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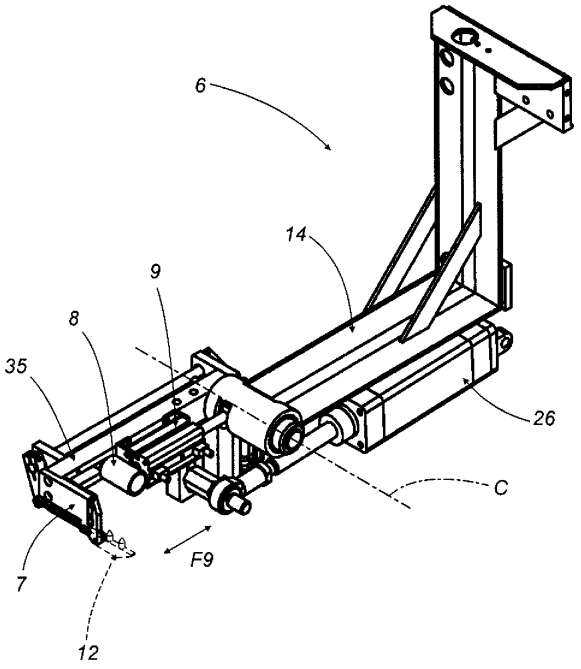
(54) Apparatus for covering groups of products with stretch film

(57) An apparatus for covering groups (1) of products with stretch film (2) comprises: a roll (4) of tubular stretch film (2) with pleated sides; means (6) for gripping and opening the mouth of the film (2) to give the mouth a polygonal shape; the means (6) comprise one gripper element for each corner (A) of the film (2), operating by holding the corners (A) by means of a first member (7) and a second member (8) for clamping and retaining the corners (A); a film (2) stretching unit (11) for receiving the film (2) from the gripping means (6) in the spread open configuration and stretching it to a size larger than the perimeter of the product group (1); each gripper element (6) is equipped with a third, auxiliary clamping member (12), positioned in the vicinity of one of the two clamping members (7, 8) and driven, by respective second means (13), between an idle position, where the third, auxiliary member (12) is located under the horizontal plane defined by the mouth of the film (2), and a working film (2) clamping position where the third, auxiliary member (12) is turned inside the mouth of the film (2) in such a way as to hold the film (2) from the inside, thus increasing the working perimeter of the mouth of the film (2).

FIG.4



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Description

[0001] This invention relates to an apparatus for covering groups of products with 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] The unit relevant in particular to this specification is described below.

[0007] The unit concerned is the one used to open the film tube that arrives from the spreading unit.

[0008] In many prior art solutions, this opening unit (see Figure 1) consists of four arms articulated to the machine frame and each equipped, at its free end, with grippers P designed to engage the corners A of the film F which is still in the closed configuration.

[0009] Drive means acting on each arm enable the grippers P to widen, that is, "open" the mouth of the film F (see Figure 2) so that it can be placed on the stretching unit below, which usually consists of four L-shaped arms arranged in opposite pairs in a closed position in order to gather up the film, by folding it in concertina fashion, and transversally stretch it.

[0010] At present, with prior art gripper units, this operation is relatively simple and reliable when the products to be covered are on pallets spanning a relatively wide working perimeter.

[0011] On the other hand, when the group of products is small, at least in terms of perimetric extension, it has been found that the gripper units, especially on account of their mode of gripping the corners of the film, are unable to open the mouth of the film enough, that is to say, create a working perimeter wide enough, to allow the stretching arms to enter the mouth itself: this is due, in particular, to the structure and overall dimensions of the stretching arms themselves.

[0012] In other words, clamping the corners of the film reduces the film perimeter on the four sides of the film mouth (see Figures 1 and 2): in this situation the working perimeter of the film cannot be used to the full and is not large enough to allow entry of the stretching arms in the closed position enabling the film to be subsequently stretched.

[0013] The aim of this invention is to overcome the above mentioned drawback by providing an apparatus for covering groups of products with stretch film, equipped with a film gripping and opening unit that is more versatile and capable of using the full working perimeter of the film, irrespective of the size of the product group to be covered.

[0014] According to the invention, this aim is achieved by a unit for opening stretch film, in particular a unit for opening stretch film in apparatus for covering product groups, comprising the technical characteristics defined in one or more of the annexed claims.

[0015] 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 and 2 are schematic top plan views illustrating two steps of gripping and opening film using prior art gripping means in apparatus for covering product groups with stretch film;
- Figure 3 is a schematic front view, with some parts cut away to better illustrate others, of an apparatus according to the present invention for covering groups of products with stretch film;
- Figures 4, 5 and 6 are, respectively, perspective, side and front views illustrating a gripper element forming part of the apparatus of Figure 3;
- Figure 7 is a schematic front view, with some parts cut away and others in cross section, showing a detail of the gripper element illustrated in the drawings listed above;
- Figures 8 and 9 are top plan views illustrating another two steps of gripping and opening the film, as in Figures 1 and 2, but using the gripper elements shown in Figures 4 to 7.

[0016] With reference to the accompanying drawings, in particular Figure 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.

[0017] 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.

[0018] 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.

[0019] 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 6 for gripping and opening the film 2 and a unit 11 for stretching the film 2.

[0020] The frame 4 is usually of the portal type enabling the product group 1 to be positioned inside it.

[0021] 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 being illustrated in Figure 1 and being of well known type) to form an initially flattened configuration, and is controlled by film 2 feed means 5 located at the top of the frame 4 itself.

[0022] The gripping and opening means 6 are located inside the frame 4 and act on the mouth of the film 2 to at least give the mouth a polygonal, and, in this case, quadrangular, cross section.

[0023] The unit 11 for stretching the film 2 receives the latter from the gripping means 6 in the spread open configuration and then stretches it to a size larger than the perimeter of the product group 1.

[0024] To do this, the unit 11 comprises a plurality of paddles 11a - usually four, arranged in twos, one at each corner formed by two longitudinal walls of the product group 1.

[0025] 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 6), 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.

[0026] The above mentioned gripping means 6 (see also Figures 4 to 7), particularly relevant to this specification, comprise one gripper element for each corner A of the film 2 (usually, as in the case of the stretching paddles 11a, there are four of these elements arranged in twos on the frame 4). The gripper elements 6 operate by holding the corners A by means of a first and a second member 7 and 8 for clamping and retaining the corners A.

[0027] The two members 7 and 8 are driven by first drive means 9 in such a way as to move relative to each other between a spaced apart, idle position (shown in Figure 1 and in Figures 4 to 7), and a clamped working position where their respective opposite surfaces are close together (see Figures 2 and 8, and arrows F9).

[0028] Each gripper element 6 is acted upon by horizontal translational drive means 10 (see arrows F10 in Figure 2) for opening the mouth of the film 2 (these means being illustrated schematically in Figure 3 since they are of well known type).

[0029] As illustrated in Figures 3 to 7 purely as a non-limiting example of the solution according to the invention, each gripper element 6 may comprise an L-shaped arm 14 articulated at B to the frame 4 and rotatable about the point B (see arrows B in Figure 3) .

[0030] The arm 14 has a front portion 35 that is in turn articulated at C to the main portion of the arm 14 itself and rotatable about the point C independently of the rest of the arm 14 (see arrows C in Figure 3) by means of an actuator 26.

[0031] The first, fixed clamping member consists of a contact plate 7 associated with the free end of the arm portion 35, while the second clamping member, which is mobile along the front portion 35 thanks to an actuator 9, consists of a roller 8 for holding the corner A of film 2 against the fixed contact plate 7.

[0032] In addition to these, each gripper element 6 has a third, auxiliary clamping member 12, located in the vicinity of the first clamping member 7 and driven by respective second means 13, between:

- an idle position, where the third, auxiliary member 12 is located under the horizontal plane defined by the mouth of the film 2 (see dashed line in Figures 7 and 8); and
- a working film 2 clamping position where the third,

auxiliary member 12 is turned inside the mouth of the film 2 in such a way as to hold the film 2 from the inside, thus increasing the working perimeter of the mouth of the film 2 (see arrows F13 in Figure 7).

[0033] More specifically, the third, auxiliary member 12 is positioned under the first clamping member 7 and parallel to the plane made by the mouth of the film 2 being opened, at the above mentioned idle position.

[0034] The third, auxiliary member 12 is, in practice, an additional clamping component acting in conjunction with an end surface 7a of the first clamping member 7 (that is, of the above mentioned plate 7), at the working position in such way as to grip the film 2 inside and outside, together with the first member 7 (as shown in Figure 7).

[0035] To better obtain this alternative grip, the second means 13 for driving each third, auxiliary clamping member 12 are positioned on the respective gripper element 6 and are coordinated with the first drive means 9 in such a manner that, when the third, auxiliary clamping member 12 is in the working position, the first and second clamping members 7 and 8 are apart so as to obtain the different configuration for holding the mouth of the film 2.

[0036] Looking more closely at the details of the structure, the third clamping member consists of a pin 12 articulated to the second drive means 13 and pivoted, at 12a, in the vicinity of the free outer end of the fixed plate 7 in such a way that, in the rotated working position, it is face to face with an end surface 7a of the clamping plate 7 with the film 2 interposed between them.

[0037] The second drive means 13 in turn comprise a drive linkage 15 (see Figures 4 to 7 again) which affords:

- a rod 16 positioned parallel with the first clamping member 7 and linked, at one end, to the pin 12 and, at the other end, to
- a first drive lever 17 which moves as one with a transmission shaft 18 extending parallel with the arm 14 and which is in turn connected, at its other end, to
- one end of a second drive lever 18a controlled by an actuator 19 interposed between the second lever 18a and the arm 14 to which the actuator 19 is linked and designed to enable the pin 12 to move from its idle to its working position and vice versa.

[0038] In this way, the movement imparted by the actuator 19, positioned at an intermediate area of the arm 14, makes the pin 12 rotate between the two above mentioned positions by means of the drive linkage 15 described above.

[0039] Further, the pin 12 may comprise an elastic partial contact surface 20 giving it a more secure grip on the film 2.

[0040] In particular, the pin 12 may comprise two elastic protrusions 20a and 20b that can be accommodated at least partially in two respective cavities 21 and 22 afforded by the end surface of the first clamping member 7 when the pin 12 is in the working position (see Figure 7).

[0041] The gripper elements 6 thus clamp and open the mouth of the film 2 in the steps illustrated in Figures 1 and 2.

[0042] After that, when necessary, the pin 12 is activated, moves into the mouth of the film 2 in the vicinity of the corners A and clamps the corners against the end surface 7a of the plate 7.

[0043] At this point, the roller 8 is retracted and the clamped portions of the film 2 corners A are released thereby enlarging the working perimeter of the film 2 mouth within which the stretching paddles 11a are positioned.

[0044] The pin 12 gripping the film 2 inside and outside in this particular way also allows the film to be pre-stretched, when necessary, thus further enlarging the working perimeter of the film mouth without tearing the film 2: this yet further facilitates the entry of the stretching paddles 11a. An apparatus structured as described above therefore achieves the aforementioned aims thanks to an extremely simple and economical mechanism applied to the gripper elements without altering the constructional architecture of the existing gripper elements.

[0045] This mechanism enables the apparatus thus structured to be used for product groups and film of any size, in particular, small sizes.

[0046] 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. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. An apparatus for covering product groups (1) with stretch film (2); the apparatus (3) being of the type comprising at least:

   - a roll (4) of tubular stretch film (2) with pleated sides, controlled by film (2) feed means (5) located at the top end of a frame (4);
   - means (6) for gripping and opening the mouth of the film (2) to give the mouth a polygonal shape; the means (6) comprising one gripper element for each corner (A) of the film (2), operating by holding the corners (A) by means of a first member (7) and a second member (8) for clamping and retaining the corners (A) and driven by first drive means (9) in such a way as to move relative to each other between a spaced apart, idle position and a clamped working position where their respective opposite surfaces are close together; each gripper element (6) being acted upon at least by horizontal translational drive means (10) designed to enable the

mouth of the film (2) to be opened;
- a film (2) stretching unit (11) for receiving the film (2) from the gripping means (6) in the spread open configuration and stretching it to a size larger than the perimeter of the product group (1); the apparatus (3) being **characterised in that** each gripper element (6) is equipped with a third, auxiliary clamping member (12), positioned in the vicinity of one of the two clamping members (7, 8) and driven, by respective second means (13), between an idle position, where the third, auxiliary member (12) is located under the horizontal plane defined by the mouth of the film (2), and a working film (2) clamping position where the third, auxiliary member (12) is turned inside the mouth of the film (2) in such a way as to hold the film (2) from the inside, thus increasing the working perimeter of the mouth of the film (2).

2. The apparatus according to claim 1, **characterised in that** the third, auxiliary member (12) is positioned under the first clamping member (7) and parallel to the plane made by the mouth of the film (2), at the idle position.

3. The apparatus according to claim 1, **characterised in that** the third, auxiliary member (12) constitutes an additional clamping component acting in conjunction with an end surface (7a) of the first clamping member (7), at the working position, in such way as to grip the film (2) inside and outside, together with the first member (7).

4. The apparatus according to claim 1, **characterised in that** each second drive means (13) for driving each third, auxiliary clamping member (12) is positioned on the respective gripper element (6) and is coordinated with the first drive means (9) in such a manner that, when the third, auxiliary clamping member (12) is in the working position, the first clamping member (7) and the second clamping member (8) are apart so as to obtain the different configuration for holding the mouth of the film (2).

5. The apparatus according to claim 1, where each gripper element (6) comprises at least: an arm (14) articulated to the frame (4) and mounting the first, fixed clamping member, which comprises a contact plate (7), at its free end, and the second clamping member, which is mobile along the arm (14) and which comprises a roller (8) for holding the corner (A) of film (2) against the fixed plate (7), the apparatus being **characterised in that** the third clamping member comprises a pin (12) articulated to the second drive means (13) and pivoted, at (12a), in the vicinity of the free outer end of the fixed plate (7) in such a way that, in the rotated working position, it is face to face with an end surface of the clamping plate (7) with the film (2) interposed between them.

6. The apparatus according to claim 5, **characterised in that** the second drive means (13) comprise a drive linkage (15) affording:

- a rod (16) positioned parallel with the first clamping member (7) and linked, at one end, to the pin (12) and, at the other end, to
- a first drive lever (17) which is associated with a transmission shaft (18) extending parallel with the arm (14) and which is in turn connected, at its other end, to
- one end of a second drive lever (18a) controlled by an actuator (19) interposed between the second lever (18a) and the arm (14) to which the actuator (19) is linked and designed to enable the pin (12) to move from its idle to its working position and vice versa.

7. The apparatus according to claim 5, **characterised in that** the pin (12) includes an elastic partial surface (20) for contact with the film (2).

8. The apparatus according to claims 5 to 7, **characterised in that** the pin (12) comprises two elastic protrusions (20a, 20b) that can be accommodated at least partially in two respective cavities (21, 22) afforded by the end surface of the first clamping member (7) when the pin (12) itself is in the working position.

FIG.1

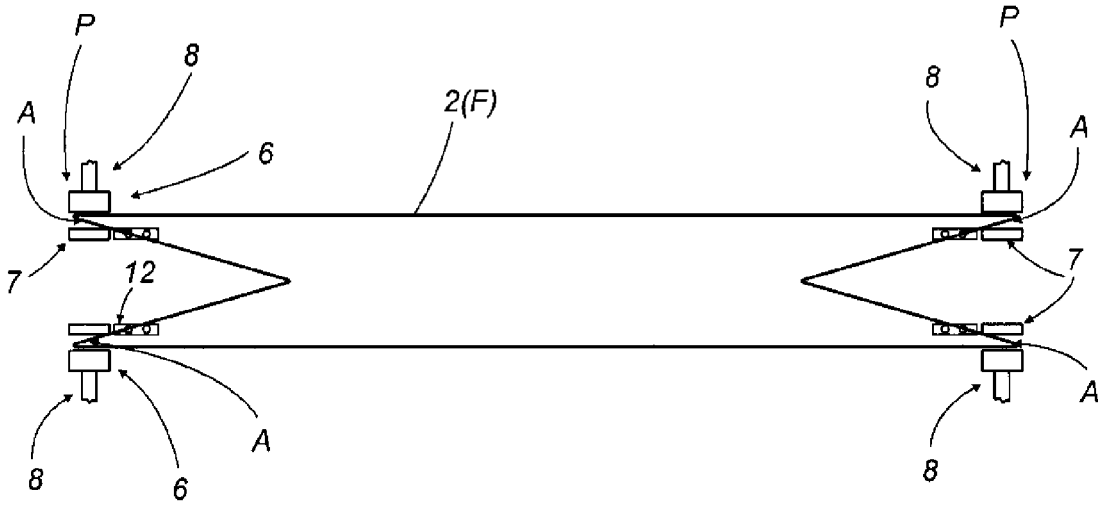
P
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FIG.2

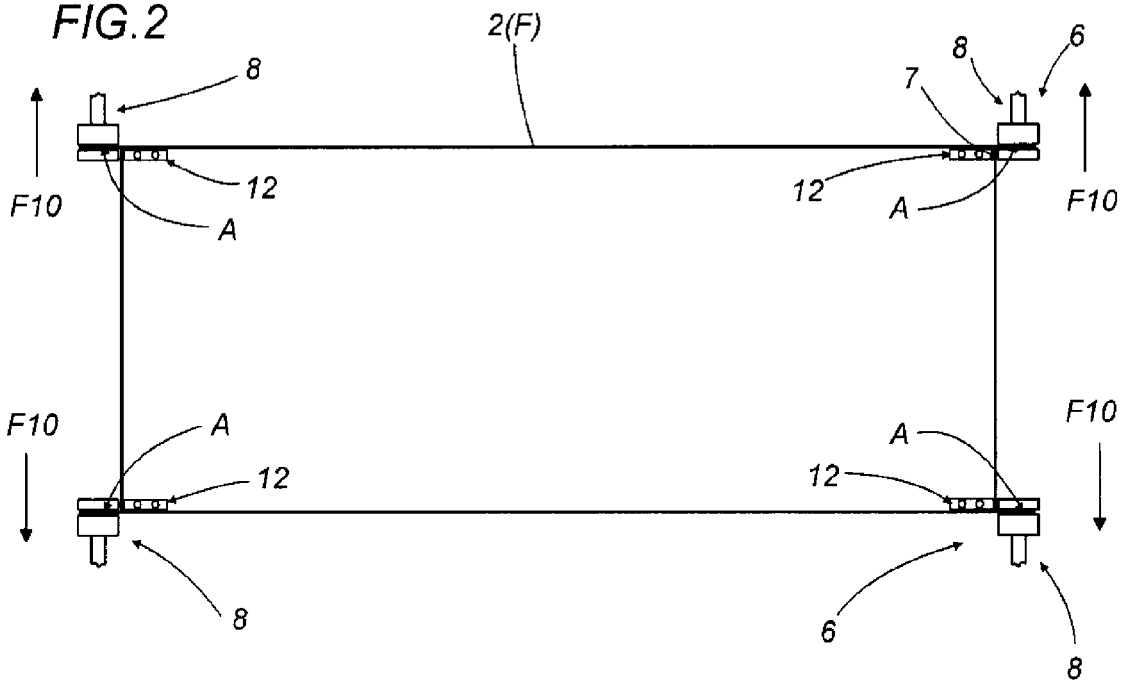
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FIG.3

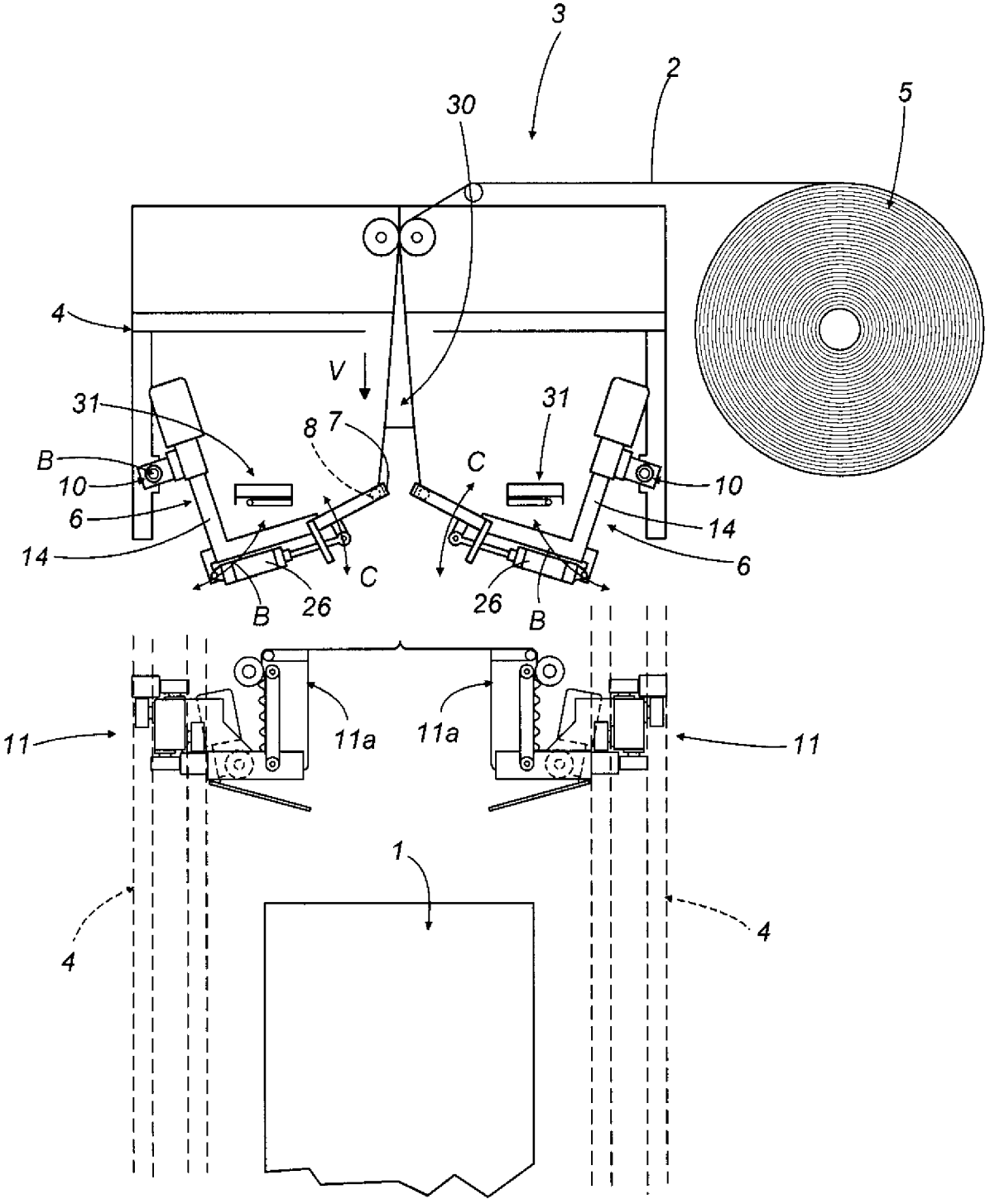


FIG.4

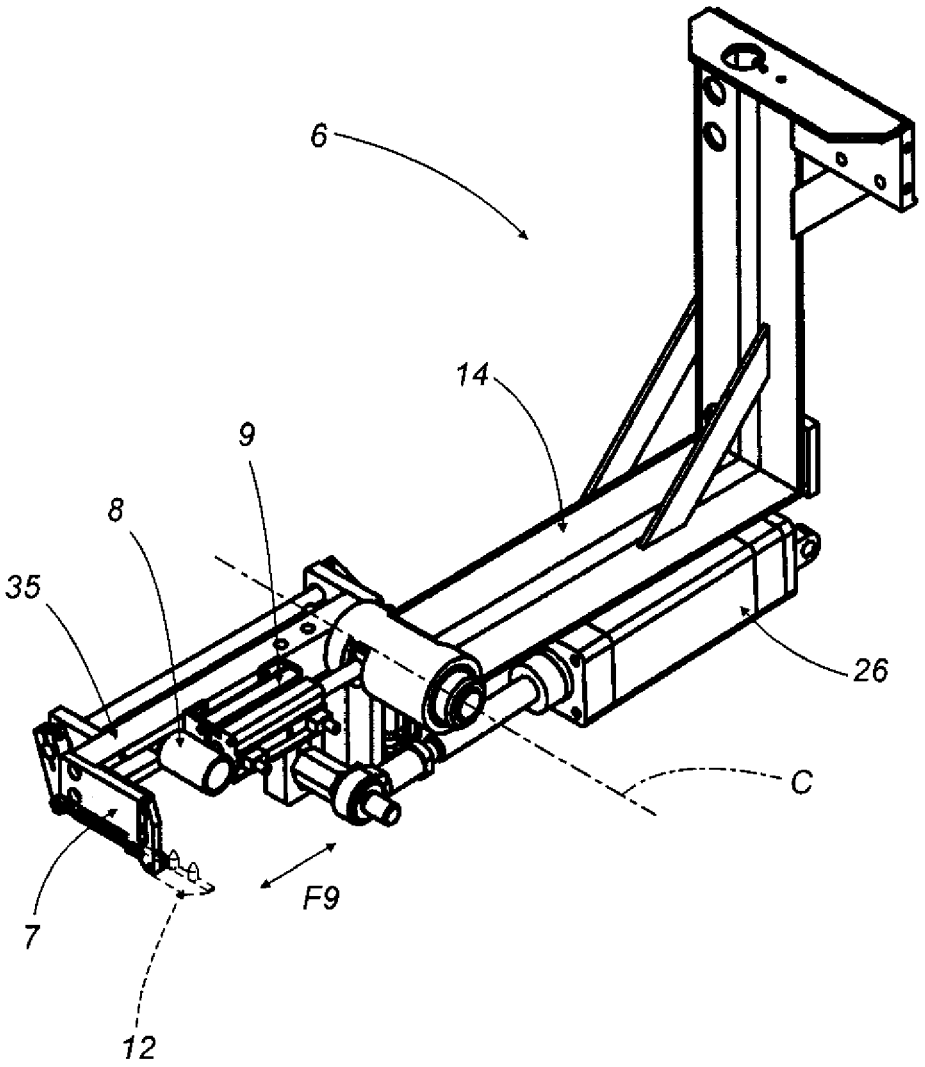


FIG.5

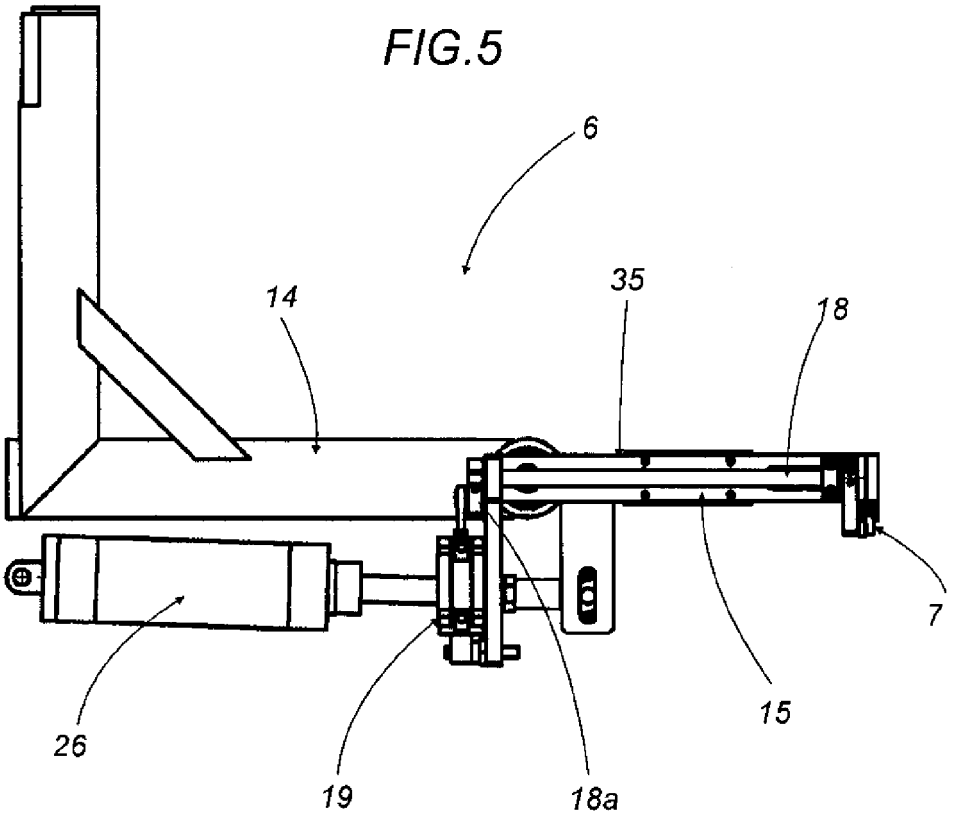
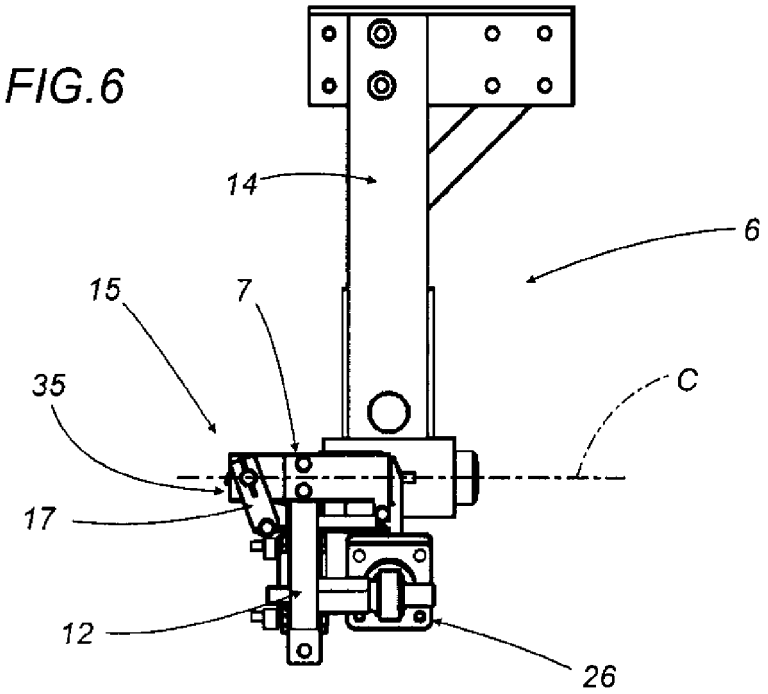


FIG.6



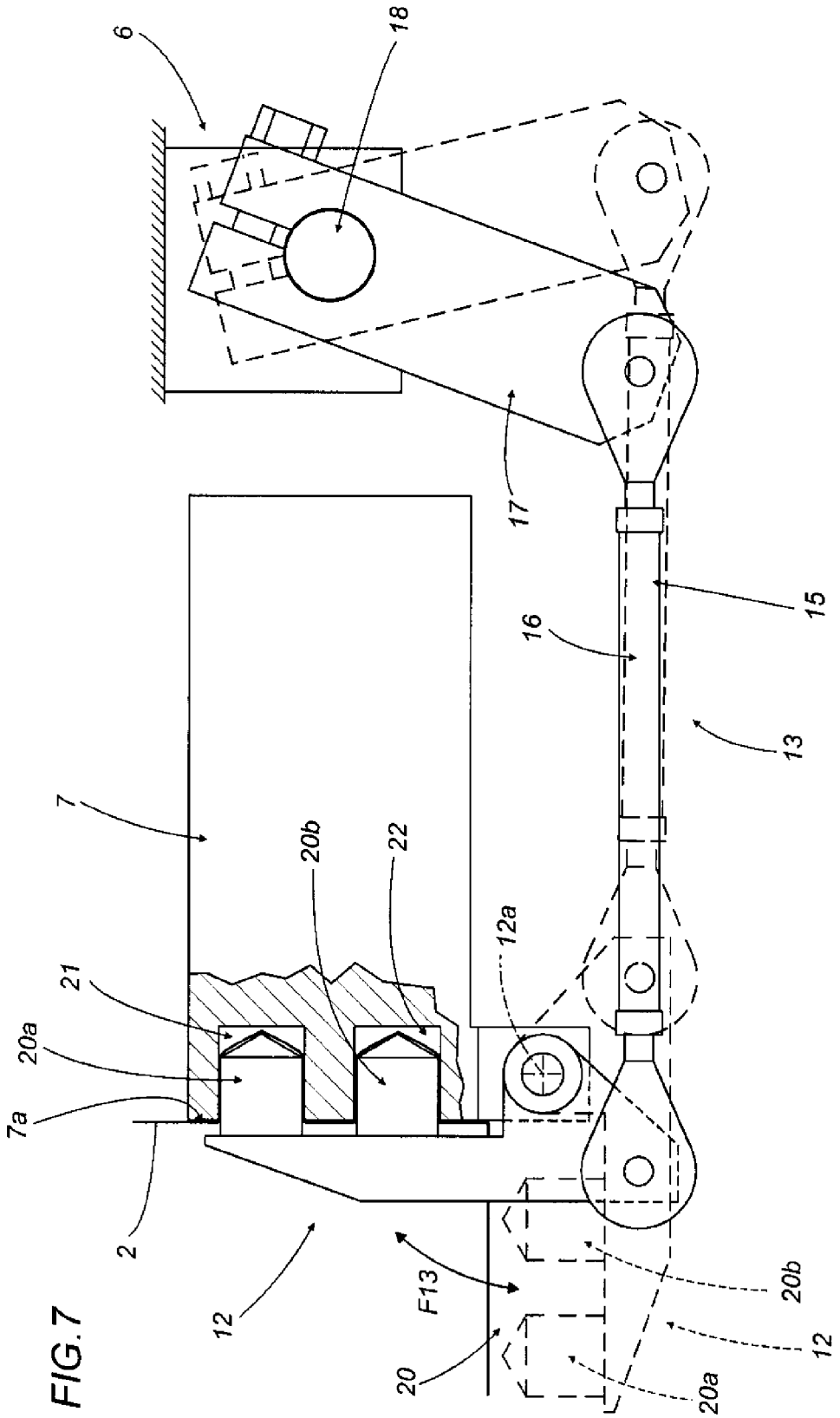


FIG.7

FIG.8

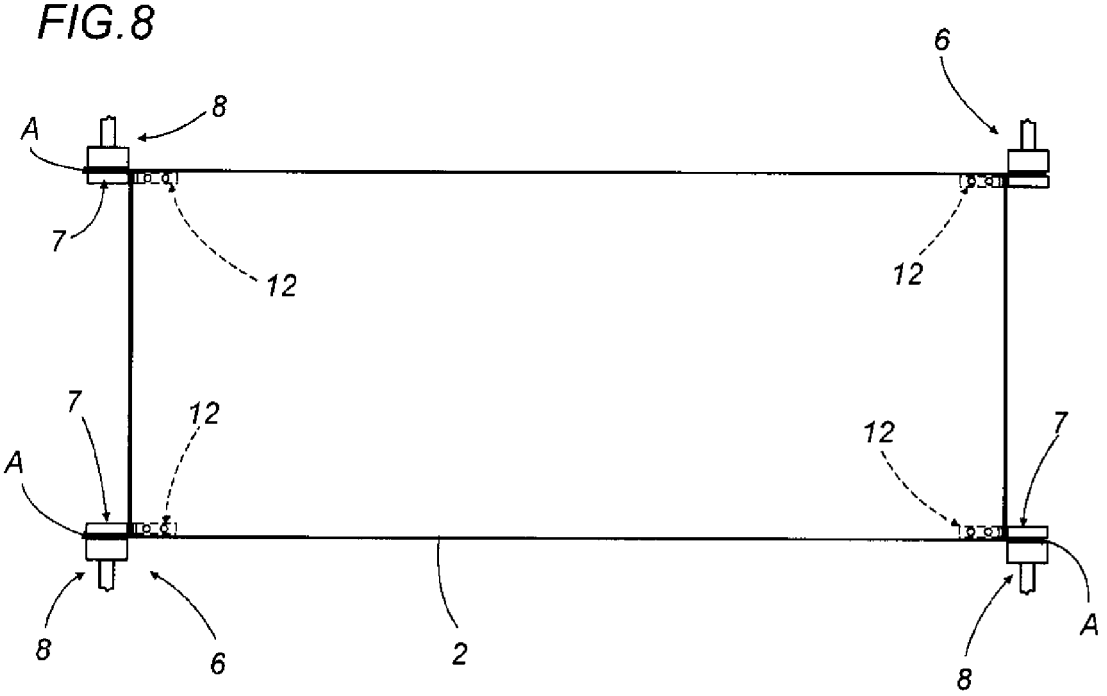
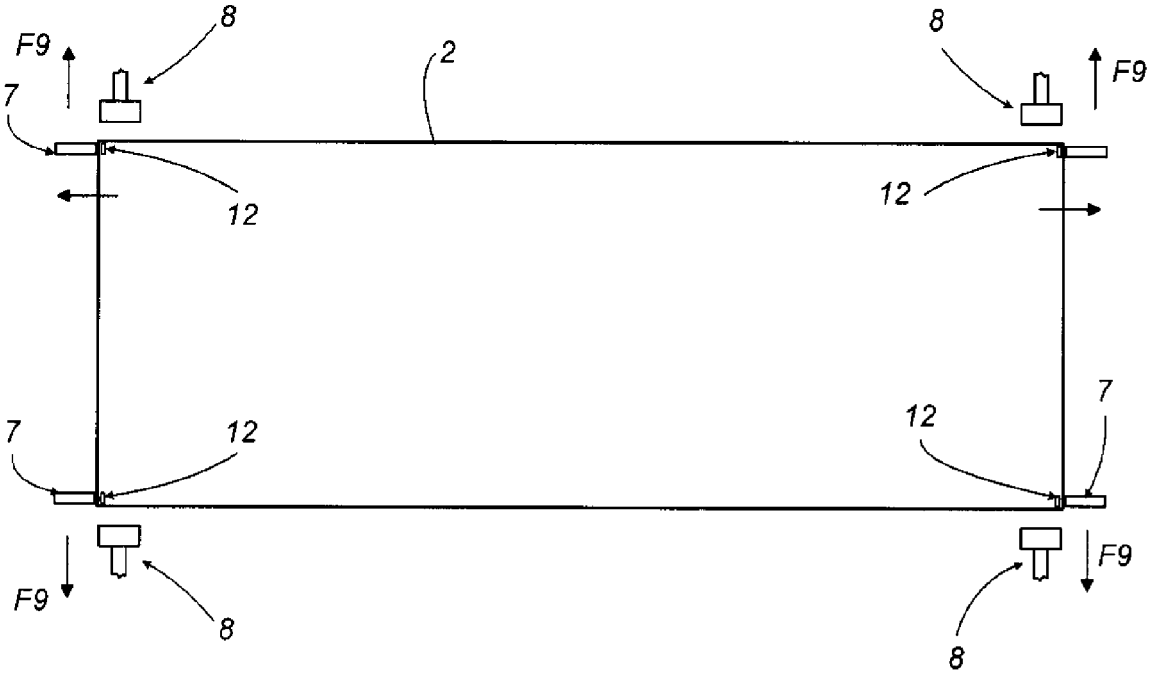


FIG.9



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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 1894

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 0 285 855 A1 (LACHENMEIER KURT APS [DK]) 12 October 1988 (1988-10-12) * column 10, line 12 - column 14, line 18; figures 1-5 *	1-4 5-8	INV. B65B9/13 B65B9/14
A	US 3 621 638 A (GROCKE DIETHELM) 23 November 1971 (1971-11-23) * column 3, line 56 - column 6, line 64; figures *	1	
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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 May 2007	Philippon, Daniel

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03-05-2007

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