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(54) **Apparatus for covering groups of products with tubular stretch film**

Vorrichtung zum Überziehen von Produktgruppen mit Schlauch-Stretchfolie

Appareil pour recouvrir des groupes de produits avec un film étirable tubulaire

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Description

[0001] This invention relates to apparatus for covering groups of products with tubular stretch film.

[0002] Prior technology for wrapping groups of products, including palletised loads, teaches the use of machinery, known in the trade as "hood stretch machines" which cover the products with a "hood", that is to say, a tubular length of film, preferably, but not necessarily, closed at the top end to form a sleeve-like covering that is stretched over the stacked products and allowed to return to its original size, thanks to the elastic properties of the film, in such a way as to tightly hold the products together.

[0003] This type of covering is used, for example, to protect stacked products comprising sacks of loose building material or foods, or to wrap domestic appliances, and is applied by machinery typically consisting of:

- a main portal frame structure inside which the group of products (usually palletised) is placed and which mounts a plurality of units for handling and forming the stretch film;
- a roll of tubular stretch film whose longitudinal edges are pleated to form an initially flat configuration, said roll being positioned on the side of the frame and being controlled by film feed means located at the top of the frame itself;
- a unit, located in the vicinity of the top end of the frame, for spreading open the flattened film tube;
- a unit for opening the mouth of the film to at least form a cross section corresponding to the cross section, usually quadrangular, of the group of products located under the spreading unit;
- a film stretching unit to which the film is fed in the spread open configuration and which is designed to stretch the film to a size larger than the perimeter of the palletised group of products;
- means for "pleating" or folding the film in concertina fashion in such a way as to gather up enough film to cover the palletised group of products in height; these means acting by pressure against the stretching unit, usually before the film is stretched;
- a unit, operating at the top end of the frame, for sealing and separating the film portion to be used from the rest of the film in such a way as to form a sleeve-like cover and usually also equipped with means for joining the top end of the sleeve (for example by sealing).

[0004] The stretching unit is also equipped with drive means that move the unit down along the frame in such a way as to draw the film over the products, allowing it to gradually release the concertina folds until the film reaches the base of the products at the pallet. Here the film is released completely so that it covers all the products and, if necessary, also the pallet.

[0005] Over time, many parts of this general machine

structure have developed according to different constructional philosophies.

[0006] Described below is the unit relevant to this specification in particular.

[0007] More specifically, the stretching unit usually consists of four substantially L-shaped arms positioned diagonally on the frame in such a way as to enable the related vertical portion to keep the corner of the film mouth open.

[0008] The horizontal portion of each arm may comprise:

- translational drive means for stretching the film by pulling it in a horizontal direction; and
- the aforementioned vertical drive means for movement along the frame, usually associated with the free end of the arm.

[0009] In some prior art arrangements, the concertina folding means are applied directly to each arm (see patents US 3,902,303 and FR 2.234.509). This unit normally consists of a power-driven wheel or similar revolving component which, when the film reaches the vertical portion of the arm, is brought into contact with the film and gathers the latter up in concertina fashion. After making the concertina folds, the wheel may be moved away from the film or it may continue to be used to guide the film downwardly along the sides of the product group.

[0010] In yet another solution (see patents DE 3918311 and

[0011] DE 3908957), independent power-driven rollers mounted on arms articulated to the frame are used. The arms move the rollers against the vertical portion of the arms in such a way as to make the concertina folds.

[0012] Yet another, different arrangement is disclosed in patent applications EP 1.276.668 and EP 1.353.847 where the concertina folds are made on a specially designed frame placed over, and independent of, the stretching arms and consisting of respective second arms for retaining the film after it has been opened out but before being stretched.

[0013] The frame mounts power-driven rollers for concertina folding the film by pushing it against the second arms or into contact with an idle roller connected to the second arms.

[0014] DE 900 1321 U1 describes an apparatus according to the preamble of claim 1.

[0015] All these solutions are based on the use of power-driven devices with a drive roller or wheel located preferably in front of the stretching arm surface, which may be equipped with one or more idle wheels. Concertina folding units structured in this way may lead to non-uniform distribution of the film gathered up along the surface of the arm: this may in turn lead to overlapping of the film during subsequent stretching, causing parts of the film to stiffen as it is drawn over the group of products.

[0016] This stiffening results in the film tearing or in any case not covering the product groups properly.

[0017] In view of the above, the Applicant has designed and constructed an apparatus for covering groups of products with tubular stretch film equipped with an extremely functional concertina folding unit capable of overcoming the above mentioned drawback while maintaining a high level of operating flexibility and without encumbering the constructional architecture of the apparatus.

[0018] This invention accordingly provides an apparatus for covering groups of products with tubular stretch film, in particular, an apparatus for covering groups of products with tubular stretch film comprising the technical characteristics defined in one or more of the annexed claims.

[0019] The technical characteristics of the invention, with reference to the above aims, 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:

- Figures 1 to 3 are schematic front views, with some parts cut away in order to better illustrate others, showing an apparatus according to the present invention for covering groups of products with tubular stretch film in different operating configurations;
- Figure 4 is a schematic side view, with some parts others cut away in order to better illustrate others, of a detail A from Figure 2, namely, a stretching arm;
- Figure 5 is a top plan view of the stretching arm of Figure 4;
- Figure 6 is a cross-section through line VI - VI of Figure 5.

[0020] With reference to the accompanying drawings, in particular Figures 1 to 3, the apparatus according to the invention, labelled 3 in its entirety, is used to cover with tubular stretch film 2 one or more products forming product groups 1.

[0021] Hereinafter, the term product group 1 will be used, without thereby limiting the scope of the inventive concept, to denote any entity consisting of a single product or two or more stacked products to be wrapped and sealed by the tubular stretch film 2.

[0022] In particular, but without restricting the scope of the invention, the apparatus is used for palletized product groups 1 of known type and only partly illustrated in schematic form in Figure 3.

[0023] The apparatus 3 according to the invention is of the type essentially comprising the following elements of particular relevance to this specification: a frame 4, a roll 5 of stretch film 2, means 8 for gripping and opening the film 2, a unit 9 for stretching the film 2 and means 13 for concertina folding or gathering up the film 2 on the stretching unit 9.

[0024] The frame 4 is usually of the portal type enabling the product group 1 to be positioned inside it.

[0025] The roll 5 of stretch film 2 is mounted outside the frame 4, is provided with film 2 having a tubular cross section with pleated sides (the pleating is not illustrated in the drawings since it is of well known type) to form an initially flattened configuration, and is controlled by film 2 feed means 6 located at the top of the frame 4 itself.

[0026] The gripping and opening means 8 are located inside the frame 4 and usually comprise four clamping gripper units 8a (shown in particular in Figures 1 and 3) acting on the mouth of the film 2 to at least give the mouth a quadrangular cross section.

[0027] The above mentioned unit 9 for stretching the film 2 receives the latter from the gripping means 8 in the spread open configuration and then stretches it to a size larger than the perimeter of the product group 1 (see Figure 2).

[0028] To do this, the unit 9 comprises a plurality of arms 10 - usually four, arranged in twos, one at each corner formed by two longitudinal walls of the product group 1.

[0029] Each arm 10 comprises a first vertical section 10a for receiving the film 2 on its surface 10b, and a second section 10c by which the arm 10 itself is linked to the frame 4.

[0030] Each arm 10 further comprises horizontal translational drive means 11 and vertical drive means 12 for respectively stretching the film 2 and moving the arms 10 down along the frame 4 in such a way as to cover the product group 1 (see arrows F11 and F12 in Figure 3).

[0031] The above mentioned means 13 for folding the film 2 in concertina fashion gather up a quantity of film 2 sufficient to cover the product group 1 (see Figures 2, 3 and 4); the means 13 are mounted on each arm 10 and act on the film 2 before it is stretched.

[0032] The drawings of the preferred embodiment also partly illustrate the following:

- a unit 30, located near the top end of the frame 4 (upstream of the gripping means 8), for spreading open the pleated sides of the film 2 fed in a vertical direction V; and
- a unit 31 for sealing the top of the unwound portion of film 2, to form a sleeve-like cover, when necessary, and separating it from the rest of the film 2; the unit 31 being located at the top end of the frame 4.

[0033] As shown in Figure 4, the concertina folding means 13 comprise a power-driven concertina folding belt 14 and an idle roller 16.

[0034] Looking in more detail, the power-driven belt 14 for folding the film 2 in concertina fashion is associated with each arm 10 and positioned in the area at the back of the above mentioned film 2 contact surface 10b of the vertical arm section 10a.

[0035] At least one section 14a of the belt 14 is located at a partial opening 15 in the surface 10b to form a part thereof and in such a way as to engage and feed the film 2 towards the bottom of the contact surface 10b (as in-

dictated by the arrow F14) in combination with the idle roller 16.

[0036] The above mentioned idle roller 16 is positioned to face the contact surface 10b of each arm 10 and is moved by respective drive means 17 between a retracted, idle position, where the roller 16 is away from the section 14a of the belt 14 (as shown by the dashed line in Figure 5), and an advanced, working position, where the roller 16 is in contact with the film 2 interposed between the roller 16 itself and the section 14a of the belt 14 (see Figure 4 and continuous line in Figure 5).

[0037] Figure 4 also shows that the belt 14 is of the endless type and is looped around two wheels 18 and 19, of which at least one, the one labelled 19, is power driven in order to drive the belt in direction F19.

[0038] On the loop defined by the belt 14, a part of the belt 14 portion extending at the top of the belt 14 itself constitutes the section 14a for engaging and feeding the film 2.

[0039] More specifically, the part of the belt 14 portion constituting the section 14a for engaging and feeding the film 2 has a predetermined active working height H such that the film 2 is moved towards the contact surface 10b even under the area where it is interposed between the belt and the idle roller 16: in practice, the film 2, which is "flung" from the point of contact between the belt 14 and the roller 16, and as it proceeds, remains in contact with the belt 14, at least partially and then comes into contact with the surface 10b of the vertical section 10 where it is gathered up uniformly.

[0040] Again with reference to Figure 4, at least the active portion of the belt 14 that feeds the film 2 extends, preferably but without restricting the scope of the invention, at an angle to the contact surface 10b.

[0041] More precisely, the entire belt 14 can be inclined to the contact surface 10b at a divergent angle α , extending from the top end to the bottom end, so that the film 2 feed section 14a of the belt 14 can project partially from the opening 15.

[0042] As mentioned above, when the roller 16 is in the advanced, working position, the belt 14 section 14a and the roller 16 are in tangential contact with each other, that is to say, they touch at a single point.

[0043] That is because the part of the belt 14 section 14a that comes into contact with the roller 16 is the part at the top wheel 18 of the belt 14.

[0044] At a constructional level (see Figure 5 in particular) the vertical section 10a of each arm 10 may have an arc-shaped cross section defined by three parts 20, 21, 22 joined to each other without interruption.

[0045] In this situation, the belt 14 is positioned behind the central part 21 where the partial opening 15 is made.

[0046] As shown in Figure 6, the belt 14 may be powered by a drive unit 23 mounted on the arm 10 and kinematically linked through a respective shaft 24 to the bottom wheel 19 of the belt 14.

[0047] As shown in Figures 5 and 6, each idle roller 16 is rotatably linked to one end of a horizontal rod 25 pivoted

at the opposite end to a pin 26 that rotates about a vertical axis Z linked to each joining section 10c of the arm 10.

[0048] Each rod 25 is acted upon by an actuator 27 (constituting the above mentioned drive means 17), located on the joining section 10c and designed to impart to the rod 25 a rotational movement in a horizontal plane between the retracted, idle position and the advanced, working position of the roller 16.

[0049] An apparatus structured in this way, therefore, achieves the above mentioned aims thanks to the presence of the belt behind the surface for gathering up the film on each arm.

[0050] Thanks to its position and cooperation with the idle roller at the front, the belt starts gathering up or concertina folding the film on its moving surface at a predetermined rate and then releases it on the unmoving surface of the arm, allowing the concertina folding action to be completed by the force of the remaining film pushing down as the belt feeds it.

[0051] This structure permits better distribution of the concertina folds along the stretching arm, making them more compact and uniform so that the film can subsequently be drawn over the group of products and released in a precisely balanced way.

[0052] Obviously, during the releasing action, the belt does not touch the film because while the film is being drawn over the walls of the product group, the tension created by stretching the film tends to keep the film path clear of the projecting part of the belt, while the roller is in the retracted position.

[0053] Moreover, it should also be noticed that the size and position of the belt do not alter the overall dimensions and configurations of the arms during their different operating movements.

[0054] The invention described has evident industrial applications and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept as claimed.

Claims

1. An apparatus for covering one or more products forming a product group (1) with tubular stretch film (2), the apparatus (3) being of the type comprising at least:

- a roll (5) of tubular stretch film (2) with pleated sides, controlled by film (2) feed means (6) located at the top end of a frame (4);
- means (8) for gripping and opening the mouth of the film (2) to at least give the cross section of the mouth a polygonal shape; said gripping means comprising a plurality of gripper elements for each corner of the film;
- a film (2) stretching unit (9) which receives the film (2) from the gripping means (8) in the spread open configuration and stretches it to a size larg-

er than the perimeter of the product group (1); the unit (9) comprising a plurality of arms (10) each consisting of a first vertical section (10a) for receiving the film (2) on its surface (10b), and a second section (10c) for linking the arms (10) to the frame (4); each arm (10) being acted upon by horizontal translational drive means (11) and vertical drive means (12) which, respectively, stretch the film (2) and move it downwards along the frame (4) in such a way as to cover the product group (1);

- means (13) for "pleating" or folding the film (2) in concertina fashion in such a way as to gather up a quantity of film (2) at least sufficient to cover the product group (1) along its perimetric sides, said means (13) being mounted on each arm (10) and acting on the film (2) before it is stretched, the apparatus (3) being **characterised in that** the concertina folding means (13) comprise at least:

- a power-driven belt (14) for concertina folding the film (2), associated with each arm (10) and positioned in the area at the back of a film (2) contact surface (10b) of the vertical section (10a); at least one section (14a) of the belt (14) being located at a partial opening (15) in the surface (10b) to form a part thereof, in such a way as to engage and feed the film (2) towards the bottom of the contact surface (10b) in combination with
- an idle roller (16), positioned to face the contact surface (10b), associated with each arm (10) and driven by respective means (17) between a retracted, idle position, where the roller (16) is away from the section (14a) of the belt (14), and an advanced, working position, where the roller (16) is in contact with the film (2) interposed between the roller (16) itself and the section (14a) of the belt (14).

2. The apparatus according to claim 1, **characterised in that** the belt (14) is of the endless type and is looped around two wheels (18, 19), of which at least the wheel (19) is power driven.
3. The apparatus according to claim 1, **characterised in that** the belt (14) is of the endless type and is looped around two wheels (18, 19), of which at least the wheel (19) is power driven; a part of the belt (14) portion extending at the top of the belt (14) itself constituting the section (14a) for engaging and feeding the film (2).
4. The apparatus according to claim 3, **characterised in that** the part of the belt (14) portion constituting the section (14a) for engaging and feeding the film

(2) has a predetermined active working height (H) such that the film (2) is moved towards the contact surface (10b) even under the area where it is interposed between the belt and the idle roller (16).

5. The apparatus according to claims 1 to 4, **characterised in that** at least the active portion of the belt (14) that feeds the film (2) extends at an angle to the contact surface (10b).
6. The apparatus according to claims 1 to 4, ' **characterised in that** the belt (14) is inclined to the contact surface (10b) at a divergent angle (α), extending from the top end to the bottom end, so that the section (14a) of the film (2) feed belt (14) projects partially from the opening (15).
7. The apparatus according to claim 1, **characterised in that** at the advanced, working position of the roller (16), the belt (14) section (14a) and the roller (16) are in tangential contact with each other, that is to say, they touch at a single point.
8. The apparatus according to claims 1 to 4, **characterised in that**, at the advanced working position, the roller (16) is in tangential contact with, that is to say, touches at a single point, the belt (14) section (14a) located at the upper wheel (18) of the belt (14).
9. The apparatus according to claim 1, where the vertical section (10a) of each arm (10) has an arc-shaped cross section defined by three parts (20, 21, 22) joined to each other without interruption, the apparatus being **characterised in that** the belt (14) is positioned behind the central part (21) where the partial opening (15) is made.
10. The apparatus according to claims 1 to 4, **characterised in that** the belt (14) is powered by a drive unit (23) mounted on the arm (10) and kinematically linked through a respective shaft (24) to the bottom wheel (19) of the belt (14).
11. The apparatus according to claim 1, **characterised in that** each idle roller (16) is rotatably linked to one end of a horizontal rod (25) pivoted at the opposite end to a pin (26) that rotates about a vertical axis (Z) linked to each joining section (10c) of the arm (10); each rod (25) being acted upon by an actuator (27) located on the joining section (10c) and designed to impart to the rod (25) a rotational movement in a horizontal plane between the retracted, idle position and the advanced, working position of the roller (16).

Patentansprüche

1. Vorrichtung zum Überziehen von einer aus einem

oder mehreren Produkten gebildeten Produktgruppe (1) mit schlauchförmiger Stretchfolie (2), wobei die Vorrichtung (3) der Art ist, die zumindest Folgendes beinhaltet:

- eine Rolle (5) schlauchförmiger Stretchfolie (2) mit gefalteten Seiten, die durch Mittel (6) für den Vorschub der Folie (2) angesteuert wird, welche am oberen Ende eines Rahmens (4) angeordnet sind;

- Mittel (8) zum Greifen und Öffnen der Mündung der Folie (2), um dem Mündungsquerschnitt zumindest eine polygonale Form zu geben; wobei die Greifermittel mehrere Greifelemente für jede Folienecke beinhalten;

- eine Einheit (9) zum Dehnen der Folie (2), welche die Folie (2) von den Greifermitteln (8) in der aufgeweiteten Konfiguration übernimmt und auf eine Größe dehnt, die größer ist als der Umfang der Produktgruppe (1); wobei die Einheit (9) mehrere Arme (10) beinhaltet, die jeweils aus einem ersten vertikalen Abschnitt (10a) zur Aufnahme der Folie (2) auf dessen Oberfläche (10b) bestehen, und aus einem zweiten Abschnitt (10c) zur gelenkigen Verbindung der Arme (10) mit dem Rahmen (4); wobei auf jeden Arm (10) Antriebsmittel (11) für die horizontale Translationsbewegung und vertikale Antriebsmittel (12) wirken, die jeweils die Folie (2) dehnen beziehungsweise sie nach unten entlang des Rahmens (4) bewegen, um die Produktgruppe (1) zu überziehen;

- Mittel (13) zum "Plissieren" oder ziehharmonikaähnlichen Falten der Folie (2), um eine solche Menge an Folie (2) anzusammeln, die zumindest für das Überziehen der Produktgruppe (1) entlang ihrer Umfangsseiten ausreicht, wobei diese Mittel (13) auf jedem Arm (10) montiert sind und auf die Folie (2) wirken, bevor diese gedehnt wird, und wobei die Vorrichtung (3) **dadurch gekennzeichnet ist, dass** die Plissiermittel (13) zumindest Folgendes beinhalten:

- einen kraftbetriebenen Riemen (14) zum Plissieren der Folie (2), der mit jedem Arm (10) verbunden und in dem Bereich auf der Rückseite der Kontaktoberfläche (10b) der Folie (2) des vertikalen Abschnittes (10a) angeordnet ist; wobei zumindest ein Abschnitt (14a) des Riemens (14) an einer teilweisen Öffnung (15) in der Oberfläche (10b) vorgesehen ist, um einen Teil davon zu bilden und auf diese Weise die Folie (2) mitzunehmen und zum unteren Teil der Kontaktoberfläche (10b) hin vorzuschieben, in Kombination mit

- einer Leerlaufrolle (16), die der Kontaktoberfläche (10b) zugewandt angeordnet ist,

mit jedem Arm (10) verbunden ist und durch entsprechende Mittel (17) bewegt wird zwischen einer zurückgezogenen Leerlaufstellung, in der die Rolle (16) von dem Abschnitt (14a) des Riemens (14) abgehoben ist, und einer vorderen Arbeitsstellung, in der die Rolle (16) die Folie (2) berührt, die sich zwischen der Rolle (16) selbst und dem Abschnitt (14a) des Riemens (14) befindet.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Riemen (14) als Endlosriemen ausgeführt und um zwei Räder (18, 19) gelegt ist, von denen zumindest das Rad (19) kraftbetrieben ist.

3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Riemen (14) als Endlosriemen ausgeführt und um zwei Räder (18, 19) gelegt ist, von denen zumindest das Rad (19) kraftbetrieben ist; wobei ein Teil des Riemenzweiges (14), der sich auf der Oberseite des Riemens (14) erstreckt, den Abschnitt (14a) für das Mitnehmen und Vorschieben der Folie (2) bildet.

4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** der Teil des Riemenzweiges (14), der den Abschnitt (14a) für das Mitnehmen und Vorschieben der Folie (2) bildet, eine vorbestimmte aktive Arbeitshöhe (H) aufweist, so dass die Folie (2) auch unterhalb des Bereiches, in dem sie sich zwischen dem Riemen und der Rolle (16) befindet, zur Kontaktoberfläche (10b) hin bewegt wird.

5. Vorrichtung nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** zumindest der aktive Zweig des Riemens (14), der die Folie (2) vorschiebt, in einem bestimmten Winkel zu der Kontaktoberfläche (10b) verläuft.

6. Vorrichtung nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** der Riemen (14) relativ zu der Kontaktoberfläche (10b) in einem divergierenden Winkel (α) geneigt ist, der sich von dem oberen Ende zum unteren Ende erstreckt, so dass der Abschnitt (14a) des Riemens (14) für den Vorschub der Folie (2) teilweise über die Öffnung (15) hervorragt.

7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** in der vorderen Arbeitsstellung der Rolle (16) der Abschnitt (14a) des Riemens (14) und die Rolle (16) in tangentialer Berührung miteinander sind, das heißt, dass sie sich an einem einzigen Punkt berühren.

8. Vorrichtung nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** in der vorderen Arbeitsstellung die Rolle (16) und der Abschnitt (14a) des Riemens (14), der am oberen Rad (18) des Riemens

(14) angeordnet ist, in tangentialer Berührung miteinander sind, das heißt, dass sie sich an einem einzigen Punkt berühren.

9. Vorrichtung nach Anspruch 1, worin der vertikale Abschnitt (10a) jedes Armes (10) einen bogenförmigen Querschnitt aufweist, der durch drei Teile (20, 21, 22) gebildet wird, die unterbrechungsfrei miteinander verbunden sind, wobei die Vorrichtung **dadurch gekennzeichnet ist, dass** der Riemen (14) hinter dem mittleren Teil (21) angeordnet ist, wo die teilweise Öffnung (15) ausgebildet ist. 5 10
10. Vorrichtung nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** der Riemen (14) durch eine Antriebseinheit (23) angetrieben wird, die auf dem Arm (10) montiert ist und kinematisch über eine entsprechende Welle (24) mit dem unteren Rad (19) des Riemens (14) verbunden ist. 15 20
11. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jede Leerlaufrolle (16) drehbar mit einem Ende einer horizontalen Stange (25) verbunden ist, die an ihrem entgegengesetzten Ende drehbar auf einem Zapfen (26) gelagert ist, der sich um eine vertikale Achse (Z) dreht und jeweils mit dem Verbindungsabschnitt (10c) des Armes (10) verbunden ist; wobei jede Stange (25) durch einen Stellantrieb (27) betätigt wird, der auf dem Verbindungsabschnitt (10c) angeordnet ist und dafür ausgelegt ist, die Stange (25) in einer horizontalen Ebene eine Drehbewegung ausführen zu lassen zwischen der zurückgezogenen Leerlaufstellung und der vorderen Arbeitsstellung der Rolle (16). 25 30 35

Revendications

1. Un appareil pour recouvrir un ou plusieurs produits formant un groupe (1) de produits avec un film étirable tubulaire (2), tel appareil (3) étant du type comprenant au moins: 40
 - une bobine (5) de film étirable tubulaire (2) avec côtés repliés, asservie à des moyens (6) d'alimentation du film (2) situés au niveau de l'extrémité supérieure d'un châssis (4); 45
 - des moyens (8) destinés à saisir et à ouvrir la bouche du film (2) pour au moins conférer à la section de ladite bouche une forme polygonale; 50
 - lesdits moyens de prise comprenant une pluralité d'éléments de prise pour chaque angle du film;
 - un groupe (9) d'étirage du film (2) qui reçoit ledit film (2) depuis les moyens de prise (8) dans la configuration ouverte et l'étire jusqu'à lui donner une dimension supérieure au périmètre du groupe (1) de produits; le groupe (9) comprenant 55
2. L'appareil selon la revendication 1, **caractérisé en ce que** la bande (14) est du type sans fin et est enroulée en boucle autour de deux roues (18, 19) dont au moins la roue (19) est motorisée.
3. L'appareil selon la revendication 1, **caractérisé en ce que** la bande (14) est du type sans fin et est enroulée en boucle autour de deux roues (18, 19) dont au moins la roue (19) est motorisée; une partie de la portion de bande (14) s'étendant au niveau de l'extrémité supérieure de la bande (14) elle-même constituant ladite portion (14a) d'assujettissement et d'alimentation du film (2).
4. L'appareil selon la revendication 3, **caractérisé en ce que** la partie de la portion de bande (14) qui cons-

nant une pluralité de bras (10) consistant chacun en une première section verticale (10a) destinée à recevoir le film (2) sur sa surface (10b) et une deuxième section (10c) destinée à associer lesdits bras (10) au châssis (4); des moyens (11) de translation horizontale et des moyens (12) d'entraînement vertical agissant sur chaque bras (10) de manière, respectivement, à étirer le film (2) et à le faire descendre le long du châssis (4) afin de recouvrir le groupe (1) de produits; - des moyens (13) pour plisser ou plier le film (2) en accordéon de manière à rassembler une quantité de film (2) au moins suffisante pour recouvrir le groupe (1) de produits le long de ses côtés périmétriques, lesdits moyens (13) étant montés sur chaque bras (10) et agissant sur le film (2) avant que celui-ci soit étiré, l'appareil (3) étant **caractérisé en ce que** les moyens (13) de pliage en accordéon comprennent au moins:

- une bande (14) motorisée pour le pliage en accordéon du film (2), associée à chaque bras (10) et positionnée dans la zone située à l'arrière de la surface (10b) de contact du film (2) de la section verticale (10a); au moins une portion (14a) de la bande (14) étant située au niveau d'une ouverture partielle (15) de la surface (10b), pour en former une partie, afin d'assujettir et d'alimenter le film (2) vers la partie inférieure de la surface de contact (10b) en association avec
- un rouleau fou (16), positionné face à la surface de contact (10b), associé à chaque bras (10) et mû par des moyens (17) respectifs entre une position rentrée de repos, dans laquelle le rouleau (16) est éloigné de la portion (14a) de la bande (14), et une position sortie opérationnelle, dans laquelle le rouleau (16) est en contact avec le film (2) interposé entre le rouleau (16) lui-même et la portion (14a) de la bande (14).

titue la portion (14a) d'assujettissement et d'alimentation du film (2) a une hauteur de travail utile (H) prédéfinie de manière à ce que le film (2) soit mû vers la surface de contact (10b) même au-dessous de la zone où il est interposé entre la bande et le rouleau fou (16). 5

5. L'appareil selon les revendications de 1 à 4, **caractérisé en ce qu'**au moins la portion active de la bande (14) qui alimente le film (2) s'étend de biais par rapport à la surface de contact (10b). 10
6. L'appareil selon les revendications de 1 à 4, **caractérisé en ce que** la bande (14) est inclinée par rapport à la surface de contact (10b) selon un angle divergent (α), s'étendant de l'extrémité supérieure à l'extrémité inférieure, de manière à ce que la portion (14a) de la bande (14) d'alimentation du film (2) dépasse partiellement de l'ouverture (15). 15
20
7. L'appareil selon la revendication 1, **caractérisé en ce qu'**au niveau de la position sortie opérationnelle du rouleau (16), la portion (14a) de la bande (14) et le rouleau (16) lui-même sont en contact tangentiel réciproque, c'est-à-dire qu'ils se touchent en un seul point. 25
8. L'appareil selon les revendications de 1 à 4, **caractérisé en ce que** le rouleau (16), dans la position sortie opérationnelle, est en contact tangentiel avec, c'est-à-dire qu'il touche en un seul point, la portion (14a) de la bande (14) située au niveau de la roue supérieure (18) de ladite bande (14). 30
9. L'appareil selon la revendication 1, où la section verticale (10a) de chaque bras (10) présente une section arquée définie par trois parties (20, 21, 22) raccordées entre elles sans interruption, l'appareil étant **caractérisé en ce que** la bande (14) est positionnée derrière la partie centrale (21) où est réalisée l'ouverture partielle (15). 35
40
10. L'appareil selon les revendications de 1 à 4, **caractérisé en ce que** la bande (14) est motorisée par un groupe d'entraînement (23) monté sur le bras (10) et cinématiquement relié, par l'intermédiaire d'un arbre (24) respectif, à la roue inférieure (19) de la bande (14). 45
11. L'appareil selon la revendication 1, **caractérisé en ce que** chaque rouleau fou (16) est associé de façon rotative à une extrémité d'une tige horizontale (25) montée de façon pivotante, au niveau de son extrémité opposée, sur un pivot (26) qui tourne autour d'un axe vertical (Z) associé à chaque section de jonction (10c) du bras (10) ; un actionneur (27) agissant sur chaque tige (25), tel actionneur (27) étant situé sur la section de jonction (10c) et étant destiné 50
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à imprimer à ladite tige (25) un mouvement de rotation, dans un plan horizontal, entre la position rentrée de repos et la position sortie opérationnelle du rouleau (16).

FIG.1

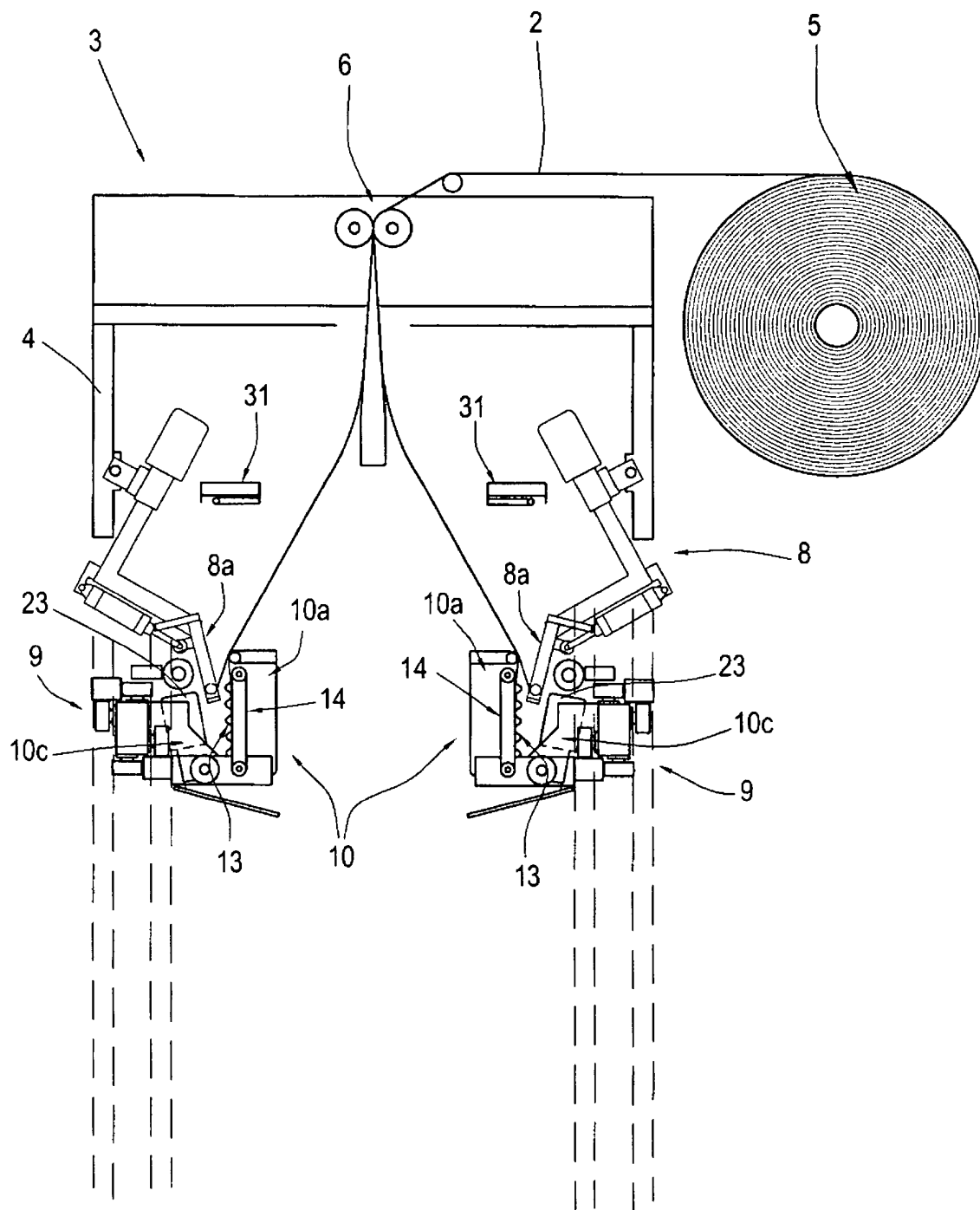


FIG.2

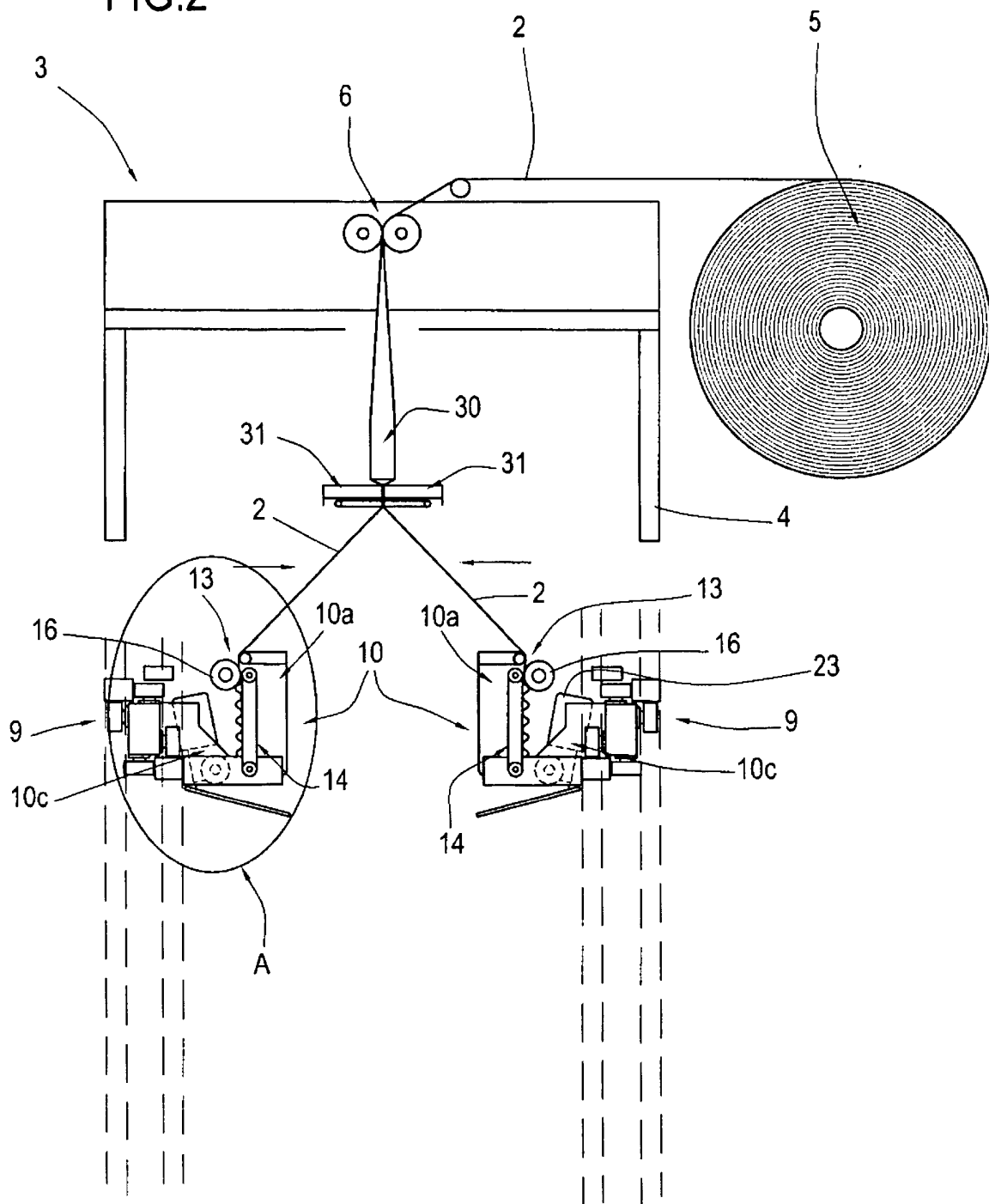


FIG.3

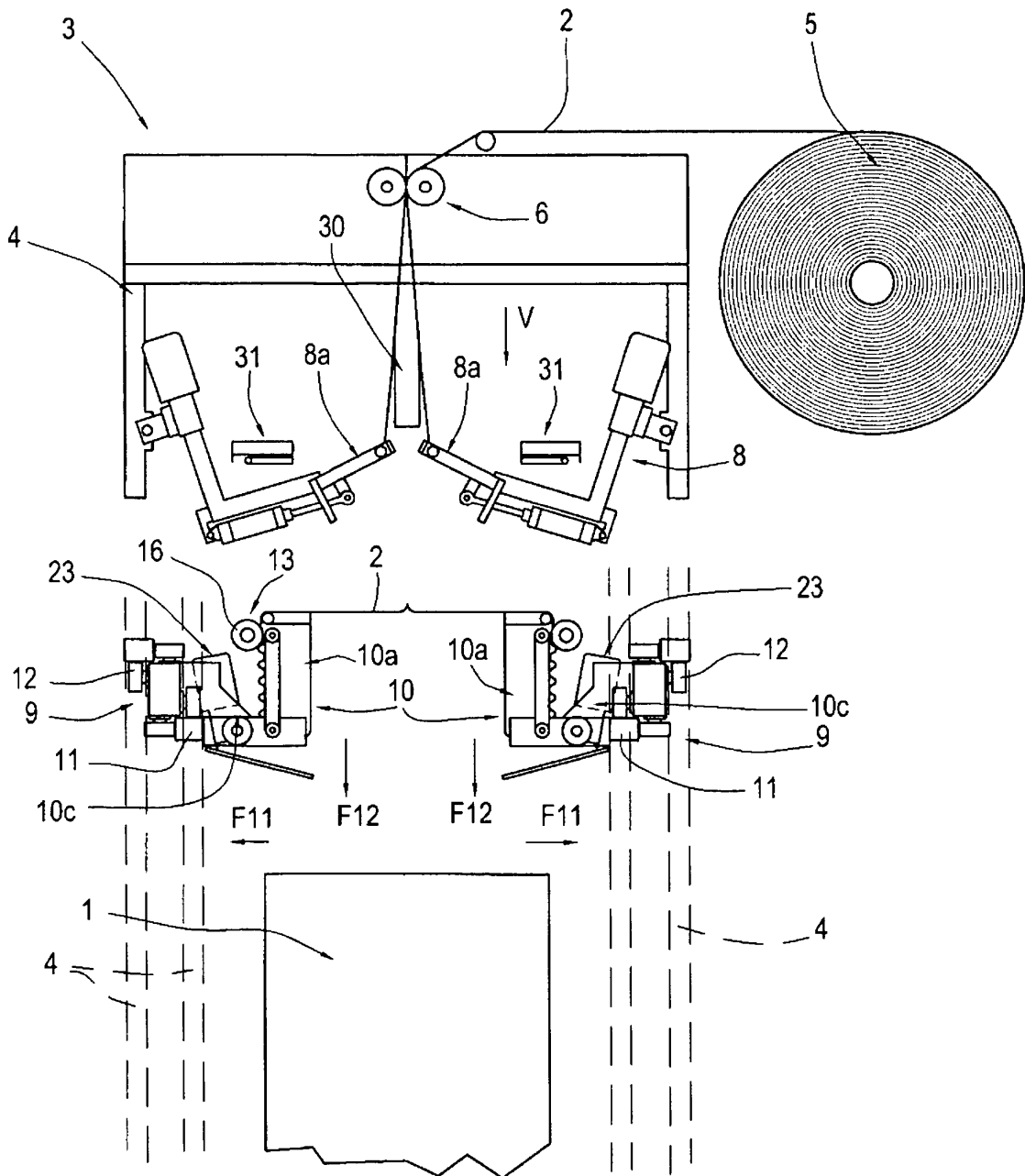


FIG.4

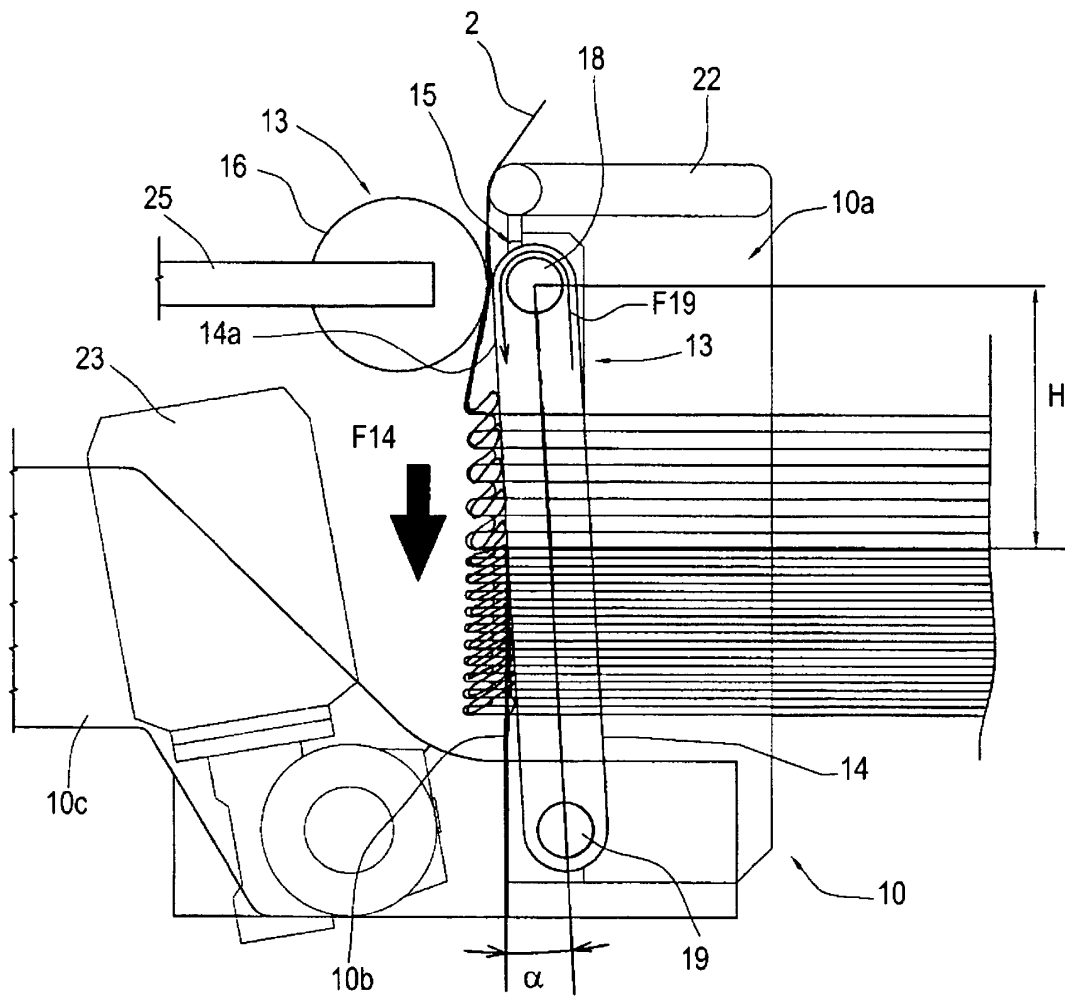


FIG.5

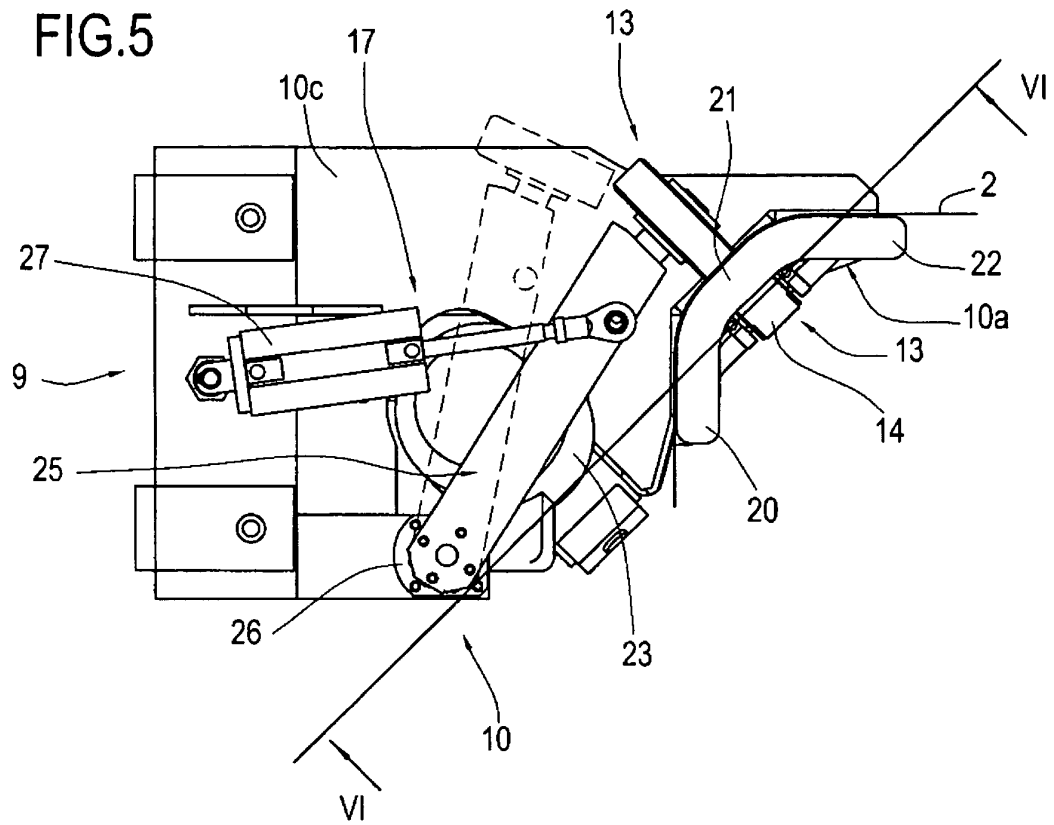
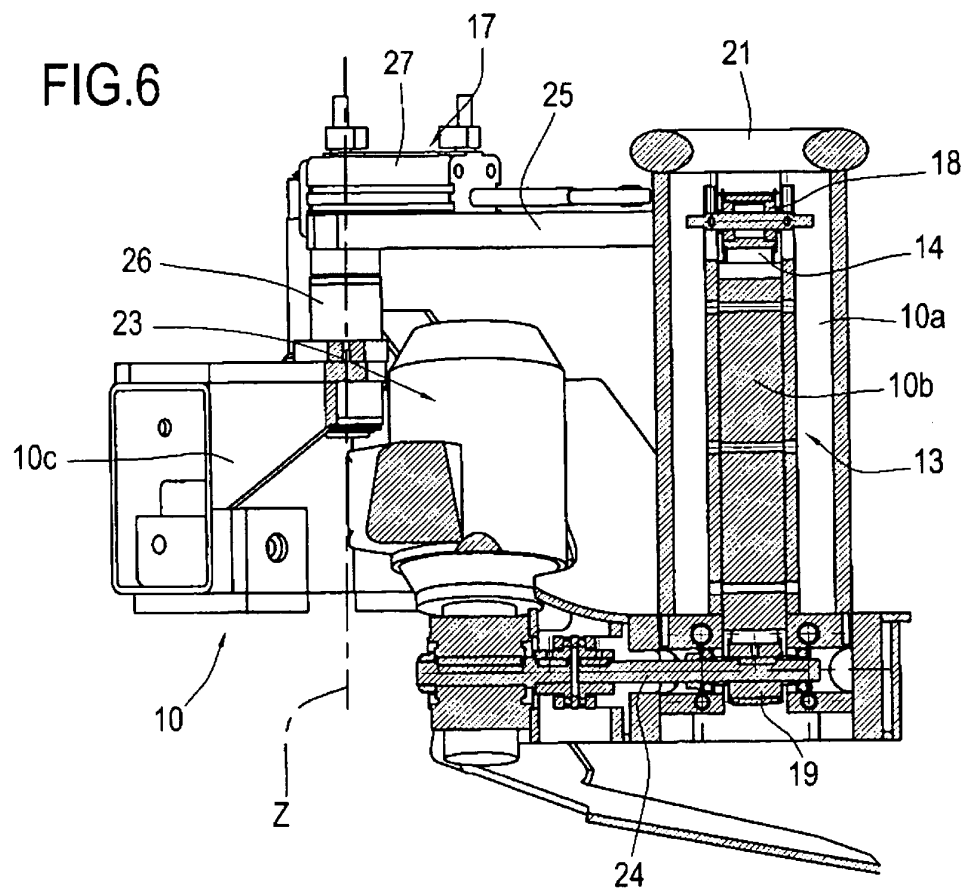


FIG.6



REFERENCES CITED IN THE DESCRIPTION

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