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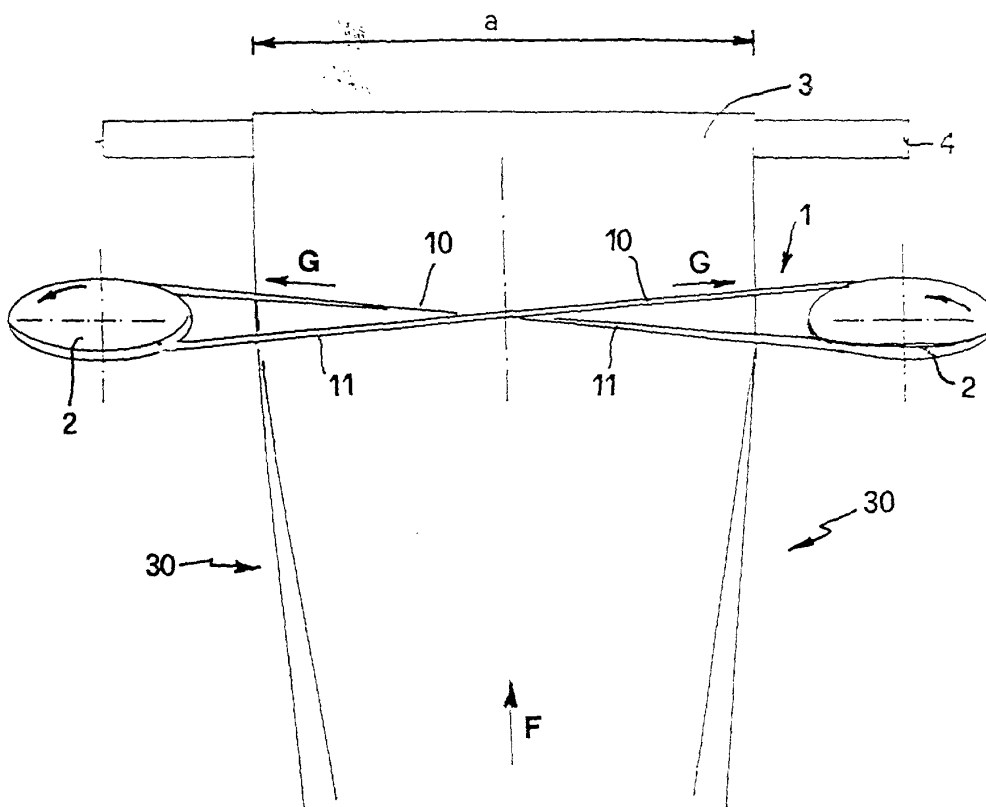
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(54) **Apparatus for stretching web products**

(57) Apparatus for stretching web products, comprising means which act upon the longitudinal edges (30) of a moving forward product (3) to perform the stretching thereof. Said stretching means comprise one

element (1) with two portions (10) joined to each other without solution of continuity and acting upon the edges (30) of the advancing product (3): the said portion (10) of the element (1) being driven into motion with centrifugal direction (G) with respect to the product's edges.



**Fig. 1**

## Description

**[0001]** The present invention relates to an apparatus for stretching web products, such as fabrics and the like, in the process of formation.

**[0002]** It is known that when fabrics are subjected to some treatments - especially to those which include the use of fluids such as steam for example - the same fabrics, being picked up from a pile of material in stock and moved forward over a path along which finish operations of various character are carried out, have their longitudinal edges subjected to a crimping or curling action.

**[0003]** In order to counteract this phenomenon it is necessary to intervene continuously on these materials to keep them in stretched condition since, failing to do so, would result in their longitudinal edges being damaged by such operations, in case of fabrics, as raising and cutting.

**[0004]** The apparatuses currently used to maintain the product in stretched attitude require the use of elements consisting essentially of single rollers or pairs of cylindrical or conical rollers, either idle or motor-driven, which act independently upon the two long sides of the material in the process of formation.

However, it is known from experience that the efficiency of the known systems is not always sufficient to keep the product in a perfectly stretched condition for the desired time.

**[0005]** The main object of the present invention is to overcome the said drawback.

This result has been achieved, according to the invention, by providing an apparatus having the characteristics disclosed in the claim 1. Further characteristics being set forth in the dependent claims.

**[0006]** The present invention allows the product in the process of formation to be set in a stretched condition by acting on both its longitudinal edges in a perfectly balanced way. This makes it possible to reach the most correct stretching of the product and perform the treatments provided downstream, whatever their nature, in yet a more efficient way. Besides, an apparatus according to the invention is simple to make, cost-effective and reliable even after a prolonged service life, while requiring only one drive motor.

**[0007]** These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 is a schematic front view of one embodiment of the apparatus according to the invention;
- Fig. 2 is a schematic plan view of the apparatus of Fig. 1;
- Fig. 3 is a schematic side view of the apparatus of Fig. 1;
- Fig. 4 is a schematic plan view of a further embodiment of the apparatus according to the invention;

- Figs. 5 and 6 are two views similar to those of Figs. 1 and 2, relating to alternative embodiments of the present invention;

- 5 - Figs. 7-9 are a schematic side view, a cutaway front view and a plan view of an apparatus which is structured according to Figs. 5 and 6;
- Fig. 10 is an enlarged detail of the drawing of Fig. 9;
- 10 - Fig. 11 is a view in section taken on line Y-Y in Fig. 10.

**[0008]** Reduced to its basic structure, and reference being made to the figures and the attached drawings, an apparatus according to the invention comprises a belt wound up, to form an "eight", over two pulleys (2) so as to exhibit two crossed lengths above the product (3) which is moved forward, as indicated by the arrow "F", relative to the pulleys (2) and belt (1).

In the description that follows, although mentioning a belt throughout, it is understood that reference could be made to equivalent members such as a web or a rope either elastic or inextensible, preferably of plastic material.

**[0009]** The movement of the product (3) is ensured by traditional driving systems. The element (4) shown in the figures of the attached drawings represents a bearing body on which the product (3) is made to slide, said body being supported by a frame (40) able to be associated to a fixed structure (S). Said frame (40) can be mounted on wheels (not shown in the drawings) to make up a distinct element, independent from the structure (S). In the example of the attached drawings, said structure (S) has a base resting with a plurality of legs (GS) onto the floor. This structure (S) makes it possible to guide and wind up the product (3) to form a coil (B) with the axis (AB) thereof being driven by an electric motor (MB) in cooperation with two idle rollers (400) provided on the side of the frame (40) facing the fixed structure (S) and developed orthogonally to the feed direction (F) the product (3). The rotation of the axis (AB) operated by the motor (MB) causes the product (3) to advance in the direction of arrow (F). Alternatively, said frame (40) is able to be associated to a fixed part of any finish machine, particularly in correspondence of the input and/or output sections of the machine. In such case, the movement of the product to be treated is ensured by the same finish machine.

One of said pulleys (2) is associated to a drive motor (66) to allow the rotation thereof about the respective axis, so that the belt (1) results subjected to a corresponding winding motion over the pulleys (2). The said motor (66) is suitably mounted on one arm (41) of the said frame (40) so as to oscillate about an axis hinge-connected (44) thereto and allowing it to be disposed, along with the respective pulley (2), in the most suitable position.

The pulleys (2) are on opposite sides with respect to the product (3) being fed and, therefore, the belt (1) extends

over the whole height of the latter. Moreover, the pulleys (2) are disposed, with respect to the plane of the product (3), in such a position that two branches or lengths (10) of the belt (1) act upon the surface of the same product. In other words, because of the way it is wound on the pulleys (2), the belt (1) exhibits, at every instant, two inner branches (10) and two outer branches (11) and each of the two inner branches (10) has a region in contact with the surface of the product (3) in correspondence of the longitudinal edges (30). The terms "inner branches" and "outer branches" refer to the branches of the belt (1) which are at any instant closer to and, respectively, farther away from the surface of the product (3), that is, the branches instantly active and, respectively, inactive. Owing to the continuous winding of the belt (1) over the pulleys (2), the said inner branches (10) slip simultaneously in centrifugal direction (G) onto the longitudinal edges (30) of the product (3), which edges are in general curled downstream of the apparatus, as shown in the drawings. Because of the simultaneous advancement of the product (3) relative to said "inner" branches of the belt (1), the same product results perfectly stretched.

**[0010]** The thus operated stretching of the product's edges is perfectly balanced, as a result of the simultaneous and absolutely synchronous intervention of the portions (10) of belt (1), the latter making up a single stretching element, instead of a multiple stretcher provided in the traditional apparatuses. The stretching speed, the tension exerted onto the product and the width of the regions of contact of the latter with the belt's inner portions, result equivalent on both sides. Moreover, even when changing the height (a) of the product in the course of formation, the system remains centred. In addition, the present apparatus is able to act indifferently both on the straight and reverse side of the product. The speed of the pulleys (2), that is of the belt (1), is adjustable at will also in relation to the feeding speed of the product (3).

**[0011]** Advantageously, according to the invention, the position of the pulleys (2) on the respective supports can be adjusted by the operator, as indicated by the double arrow "H" in Fig. 3, who can set at will the angle of incidence of said active portions (10) of the belt (1) on the product (3).

**[0012]** According to the embodiment represented by way of example in Fig. 4, idle wheels (5) are correspondingly associated to the pulleys (2), each wheel having its axis parallel to the respective pulley and able to be moved from and towards the product (3), as indicated by the double arrow "E". This makes it possible to displace the product (3) relative to the axis (b-b) of the station of destination without, for this reason, having to correspondingly displace the belt/pulleys assembly. In practice, without displacing the frame (4) and pulleys (2) of the present apparatus, it is possible, by means of pulleys (5), to move the crossing point of belt (1) so that the projection of such point onto the feeding product (3) will fall onto the axis of longitudinal symmetry of the lat-

ter. For example, in case the product is a knitted fabric, this operation results useful should a raising machine be provided in the station of destination. In fact, since the operating width of this type of machine is generally much larger than the height (a) of the fabric, the displacement of the latter, according to a technique known per se, ensures a more uniform wear of the gaskets provided for the work. Besides, the use of additional pulleys (5) allows, as above mentioned, the crossing plane of the belt (1) to be shifted to carry out the displacements imposed on the product (3) during the work.

**[0013]** The stretching effect operated upon the edges of the product (3) by the present apparatus can be made more intense by providing, beside each of said pulleys (2), a further pair of pulleys (6, 7) having a corresponding belt (8) wound thereon. The said additional pulleys (6, 7) are positioned, on the same plate (42) of the arm (41) which supports the main pulleys (2), on the side opposite to the product (3), so that the edges (30) to be stretched of the latter will result interposed between the main belt (1) and the two additional belts (8). In this way, the two edges (30) of the product are subjected to the action of both belts (1, 8) acting from opposite sides.

**[0014]** The additional belts (8) receive the motion directly from the main belt (1), as described in more details here below.

Moreover, the additional pulleys (6, 7) may be mounted on supports (71) which allow them to be moved relative to the product (3) being fed, as schematically illustrated in Fig. 6, in order to exert a kind of brushing of the edges of the product simultaneously to the stretching thereof. To this end, the support (71) for the additional pulleys (6, 7) is hinged with vertical axis (72) to the corresponding plate (42) of the frame (40), said axis (72) being coincident with that of the additional pulley (6) which is farther away from the product (3).

Each of the additional belts (8) is associated to the main belt (1) so as to be driven into motion only by the motor (66). According to the embodiment shown in Figs. 9-11, this is achieved by means of an idle roller (9) with axis (r-r), able to be positioned at a preset distance from the corresponding edge (30) of the product (3) and acting upon the outer side of the main belt (1), so as to press the latter against the additional belt (8). The pressure exerted by the roller (9) onto the main belt (1) causes the latter to come in contact with the additional belt (8) which, therefore, results driven by friction and wound over the respective pulleys (6, 7) for cooperating with the main belt (1) in stretching the edges (30) of the product (3). The arrows (L) and (K) of Fig. 10 show the directions of motion of the main belt (1) and, respectively, of the additional belt (8). The small roller (9) is mounted within a housing defined by a body (90) fixed, by means of two rods (91) parallel to each other, to a skid (92) sliding onto a straight guide (70) parallel to the support (71) of the additional pulleys (6, 7). The said skid (92) being able to be disposed in fixed position on the guide (70) by means of tightening knob (93). The said rods (91)

parallel to the skid (92) make up a fork in which both the main (1) and additional (8) belts slide. The said fork acts as an end-of-stroke element for the product (3) in case the latter is subjected to undesired side shifts. Although Figs. 8-11 of the attached drawings show a single group (6, 7, 8) with relevant support (71), skid (92) and small roller (90), it is understood that the whole is present on both sides of the frame (40) to act on both the longitudinal edges (30) of the product.

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## Claims

1. Apparatus for stretching web products, comprising means which act upon the longitudinal edges (30) of a moving forward product (3) to perform the stretching thereof, **characterized in that** said stretching means comprise one element (1) with two portions (10) joined to each other without solution of continuity and acting upon the edges (30) of the advancing product (30): the said portion (10) of the element (1) being driven into motion with centrifugal direction (G) with respect to the product's edges. 15
2. Apparatus according to claim 1, **characterized in that** the position of said element (1) with respect to the product (3) is adjustable. 20
3. Apparatus according to claim 1, **characterized in that** said element (1) is made up of a belt, or web or a rope, either elastic or inextensible, wound to form an "eight" over two pulleys (2) disposed with skew axes on opposite sides with respect to the product (3): one of said pulleys (2) being associated to a corresponding motive member. 25
4. Apparatus according to claim 3, **characterized in that** located between each of said pulleys (2) and the product (3) is an idle or mobile wheel (5): each of the wheels (5) being disposed with its axis parallel to that of the corresponding pulley (2). 30
5. Apparatus according to claim 1, **characterized in that** said element (1) has two active portions (10) and two inactive portions (11) when in operation. 35
6. Apparatus according to claim 1, **characterized in that** it comprises two additional stretching elements (8), each of which acts upon a corresponding edge (30) of the product (3). 40
7. Apparatus according to claims 1 and 6, **characterized in that** each of said additional stretchers (8) is associated to said element (1) with portions (10) joined with each other without solution of continuity. 45
8. Apparatus according to claims 1 and 6, **character-** 50

**ized in that** each of said additional stretchers (8) is made up of a belt or a web or a rope, either elastic or inextensible, associated to said means (1).

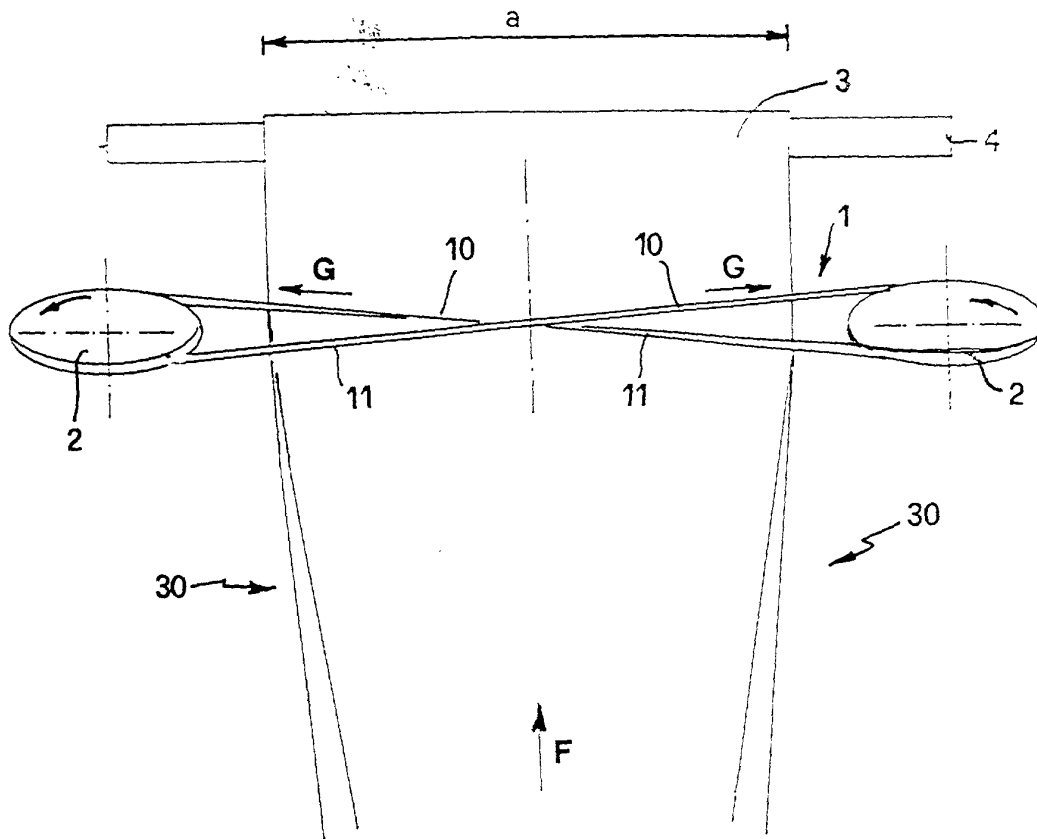


Fig. 1

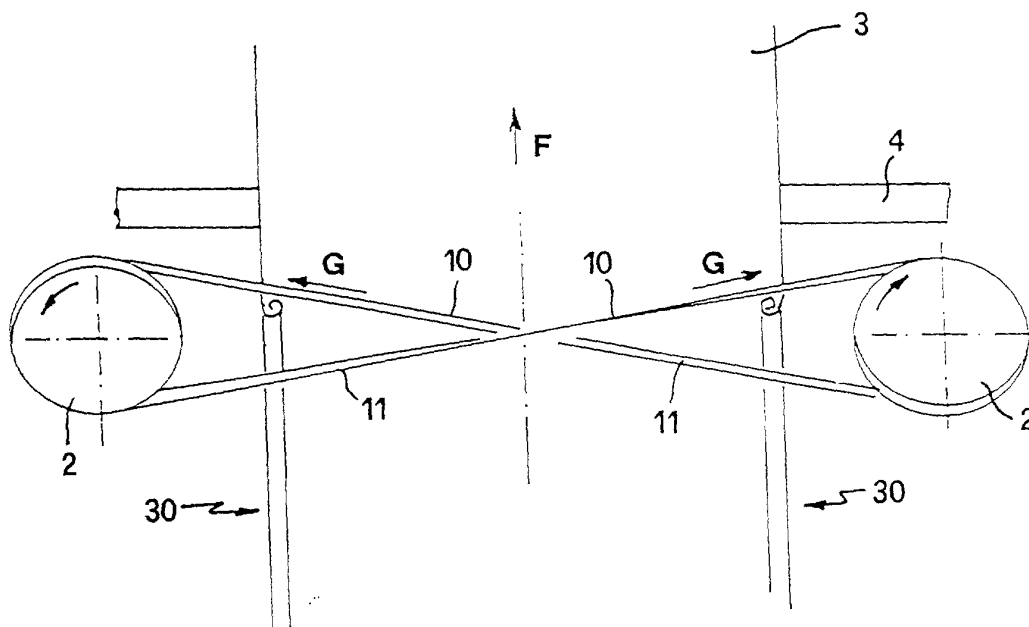
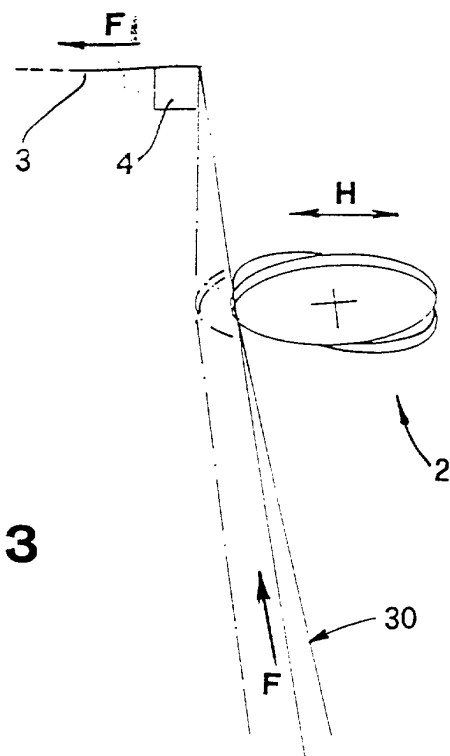
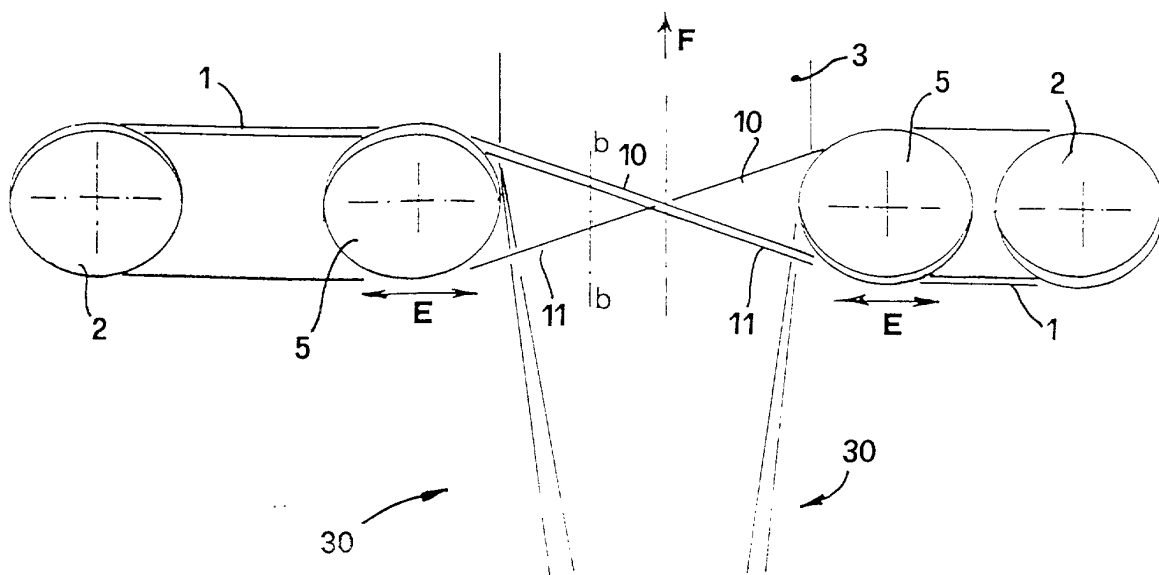


Fig. 2



**Fig. 3**



**Fig. 4**

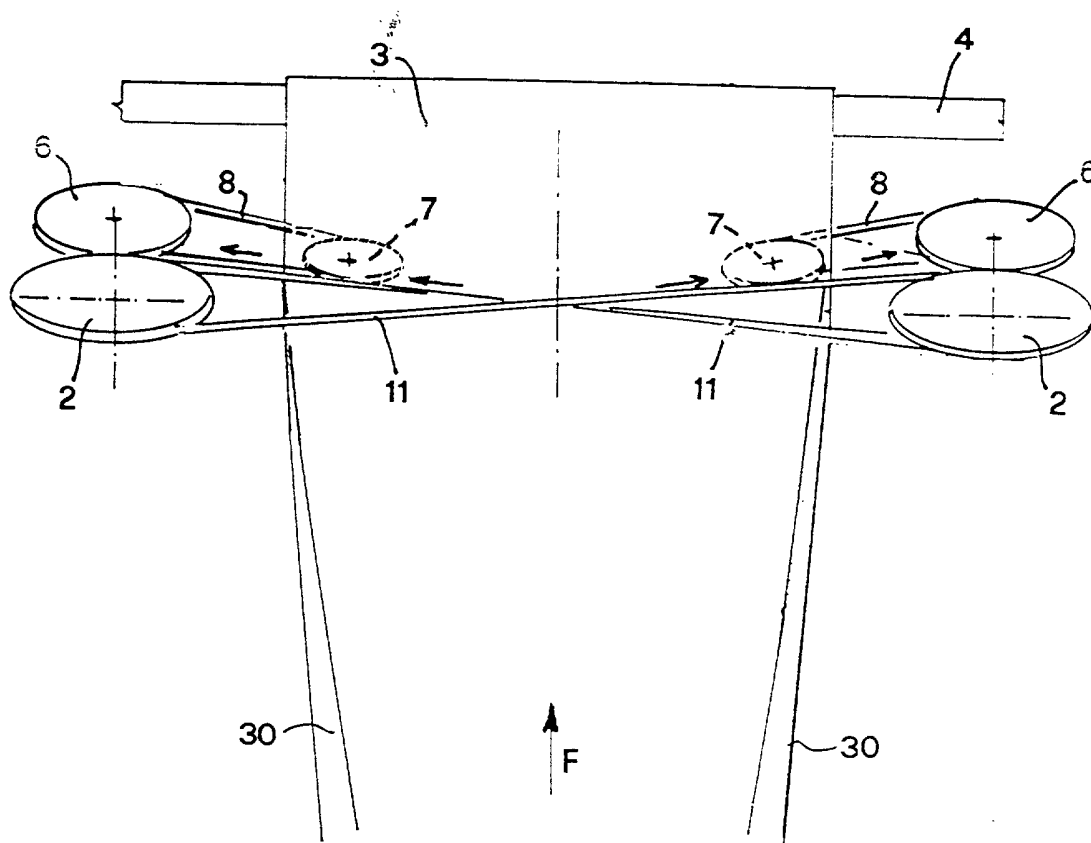


Fig. 5

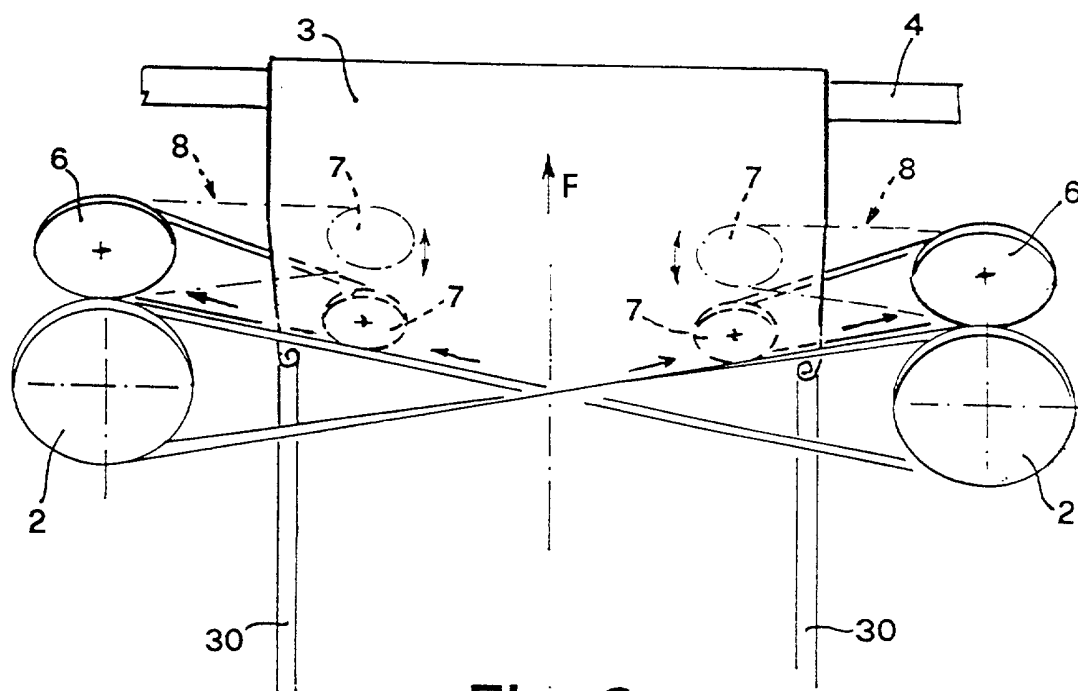


Fig. 6

Fig. 7

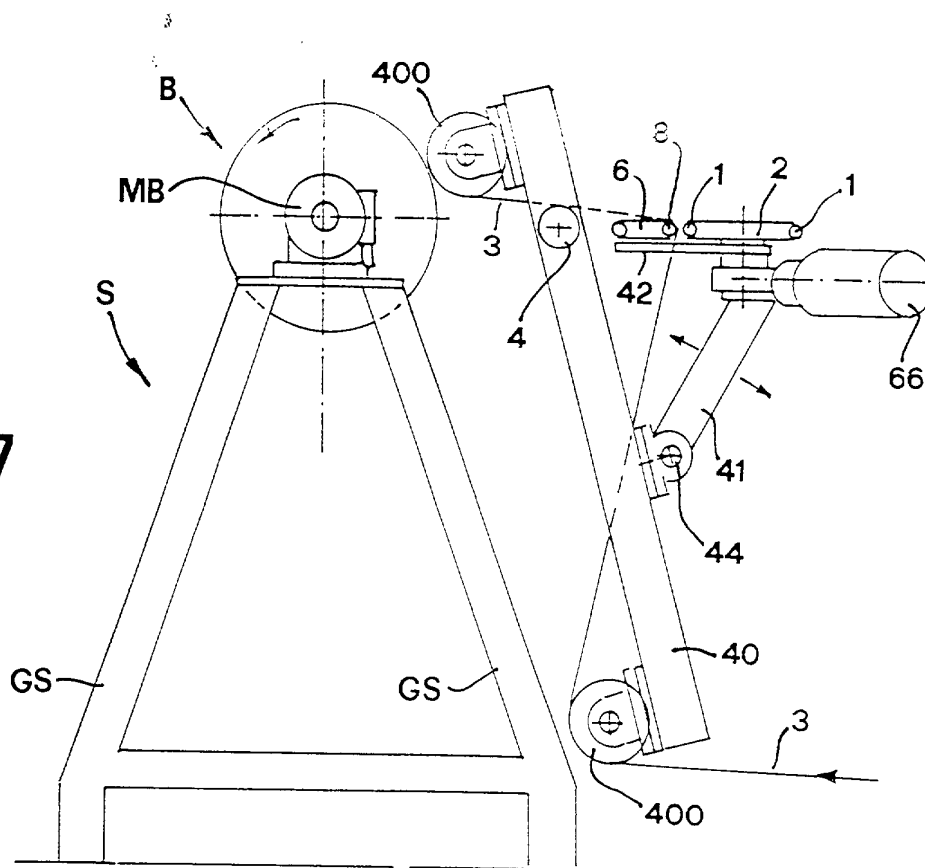


Fig. 10

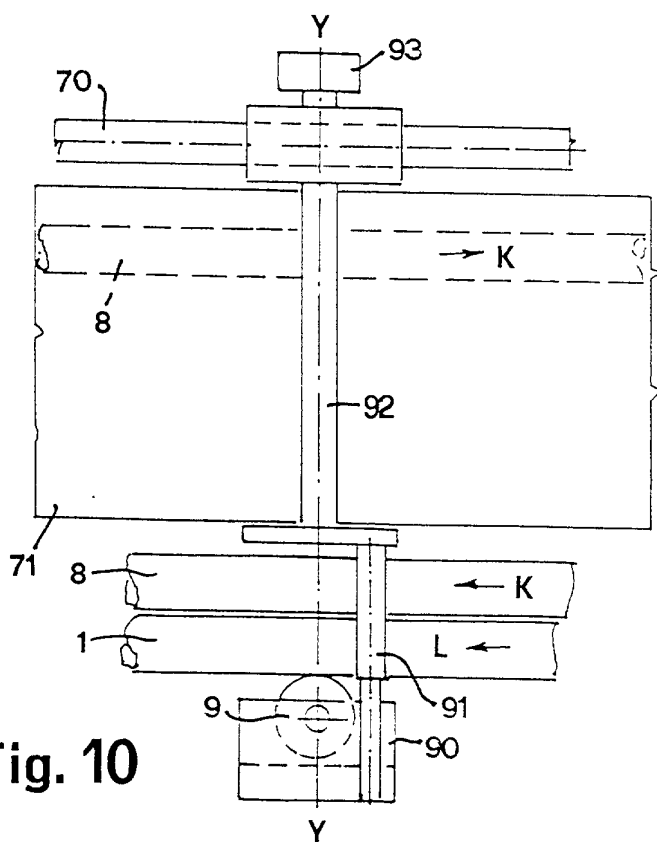
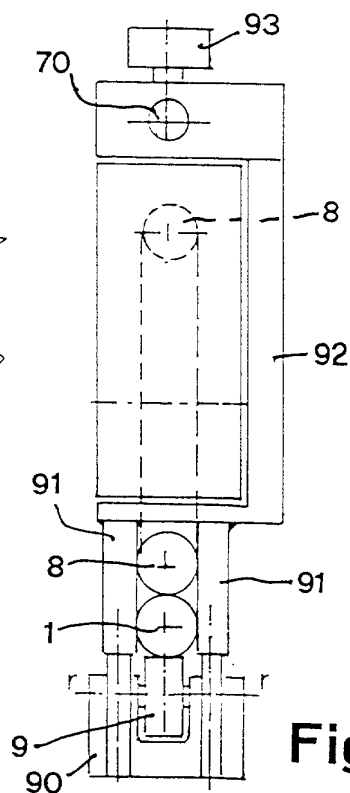
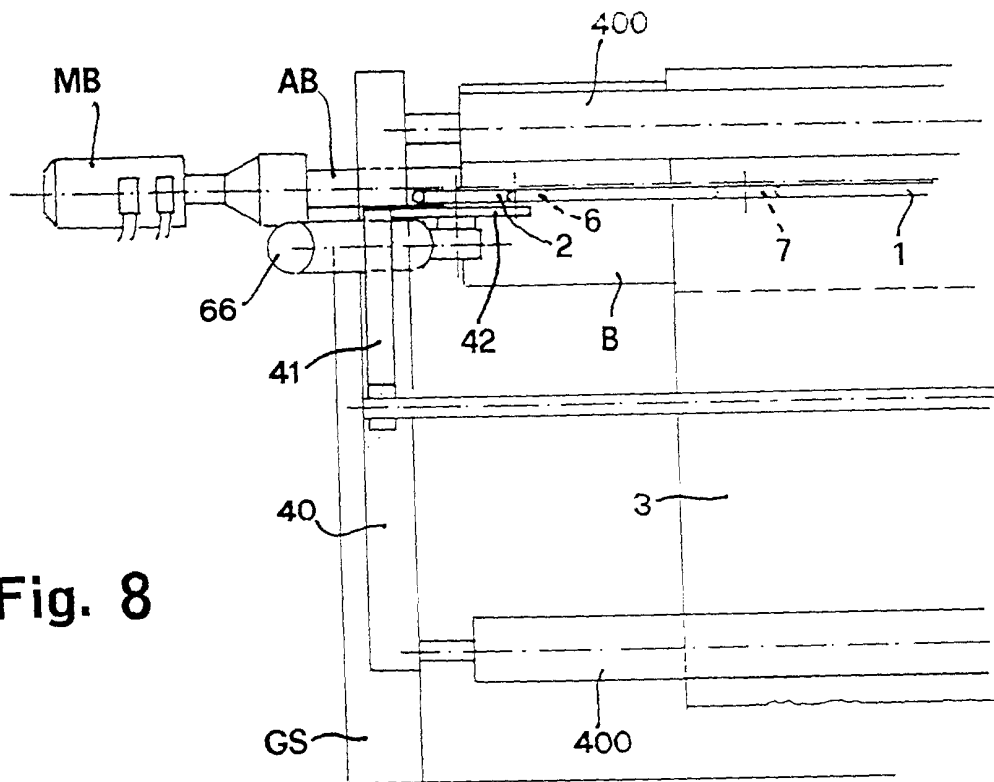


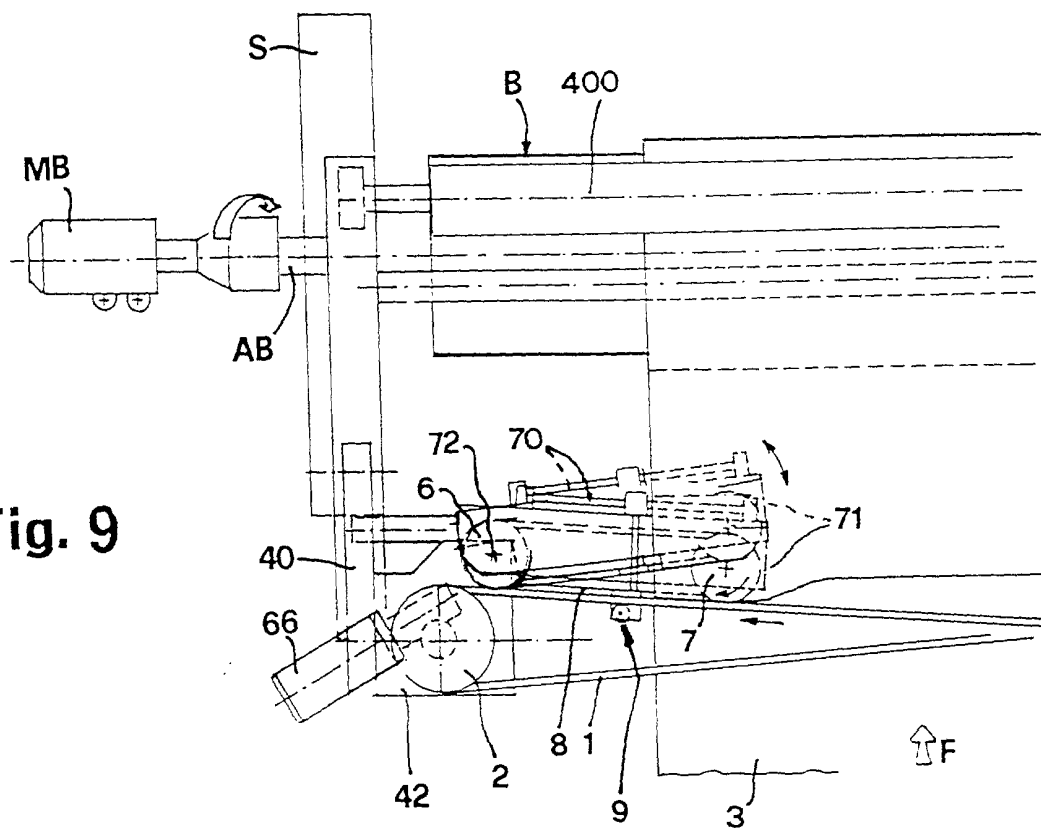
Fig. 11







**Fig. 8**



**Fig. 9**



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## EUROPEAN SEARCH REPORT

Application Number  
EP 01 83 0293

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 3 353 237 A (W.N. HADLEY; W.J. HOLM) 21 November 1967 (1967-11-21) * column 2, line 69 - column 3, line 45 *	1,2	D06C3/06 B65H23/022
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		9 October 2001	Goodall, C
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