generated while the band 9 itself is being unwound and printed on predetermined parts of the latter (as shown in Figure 1) calculated in accordance with the size of the stack 3 passing by.

[0045] For easy legibility of the codes C when the stack 3 is in a warehouse or is being transported from one place to another, the band 9 may have three sets of codes C applied to it, positioned on the front 3f, on one side 3g and at the back 3r of the stack 3.

[0046] On the side 3g and back 3r of the stack 3 the codes C are generated or applied to the predetermined part Z' during the step of feeding the stack 3 along the conveyor 2 while the band 9 is being unwound and in such a way that the stack front 3f intercepts the film bands 9 and 9' positioned transversally with respect to the uprights 7 and 8. The step of generating and applying the codes C to the band 9 is performed preferably while the band 9 is moving normally, or it may be performed while the band 9 is slowed down slightly or stopped for a short length of time. Alternatively, depending on the type of unit 11 used, the unit 11 may be made to move at the same speed as the band 9 being unwound and to generate and apply the codes as it follows the band 9.

[0047] The codes C on the front 3f of the stack 3, on the other hand, are obtained by a step of generating the codes C prior to the step of feeding the stack 3.

[0048] As illustrated in Figure 4, the step of feeding the stack 3 may be preceded by:

- a step of moving the branch R of the band 9 positioned transversally with respect to the uprights 7 and 8 by an amount sufficient to position at least one part Z of it at the unit 11 that applies the codes C;
- a step of generating at least the codes C on the part Z of the band 9 (see Figure 5);
- a step of further moving the branch R of the band 9 by an amount sufficient to reposition the branch R between the uprights 7 and 8 and with the part Z with the codes C applied to it at a predetermined position depending on the size of the incoming stack 3 (see Figure 6).

[0049] These steps of moving the part Z of the band 9 towards and away from the uprights 7 and 8 is accomplished by jointly turning the pair of film rolls 5 and 6.

[0050] A machine structured as described above therefore achieves the aforementioned objects by incorporating into the banding machine structure a code application unit in such a way that operations previously carried out at two different operating stations are now carried out at a single operating station.

[0051] This architecture makes it possible to speed up stack processing without affecting normal banding time

and with the advantage that the stacks have the codes assigned to them applied at the same time as they are banded.

[0052] The incorporation of the code application unit into the banding machine eliminates the need for a labelling station downstream of the banding machine, thus saving time, space and money.

[0053] The invention described has evident industrial applications and may be subject to modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A machine for banding individual, grouped or palletised products, the machine (1) comprising at least:

   - a conveyor (2) extending in a direction of feed (A) and used to transport the products (3);
   - a frame (4) mounted over the conveyor (2) and equipped with at least two rolls (5, 6) of film mounted on the frame uprights (7, 8) in such a way as to form a band of film (9, 9') positioned transversely relative to the uprights (7, 8) and intercepted by the front of the products (3) as they move forward in such a way as to unwind the film from the pair of rolls (5, 6);
   - at least one unit (10) for sealing and cutting the film (9, 9'), supported by the frame (4) and mobile between an idle position, where the unit (10) is close to the uprights (7, 8), and a working position, where the unit (10) is away from the uprights (7, 8) so that it intercepts, seals and cuts the portion of film (9, 9') wrapped around the products (3), the machine being **characterised in that** it further comprises at least one unit (11) located in the vicinity of a section of the film band (9, 9') unwinding path (P) and designed to apply at least one distinctive code (C) to at least one part of the film band (9, 9').

2. The machine according to claim 1, **characterised in that** the unit (11) is positioned in the vicinity of one of the film rolls (5, 6) and is equipped with a plurality of feed rollers (12) forming the unwinding path (P) and defining at least one straight section of the film (9) facing the unit (11).

3. The machine according to claim 1, **characterised in that** the unit (11) is mounted outside the frame (4), on one side of the frame (4).

4. The machine according to claim 1, where the pair of rolls (5, 6) can be adjusted vertically in both directions along the uprights (7, 8) of the frame (4), **characterised in that** the unit (11) is equipped with vertical drive means (13) allowing the band (9, 9') and the unit (11) to assume predetermined positions relative to each other.

5. The machine according to claim 1, where the pair of rolls (5, 6) can be adjusted vertically in both directions along the uprights (7, 8) of the frame (4), **characterised in that** the unit (11) is equipped with vertical drive means (13) that permit synchronised drive between the band (9, 9') and the unit (11).

6. The machine according to claim 1, where there are two pairs of rolls (5, 6; 16, 17) forming respective bands (9, 9') around the palletised product stack (3) and two units (10, 10') for sealing and cutting the respective bands (9, 9'), **characterised in that** the code (C) application unit (11) is positioned along the path (P) of the band (9) closest to the conveyor (2), that is to say, in the vicinity of a lower roll (6).

7. The machine according to claim 1, where there are two pairs of rolls (5, 6; 16, 17) forming respective bands (9, 9') around the palletised product stack (3) and two units (10, 10') for sealing and cutting the respective bands (9, 9'), **characterised in that** the code (C) application unit (11) is positioned along the path (P) of the band (9') furthest from the conveyor (2), that is to say, in the vicinity of an upper roll (16).

8. The machine according to claim 1, **characterised in that** the unit (11) comprises a labelling unit (11e) and means (11m) for applying at least one label (C) to the band of film (9, 9').

9. The machine according to claim 8, **characterised in that** the unit (11) is equipped with means (11m) for applying at least one label (C) made of paper.

10. The machine according to claim 8, **characterised in that** the unit (11) is equipped with means (11m) for applying at least one label (C) made of plastic.

11. The machine according to claim 1, **characterised in that** the code (C) application unit (11) comprises means (11s) for printing the codes (C) directly on the band of film (9, 9').

12. The machine according to claim 1, **characterised in that** the unit (11) is connected to a data processing and transmission system (30) to enable the unit (11) to receive at least one signal corresponding to at least one distinctive code (C) to be applied to the band (9, 9').

13. The machine according to claim 1, **characterised in that** it comprises means (31) for controlling the

unwinding of the band (9, 9') and activating the unit (11) in accordance with the parts (Z, Z') of the band (9, 9') to which the codes (C) have to be applied.

14. A method for applying codes (C) to bands of film (9, 9') wrapped around products (3) by a machine (1) as defined in claims 1 to 13, the method comprising at least the step of:

- feeding the products (3) along the conveyor (2) in such a way that the front (3f) of the products intercepts at least one band of film (9, 9') positioned transversally with respect to the uprights (7, 8), causing the film (9, 9') to be unwound at least from the pair of rolls (5, 6), the method being **characterised in that** the step of feeding the products (3) and intercepting the film band (9, 9') is preceded by:

  - a step of moving the branch (R) of the band (9, 9') positioned transversally by an amount sufficient to position at least one part (Z) of it at the unit (11) that applies the codes (C);
  - a step of applying at least one distinctive code (C) to the part (Z) of the film (9, 9');
  - a step of further moving the branch (R) of the band (9, 9') by an amount sufficient to reposition the branch (R) between the uprights (7, 8) and with the part (Z) with the code (C) applied to it at a predetermined position.

15. The method according to claim 14, **characterised in that** the steps of moving the part (Z) of the band (9, 9') towards and away from the uprights (7, 8) is accomplished by the joint rotation of the pair of film rolls (5, 6).

16. A method for applying codes (C) to bands of film (9, 9') wrapped around products (3) by a machine (1) as defined in claims 1 to 13, the method comprising at least the step of:

- feeding the products (3) along the conveyor (2) in such a way that the front (3f) of the products intercepts at least one band of film (9, 9') positioned transversally with respect to the uprights (7, 8), causing the film (9, 9') to be unwound at least from the pair of rolls (5, 6), the method being **characterised in that** the step of unwinding the film band is performed at the same time as a step of applying the code (C) to at least one part (Z) of the film band (9, 9').

FIG.1

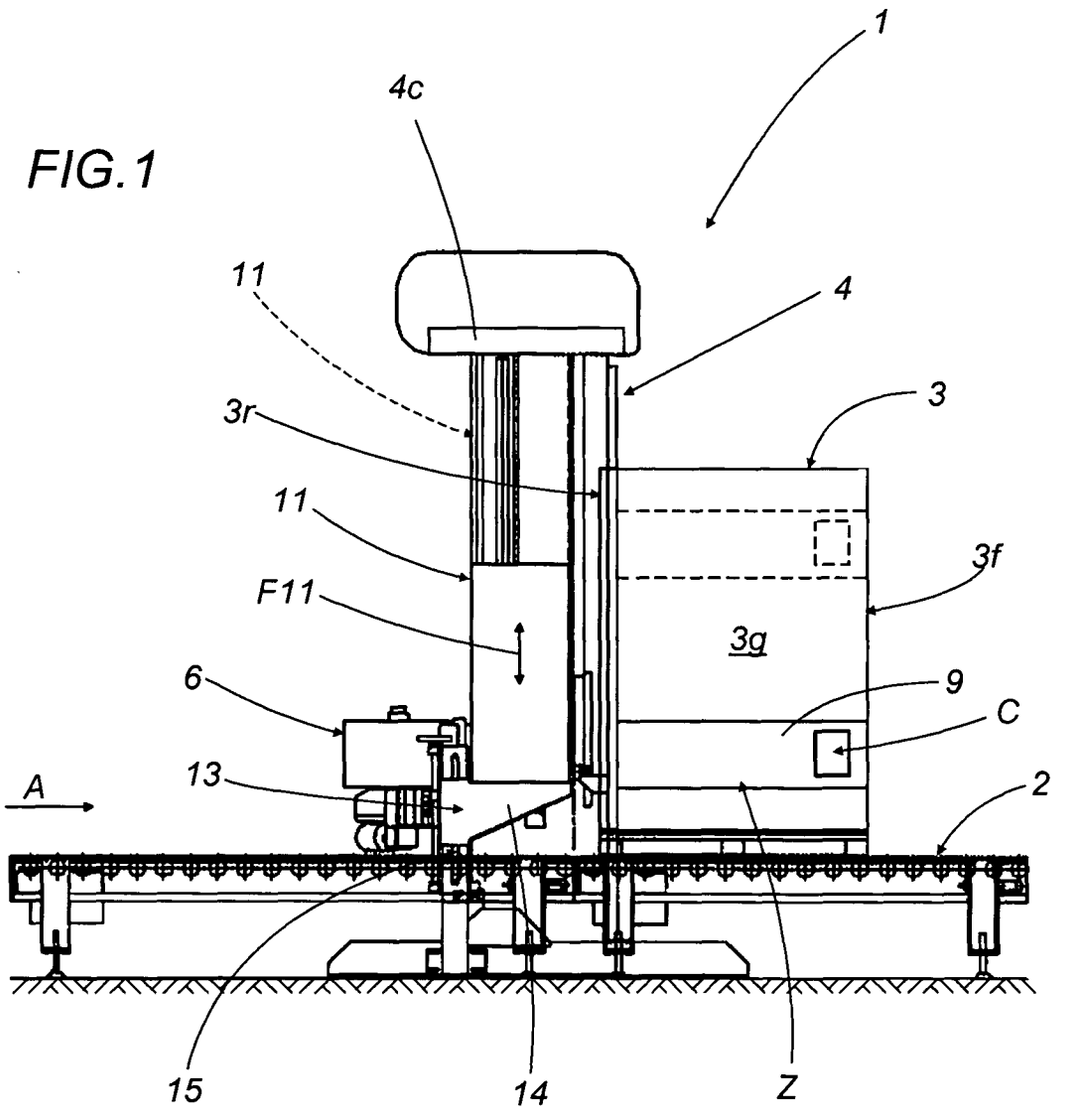


FIG.2

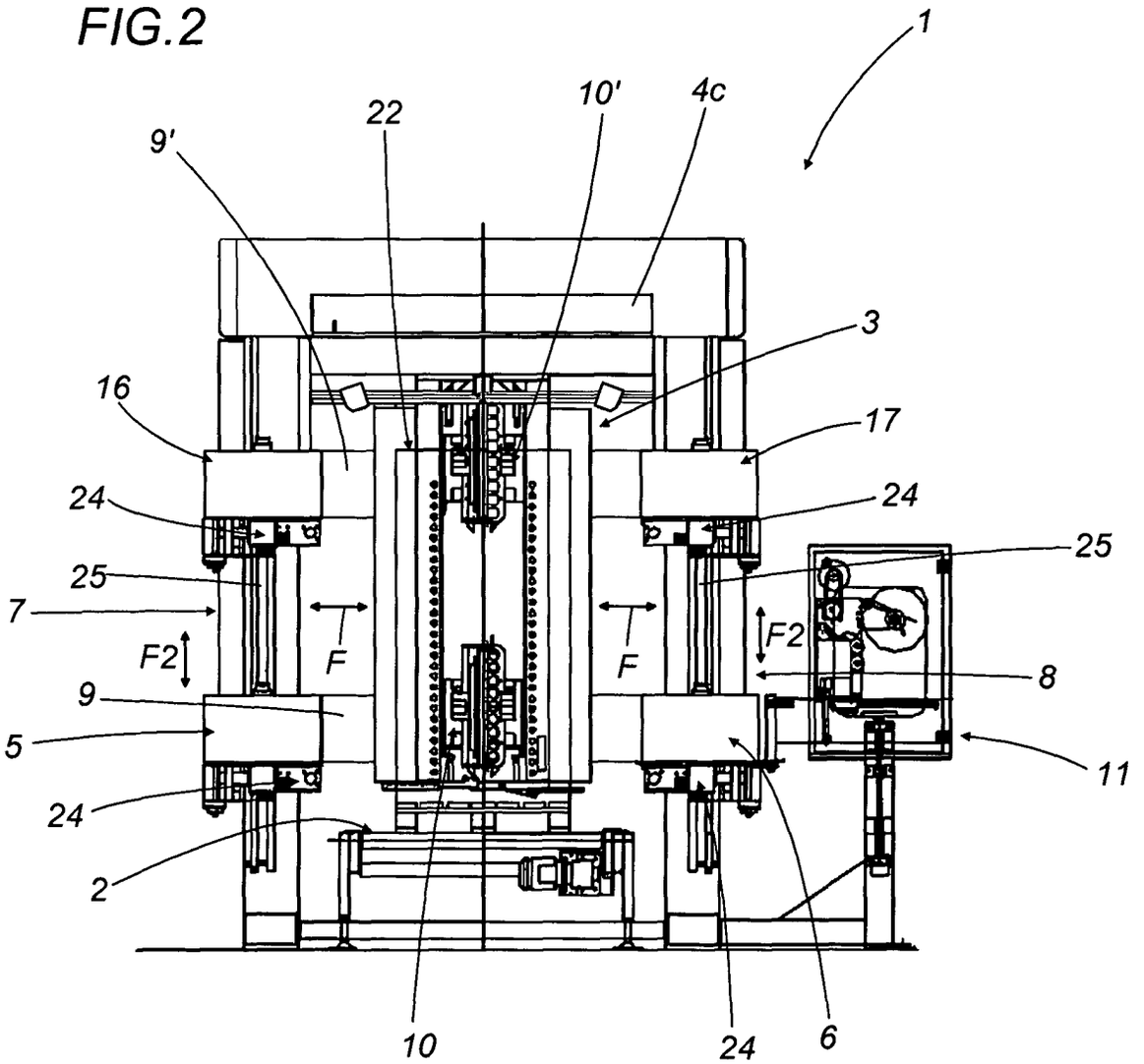


FIG.3

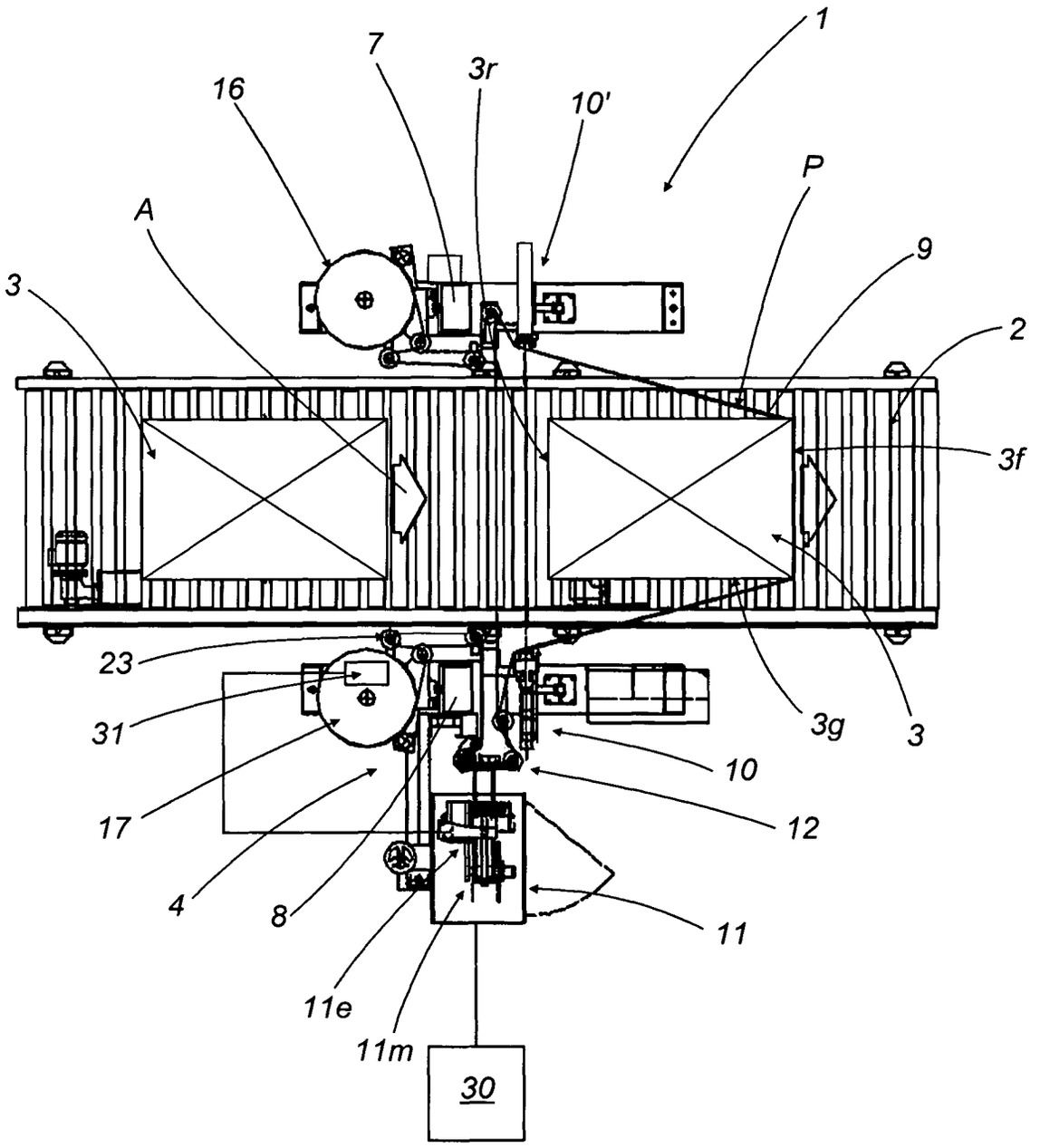


FIG.4

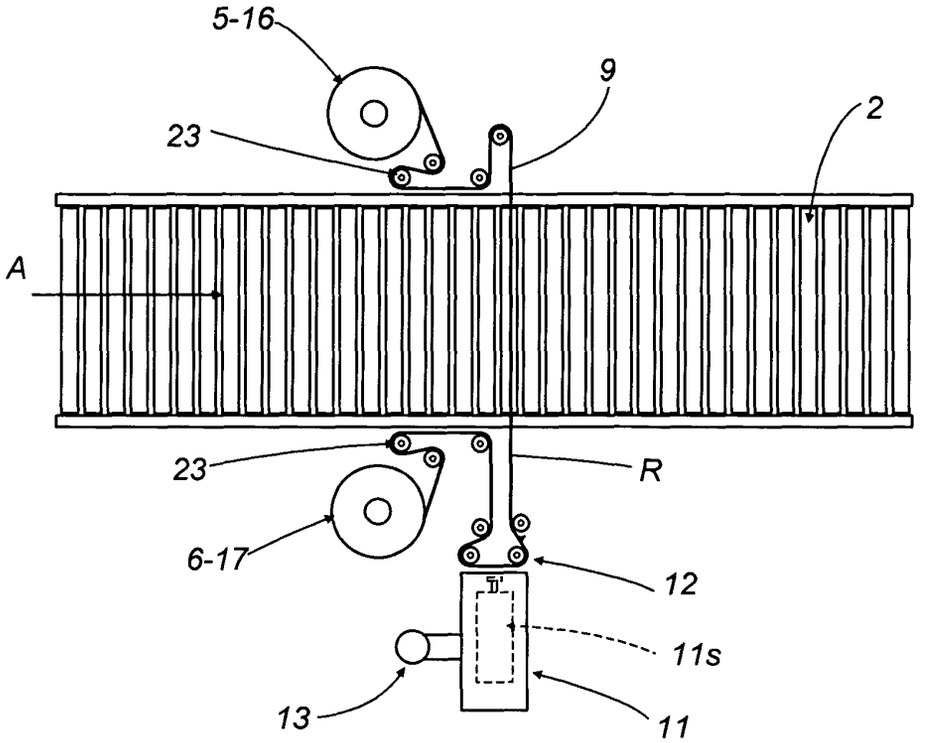


FIG.5

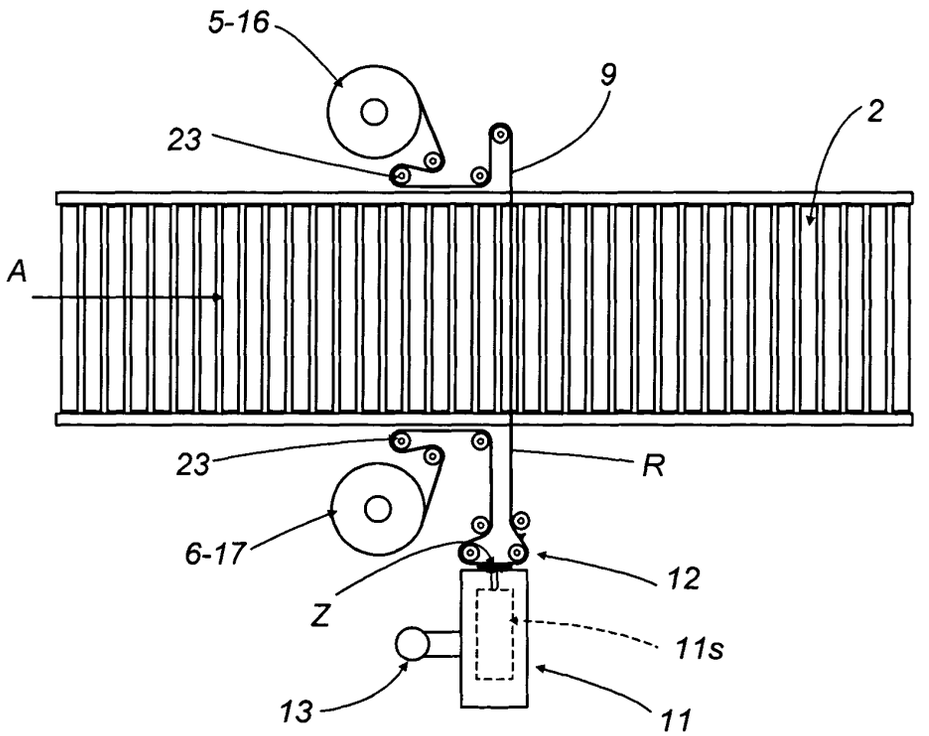
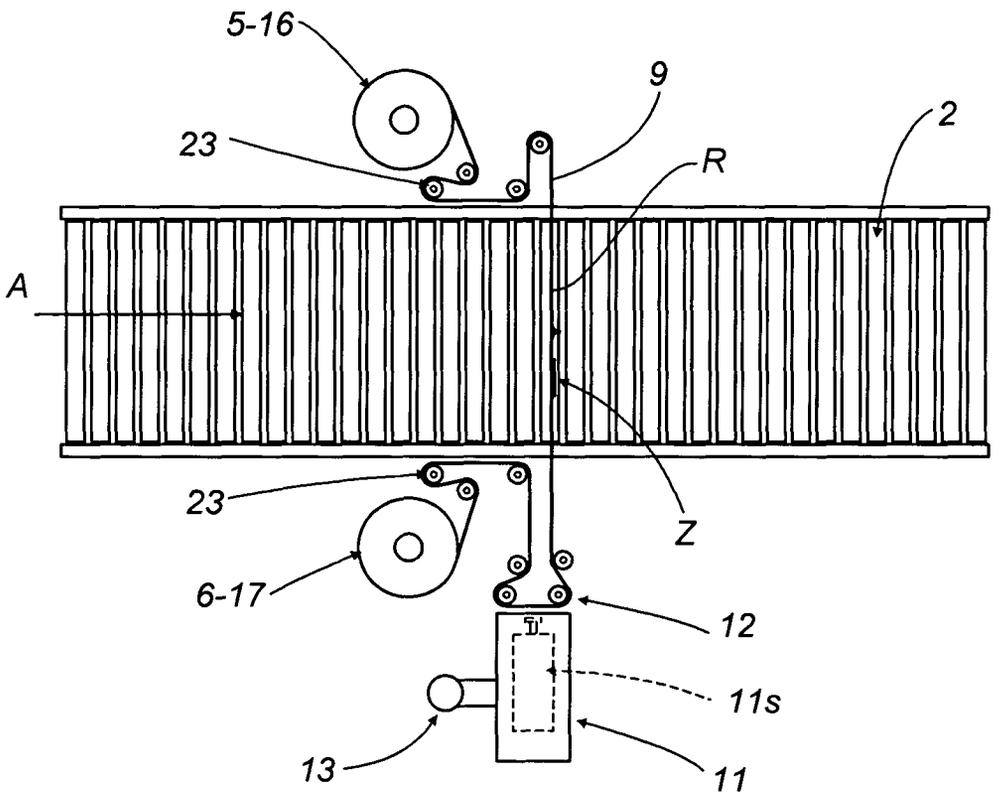


FIG.6



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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5710

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)
A	US 6 474 051 B1 (VERMEULEN NORBERT ET AL) 5 November 2002 (2002-11-05) * the whole document *		B65B9/02
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 January 2005	Ungureanu, M

CATEGORY OF CITED DOCUMENTS

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