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(54) Apparatus for subjecting materials in sheet form to continuous traction

(57) An apparatus for subjecting materials in sheet form to continuous traction, which has the particularity that it comprises, on a supporting frame, a first roller (4) and a second roller (5) which are spaced from each other and have parallel axes. At least one sheet-like element (20) to be subjected to traction winds around the rollers. At least one redirection element (10) is provided between the rollers (4, 5) for the exit of the sheet-like element subjected to traction from the traction apparatus (1).

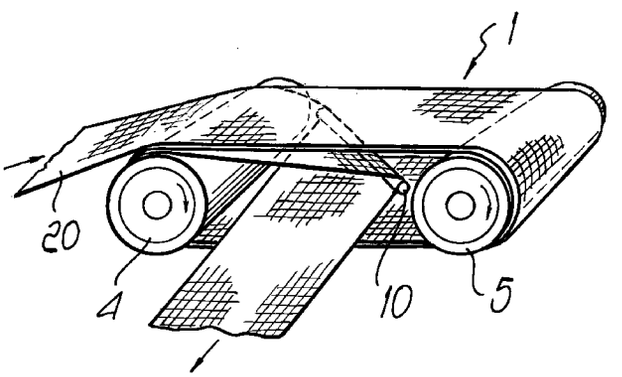

Fig. 3

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Description

[0001] The present invention relates to an apparatus for subjecting materials in sheet form to continuous traction.

[0002] It is known that in many industrial fields, and particularly in the stretching of sheet-like elements made of plastics, such as nets, grids and the like, it is necessary to apply traction to the continuously-produced material in sheet form so as to achieve the intended product stretching step.

[0003] It is known that the equipment currently in use subjects the sheet-like element to traction by means of a calender system, provided by two mutually opposite rotating cylinders between which the product is made to pass, advancement whereof occurs by means of the pressure between the two cylinders.

[0004] This system entails the severe drawback that contact pressure is applied over a very small surface, so that it is necessary to apply an intense pressure in order to make the product advance and avoid slippage.

[0005] Concentration of all the pressure applied by the rollers in a single point can crush or in any case damage the sheet-like element subjected to traction.

[0006] In order to avoid spoiling the product to be subjected to traction, it is not possible to apply intense pressures thereto; this in effect makes it very often impossible to subject thick or easily compressible materials to traction.

[0007] Moreover, if it is necessary to subject to traction materials with a variable surface to traction, the pressure applied by the rollers does not distribute uniformly and the traction is abnormal, causing further damage and alteration of the product.

[0008] In order to at least partially avoid these drawbacks, devices are currently used which have a plurality of rollers staggered with respect to the traction direction, so that it is possible to achieve a higher traction force since the surface of contact between each individual roller and the sheet-like element being subjected to traction is increased.

[0009] However, this system is highly expensive, since it is necessary to multiply the number of traction rollers; moreover, the higher the force to be applied, the larger the apparatus must be.

[0010] The aim of the present invention is to eliminate the above drawbacks, by achieving a traction force which is significantly higher than obtainable with conventional systems and can thus be easily used with materials in sheet form produced continuously, without having to resort to large and expensive devices.

[0011] Within the scope of this aim, a particular object of the present invention is to provide an apparatus which allows to continuously subject materials in sheet form to traction even if they are significantly large in terms of thickness and transverse width.

[0012] Another object of the present invention is to provide an apparatus which does not damage in any way the elements being subjected to traction, since it does not use mutually opposite rollers acting by pressing.

[0013] Another object of the present invention is to provide an apparatus which allows to subject to uniform and constant traction also products having considerable thickness variations or an irregular configuration, without thereby flattening the products or damaging them in any way.

[0014] Another object of the present invention is to provide an apparatus for subjecting materials in sheet form to continuous traction which, by means of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use and is also inexpensive since the components are reduced significantly.

[0015] This aim, these objects and others which will become apparent hereinafter are achieved by an apparatus for subjecting materials in sheet form to continuous traction, characterized in that it comprises, on a supporting frame, a first roller and a second roller which are spaced from each other and have substantially parallel axes, at least one sheet-like element to be subjected to traction winding around said rollers, at least one redirection element being provided between said rollers for the exit of the sheet-like element subjected to traction from said traction apparatus.

[0016] Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of an apparatus for subjecting materials in sheet form to continuous traction, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic elevation view of the apparatus for subjecting materials in sheet form to continuous traction, according to the invention;
figure 2 is a schematic plan view of the apparatus according to the invention;
figure 3 is a view of a sheet-like element during traction, in which the product subjected to traction exits from one side;
figure 4 is a view of an apparatus in which the product subjected to traction, constituted in this case by a sheet, exits from the other side;
figure 5 is a view of an apparatus for simultaneously subjecting to traction two sheet-like elements which exit in mutually different directions; and
figure 6 is a view of the apparatus according to the invention during the traction of two sheet-like elements which exit so as to be mutually superimposed.

[0017] With reference to the above figures, the apparatus for subjecting materials in sheet form to continuous traction, according to the invention, generally designated by the reference numeral 1, comprises a supporting frame 2 which supports, by means of lugs 3

or other similar elements, a first roller 4 and a second roller 5 which are mutually spaced and have substantially parallel axes.

[0018] Advantageously, the rollers 4 and 5 have specific driving means, such as motor means and the like, and rotate in the same direction.

[0019] The rollers 4 and 5 may optionally have, on their surface, a certain roughness so as to enhance the friction effect, as described in detail hereinafter.

[0020] A redirection element is arranged between the rollers 4 and 5 and is constituted by a transverse bar 10, preferably made of a metallic material and arranged at an angle with respect to the winding direction of the sheet-like element which winds around the rollers 4 and 5, the bar being preferably inclined at 45° with respect to the rollers.

[0021] In the embodiment shown in figures 3 and 4, the sheet-like element, designated by the reference numeral 20, winds around the first roller, forming an upper portion, up to the second roller, around which it winds so as to form a lower portion which in turn reaches the roller 4 again.

[0022] A plurality of turns can be formed, thus increasing friction.

[0023] Once the sheet-like element has performed the number of turns or passes around the rollers 4 and 5 that correspond to the intended traction, it is guided towards the transverse bar 10, which is arranged between the rollers 4 and 5, and is made to exit towards subsequent processing steps.

[0024] As shown in figures 3 and 4, the sheet-like element can be made to exit in one direction or the other, depending on the roller on which the last pass was performed.

[0025] With the described arrangement, the continuous passage of the material around the rollers 4 or 5, with the superimposition of a plurality of layers, generates a pressure which is transmitted from one layer to the underlying one and which ultimately compresses the inner layers of the sheet-like material against the surface of the rollers.

[0026] The resulting total pressure generates a traction force which entrains even very thick and wide materials.

[0027] Moreover, despite the intense pressures involved, the material in sheet form is not crushed or damaged, indeed because of the gradual effect of the traction applied by the material itself.

[0028] The exit of the material by passing around the transverse bar 10 allows to extract the material usefully and without having to stop the production cycle.

[0029] Figure 5 illustrates another embodiment, in which there is provided a second transverse bar, designated by the reference numeral 11, which allows to simultaneously subject to traction two sheet-like elements 20 and 21, which are made to exit from the traction apparatus in directions and with orientations which can be optionally different from each other.

[0030] If required, as shown in figure 6, it is also possible to couple two sheet-like elements which are introduced in the traction device separately and are extracted in a superimposed condition from the traction apparatus, again by employing the above-described structure.

[0031] From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that a traction apparatus is provided which is capable of applying very intense forces to the product to be subjected to traction, using just two rollers, with a considerable cost reduction and a functional improvement with respect to currently used devices for subjecting the same type of product to traction.

[0032] The pressure forces generated between the various layers of product during their superimposition on the rotating rollers are such that they equal or exceed those of systems in which rollers with very large diameters are installed.

[0033] It is also sufficient to increase the number of turns that the sheet-like element forms around the rollers in order to proportionally increase the pressure and accordingly the traction force.

[0034] With the present invention, the traction force can be raised to the tearing point of the product that passes through, simply by increasing the number of turns of said product around the rollers, without having to apply further modifications to the apparatus.

[0035] The product that can be subjected to traction can also be constituted by elements having substantial thickness variations without causing damage or flattening during traction.

[0036] The apparatus also allows to easily extract the product being subjected to traction from the apparatus itself, in order to perform subsequent processes, even if the product is superimposed inside the apparatus.

[0037] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0038] All the details may also be replaced with other technically equivalent elements.

[0039] In practice, the materials employed, as well as the contingent shapes and dimensions, may be any according to requirements.

[0040] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An apparatus for subjecting materials in sheet form to continuous traction, characterized in that it comprises, on a supporting frame, a first roller and a

second roller which are spaced from each other and have substantially parallel axes, at least one sheet-like element to be subjected to traction winding around said rollers, at least one redirection element being provided between said rollers for the exit of the sheet-like element subjected to traction from said traction apparatus.

2. An apparatus according to claim 1, characterized in that said rollers rotate in the same direction.

3. An apparatus according to one or more of preceding claims, characterized in that it comprises rough regions on the lateral surface of said rollers in order to increase friction with said at least one sheet-like element.

4. An apparatus according to one or more of the preceding claims, characterized in that said redirection element comprises a transverse bar arranged at an angle with respect to the unwinding direction of said at least one sheet-like element.

5. An apparatus according to one or more of the preceding claims, characterized in that said transverse bar is inclined by substantially 45° with respect to the axis of said rollers.

6. An apparatus according to one or more of the preceding claims, characterized in that said sheet-like element winds around said first and second rollers so as to form a number of turns which is a function of the preset traction force.

7. An apparatus according to one or more of the preceding claims, characterized in that said redirection element comprises a second transverse bar for simultaneously subjecting to traction two sheet-like elements which protrude from said apparatus in mutually different directions and/or orientations.

8. An apparatus according to one or more of the preceding claims, characterized in that it comprises two sheet-like elements which enter said rollers separately and exit in an at least partially mutually superimposed condition.

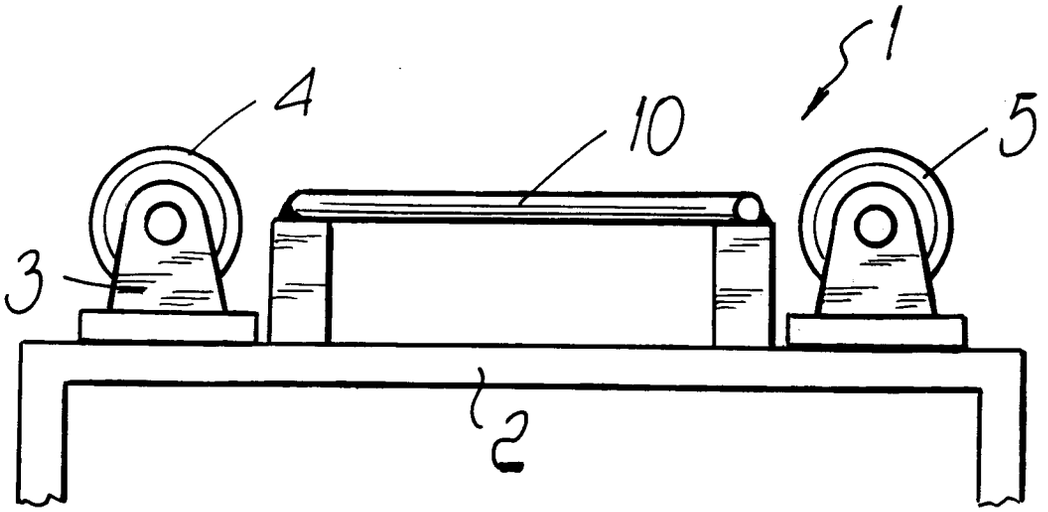

Fig.1

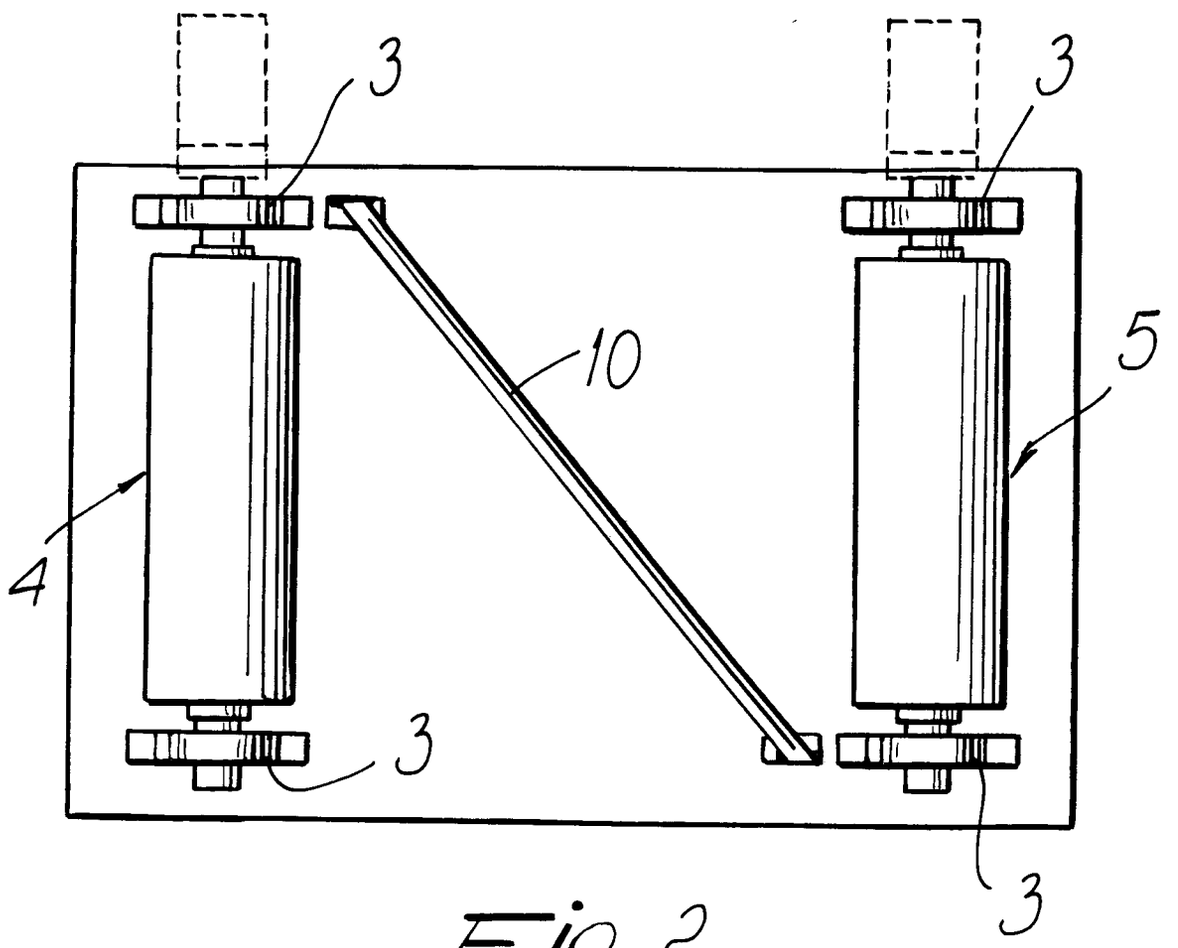

Fig. 2

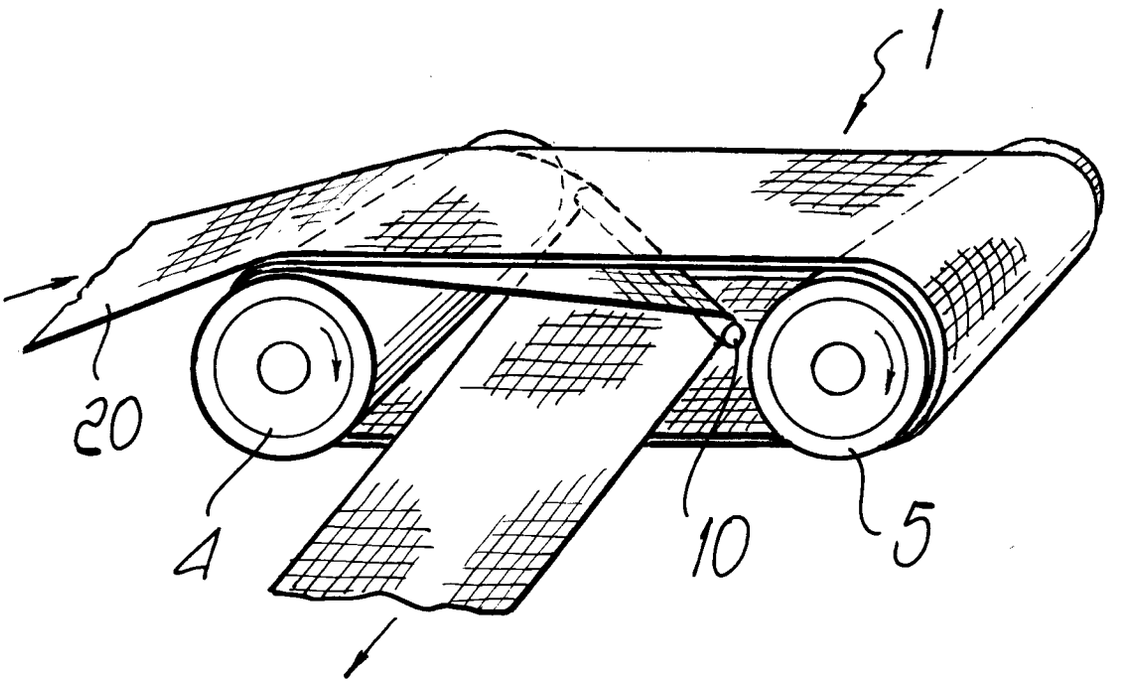

Fig. 3

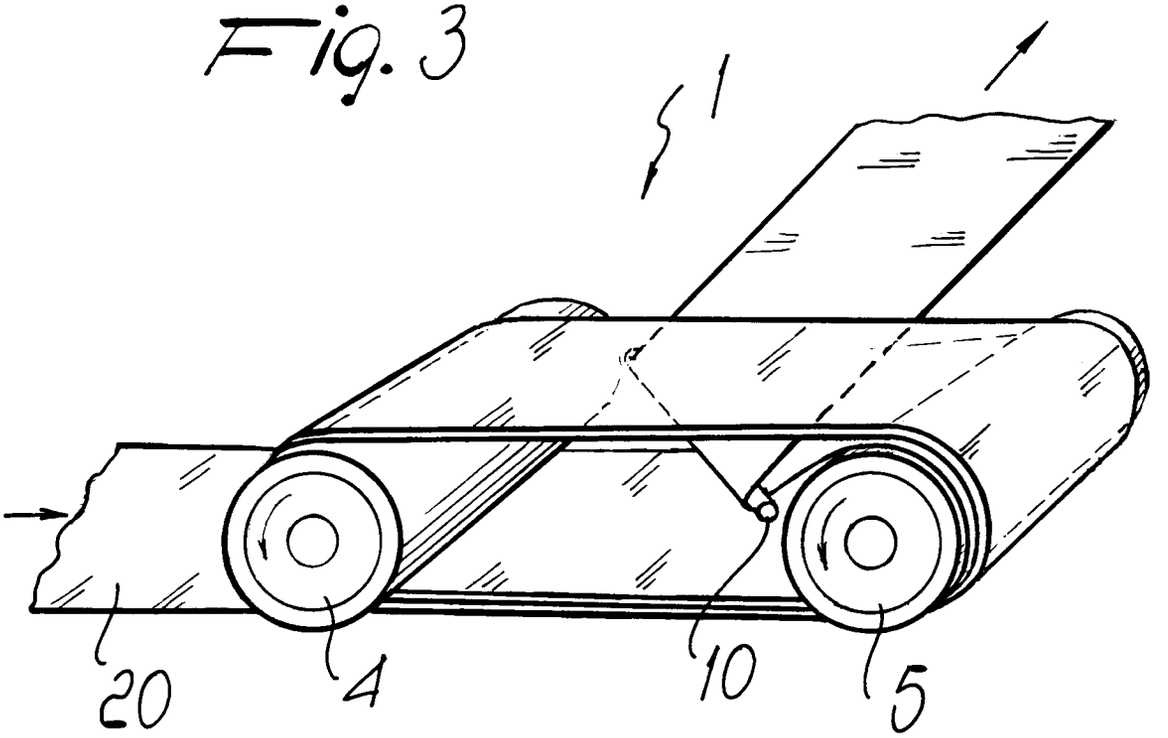

Fig. 4

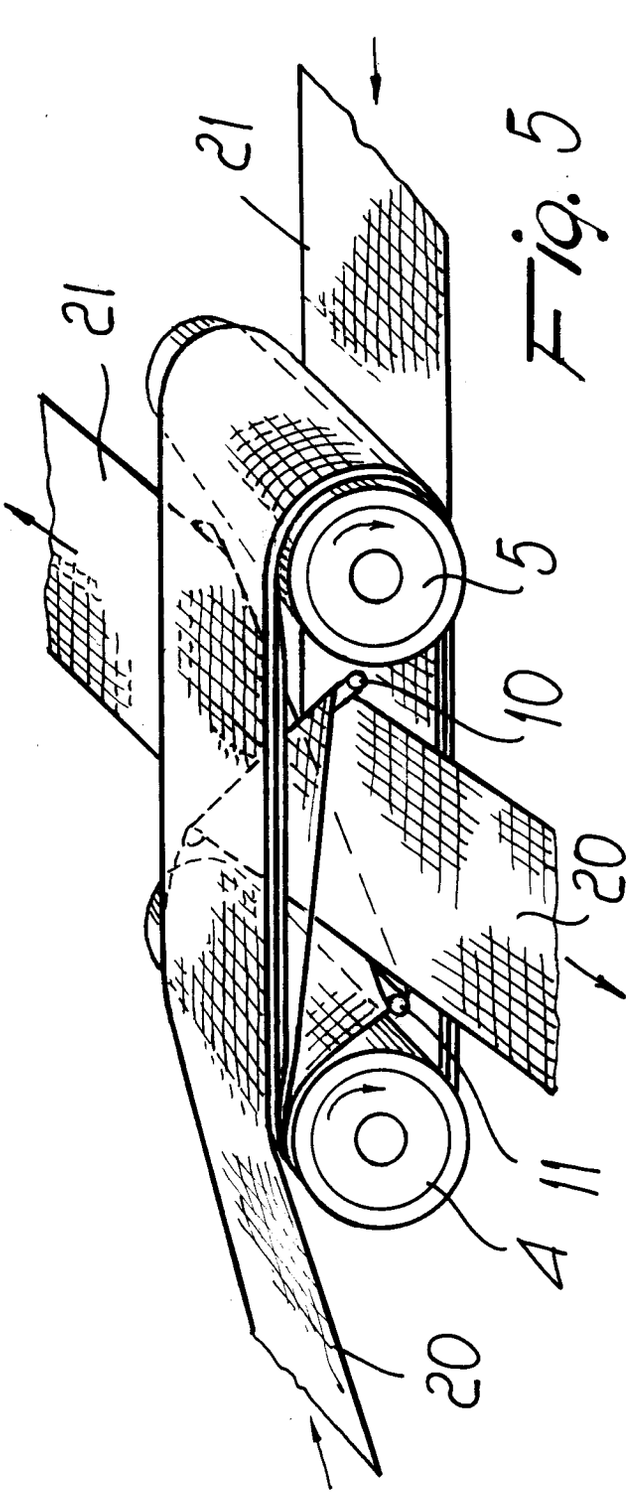

Fig. 5

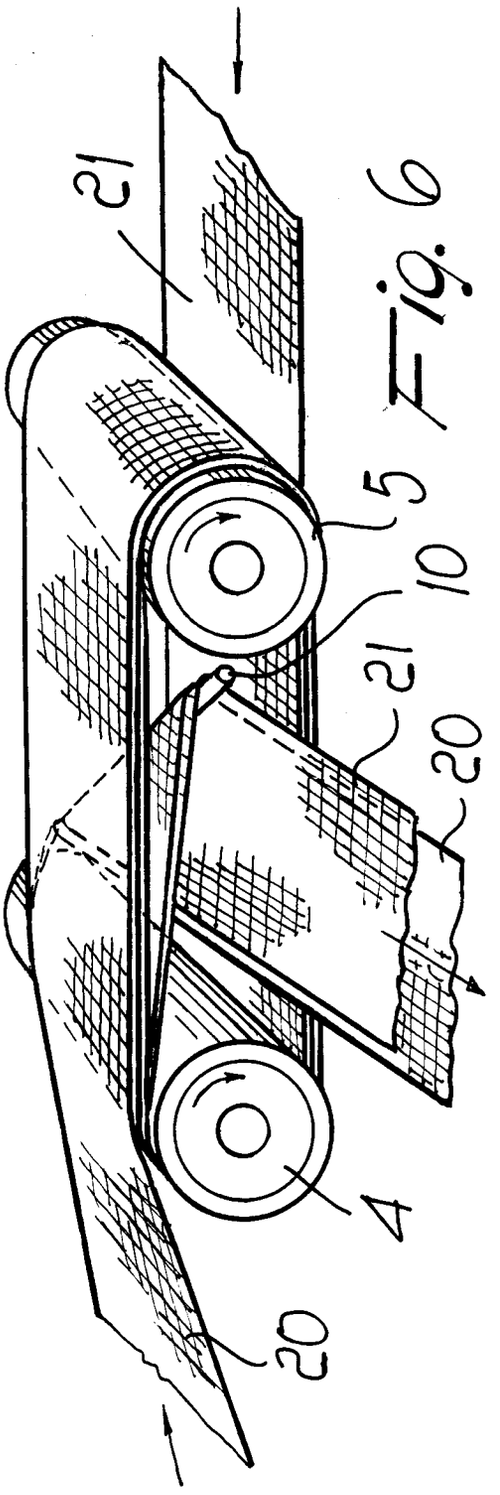

Fig. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0660

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.6)
X A	DE 26 37 304 A (HOECHST AG) * page 5, line 15 - line 27; figures 1A,1B * ---	1,2,4-6 3	C07C49/00 B65H20/24
A	PATENT ABSTRACTS OF JAPAN vol. 097, no. 011, 28 November 1997 -& JP 09 175703 A (YOSHIKAWA KOGYO CO LTD), 8 July 1997, * abstract * ---	3	
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A	DE 40 03 659 A (KOKES MICHAEL DIPL ING FH) * the whole document * ---	1-8	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65H
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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	12 May 1998	Haaken, W

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X : particularly relevant if taken alone
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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