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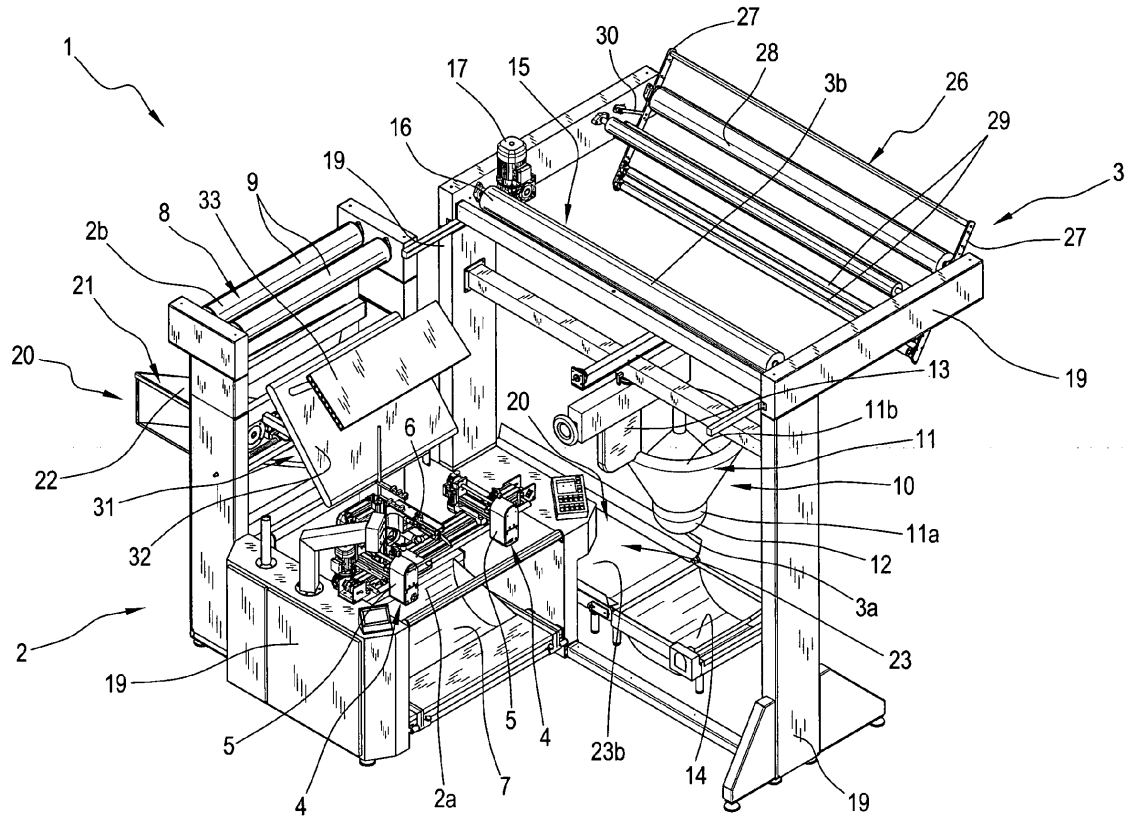
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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Installation for the processing of fabrics**

(57) An installation for the processing of fabrics comprises a sewing unit (2) for stitching together in series a succession of tubular pieces of fabric; a unit (3) for cutting lengthways said succession of tubular pieces; the cutting unit (3) being connected to the sewing unit (2); a chute (21) located between an outfeed section (2b) of the sewing unit (2) and an infeed section (3a) of the cutting unit (3).

Fig.1



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Description

[0001] This invention relates to an installation for the processing of fabrics. In particular, the invention relates to an installation for processing tubular pieces of fabric.

[0002] In this specification the term "piece" refers to a length of fabric which may be gathered in rolls or in superposed folds or in any other way which allows its effective storage.

[0003] In particular, the invention is advantageously applied for the preparation of fabrics for subsequent treatment or processing such as, for example, dyeing, washing or others.

[0004] As is known, the tubular pieces of fabric are joined to each other in series by suitable sewing units which stitch a final end edge, also known as tail, of one piece of fabric to a starting end edge, also known as head, of the next tubular piece of fabric. That way, a long tubular web of fabric that can be subjected to a series of continuous treatments is created.

[0005] Next, the continuous tubular web of material thus made is cut lengthways and opened so that the fabric can be laid out flat in a single plane. This cutting operation is performed by a specific cutting unit.

[0006] The sewing unit and the cutting unit are two separate units, independent of each other.

[0007] In other words, when the successive pieces of fabric have been sewn to each other and fed out in the form of a continuous web, the fabric is taken away from the sewing unit by an operator and stored. Later, the operator transports the web of fabric to the cutting unit for the next step in the process cycle.

[0008] Disadvantageously, therefore, the semi-finished tubular lengths of fabric must be transported from one unit to the other in order to complete processing of the fabric itself.

[0009] That obviously lengthens process times, which must also include the time needed to store the semi-finished product between one step and the next and the time needed to transfer the semi-finished product from one unit to the other.

[0010] Moreover, it should also be remembered that this process often requires the presence of more than one operator to be completed easily. In effect, at least a first operator attends to the sewing unit, a second operator controls the cutting, while a third operator transfers and/or stores the semi-finished product.

[0011] In this context, the basic purpose of this invention is to provide an installation for the processing of fabrics that overcomes the above mentioned disadvantages of the prior art.

[0012] In particular, this invention has for an aim to provide a fabric processing installation which can significantly reduce the number of operators required to attend to operations.

[0013] Another aim of the invention is to provide a fabric processing installation that can reduce processing times.

[0014] The stated technical purpose and the preset aims are substantially achieved by an installation for the processing of fabrics comprising the technical characteristics described in one or more of the appended claims.

[0015] Further characteristics and advantages of the invention are more apparent in the non-limiting description which follows of a preferred but non-exclusive embodiment of an installation for the processing of fabrics as illustrated in the accompanying drawings, in which:

- Figure 1 is a perspective view of an installation for the processing of fabrics according to this invention; and
- Figure 2 is a plan view of the installation illustrated in Figure 1.

[0016] With reference to the accompanying drawings, the numeral 1 denotes in its entirety an installation for the processing of fabrics according to this invention.

[0017] In particular, the installation 1 makes long webs of fabric wound in rolls or folded, ready for subsequent treatments such as, for example, dyeing, further finishing or washing.

[0018] The installation 1 comprises a sewing unit 2 and a cutting unit 3 connected to each other. In particular, the sewing unit 2 stitches together a succession of tubular pieces of fabric to form a continuous tubular web of fabric. With reference to the sewing step, the tail edge of one tubular piece of fabric is placed over and stitched to the head edge of the next tubular piece of fabric at the sewing unit 2.

[0019] Once the tubular web has been formed, it is cut lengthways in order to make a continuous open web of material twice as wide as the tubular web. In other words, at the cutting unit 3, the continuous tubular web of fabric is cut in a direction substantially perpendicular to the direction of the stitching that joins the different tubular pieces of fabric.

[0020] The sewing unit 2 extends between an infeed section 2a, where the tubular pieces of fabric are fed in succession to the sewing unit 2 itself, and an outfeed section 2b, where the continuous tubular web leaves the sewing unit 2.

[0021] At the infeed section 2a of the sewing unit 2, there is a movement element 4 which allows the head and tail edges or ends of the tubular pieces of fabric to be placed over each other and moved circumferentially while they are being joined.

[0022] In the embodiment illustrated, the movement unit 4 comprises a pair of conveyor belts 5 round which the head and tail edges of the tubular pieces of fabric are fitted. Conveyor belt drive allows the tubular ends to be moved circumferentially.

[0023] The movement element 4 forms at least part of the infeed section 2a of the sewing unit 2.

[0024] The sewing unit 2 also comprises a sewing machine 6 which makes the connecting stitches. In more detail, the sewing machine 6 is located between the con-

veyor belts 5 so that the latter, as they move, feed the superposed head and tail edges of two consecutive tubular pieces to the sewing machine 6 itself.

[0025] Under the movement element 4 and the sewing machine 6, there is a cradle 7 on which the tubular pieces are positioned, for example wound on themselves and ready to be fed to the sewing unit 2.

[0026] The sewing unit 2 also comprises pulling means 8 operating on the tubular pieces of fabric after they have been stitched together in such a way as to move the continuous web out of the sewing unit 2 itself.

[0027] The pulling means 8 comprise a pair of parallel, counter-rotating pulling rollers 9 mounted side by side. The pulling rollers 9 are connected to a motor (not illustrated in the drawings) which drives them. In use, the continuous tubular web passes between the two pulling rollers 9 which are designed to pull it away from the sewing machine 6. As illustrated, the means 8 for pulling the tubular pieces of fabric after they have been stitched together form at least part of the outfeed section 2b of the sewing unit 2.

[0028] It should be noted that the means 8 for pulling the tubular pieces after they have been stitched together are mounted at a higher level than the element 4 that moves the tubular pieces before they are stitched together. In other words, the infeed section 2a of the sewing unit 2 is located at a lower level than the outfeed section 2b of the sewing unit 2.

[0029] The cutting unit 3 extends between an infeed section 3a, where the continuous tubular web (that is, the succession of tubular pieces after they have been stitched together) is fed into the cutting unit 3, and an outfeed section 3b where the cut web leaves the cutting unit 3.

[0030] The cutting unit 3 comprises an opening element 10 located at the infeed section 3a of the cutting unit 3. In use, the continuous tubular web is passed round the opening element 10 in such a way that the walls of the tubular web are spread apart. In the embodiment described, the opening element 10 comprises a truncated cone shaped member 11 positioned with its longitudinal axis substantially vertical. Looking in more detail, the truncated cone shaped member 11 is positioned in such a way that its cross section (transversal to the longitudinal axis) widens upwards.

[0031] At a first end 11a of the truncated cone shaped member 11, where the latter's cross section is narrowest, there is a hemispherical guiding element 12.

[0032] In use, when the continuous tubular web is fed to the opening element 10, it undergoes an upward movement.

[0033] The cutting unit 3 also comprises a blade 13 which makes the above mentioned lengthwise cut. In detail, the blade 13 is associated with the opening element 10. Looking in further detail, the blade 13 is positioned at a second end 11b of the truncated cone shaped member 11, where the latter's cross section is widest.

[0034] In the embodiment illustrated, the blade 13 is substantially flat and positioned in a substantially vertical plane.

[0035] Under the opening element 10, there is a collecting tank 14 where the continuous tubular web from the sewing unit 2 can be temporarily stored before being fed to the opening element 10.

[0036] The cutting unit 3 also comprises a device 15 for transporting and dragging the continuous open web so that the fabric can be fed out of the cutting unit 2. The device 15 comprises a cylinder 16 mounted with its axis of rotation substantially horizontal. The cylinder 16 is connected to a motor 17 which drives it. The cylinder 16 is mounted at a higher level than the opening element 10.

[0037] The device 15 for transporting and dragging the continuous web of fabric constitutes the outfeed section 3b of the cutting unit 3.

[0038] It should be noted that the blade 13 is mounted substantially at - or rather, aligned with - a central portion of the cylinder 16. In more detail, the blade is located half way along the cylinder 16. This enables the web just cut to be laid out easily on the cylinder 16 which feeds it out. Preferably, the installation 1 comprises a mounting structure 19 which both the sewing unit 2 and the cutting unit 3 are connected to. Advantageously, there is only one mounting structure 19 which is made as one with both the sewing unit 2 and the cutting unit 3, so that the installation 1 has no separate portions independent of one another. Preferably, both the sewing unit 2 and the cutting unit 3 are rigidly connected to the mounting structure 19.

[0039] Advantageously, the mounting structure 19 is shaped in such a way that the sewing unit 2 and the cutting unit 3 are positioned at right angles to each other. This makes it possible to reduce the overall dimensions of the installation 1. Further, an installation 1 shaped in this way means that the infeed section 2a of the sewing unit 2 and the infeed section 3a of the cutting unit 3 are adjacent to each other. More specifically, the shape of the installation 1 is such that the infeed section 2a of the sewing unit 2 and the infeed section 3a of the cutting unit 3 give onto the same operating area where a single operator is working. In other words, the operator occupies a single operating area from which the operator has easy access to both the infeed section 2a of the sewing unit 2 and to the infeed section 3a of the cutting unit 3 without having to move.

[0040] In one embodiment not illustrated, the mounting structure 19 is shaped in such a way that the sewing unit 2 and the cutting unit 3 are positioned parallel with each other. Preferably, the sewing unit 2 and the cutting unit 3 are aligned with each other.

[0041] According to the invention, the installation 1 also comprises a connecting member 20 located between the sewing unit 2 and the cutting unit 3. The connecting member 20 enables the tubular web feeding out of the sewing unit 2 to be transferred to the cutting unit 3.

[0042] More in detail, the connecting member 20 comprises a chute 21 located between the outfeed section 2b of the sewing unit 2 and the infeed section 3a of the

cutting unit 3.

[0043] In effect, as already stated, the outfeed section 2b of the sewing unit 2 is located at a higher level than the infeed section 3a of the cutting unit 3.

[0044] Obviously, therefore, the chute 21 is inclined downwardly from the outfeed section 2b of the sewing unit 2 to the infeed section 3a of the cutting unit 3.

[0045] That way, therefore, the chute 21 allows the tubular web to be transferred quickly and continuously from the sewing unit 2 to the cutting unit 3.

[0046] In the embodiment described, the chute 21 comprises a straight portion 22 located at the outfeed section 2b of the sewing unit 2. The straight portion 22 of the chute 21 is inclined downwardly. Further, a conveyor belt 23 forming a respective substantially horizontal portion of the member 20 is located near the infeed section 3a of the cutting unit 3. The straight portion 22 is substantially at right angles to the horizontal conveyor belt 23.

[0047] Further, an oblique portion 24 of the chute 21 is located between the straight portion 22 and the conveyor belt 23 in such a way as to join the two parts. More in detail, in a plan view, the oblique portion 24 is positioned in such a way as to make with the straight portion 22 and the horizontal conveyor belt 23 respective predetermined angles with reference to the directions of longitudinal extension of the chute 21 portions themselves. As illustrated, in a plan view, the oblique portion 24 is positioned in such a way as to make angles substantially of 45° with the straight portion 22 and with the horizontal portion 23 formed by the conveyor belt.

[0048] In the embodiment where the sewing unit 2 and the cutting unit 3 are aligned, there is no need to provide any inclined portion between the straight portion 22 and the horizontal portion 23. The chute 21 might, however, comprise further connecting portions aligned with the other portions mentioned above.

[0049] With reference to the accompanying drawings, it should be noted that the conveyor belt 23 has a first end 23a located in the proximity of the oblique portion 24 and a second end 23b, opposite the first, located in the proximity of the above mentioned collecting tank 14.

[0050] Advantageously, the conveyor belt 23 facilitates the passage of the continuous tubular web of fabric from the chute 22 to the tank 14.

[0051] The installation 1 also comprises a folding device 26 located downstream of the cutting unit 3 and rigidly connected to the mounting structure 19.

[0052] The folding device 26 comprises a frame 27 rotatably connected to the mounting structure 19.

[0053] The frame 27 mounts a pulling cylinder 28. The pulling cylinder 28 is mounted parallel to the cylinder 16 of the transporting device 15 of the cutting unit 3. In more detail, the cut, opened fabric feeding out of the cutting unit 3 passes round the pulling cylinder 28 and is directed downwards by gravity towards a collecting container that is not illustrated.

[0054] The folding device 26 also comprises a pair of guide rollers 29 mounted on the frame 27 and parallel to the pulling cylinder 28. The opened fabric is made to pass between the guide rollers 29.

[0055] An actuator 30 is located between the mounting structure 19 and the frame 27 in such a way as to impart to the latter, and in particular, to the guide rollers 29, an oscillating movement. That way, the fabric moving down towards the collecting container is gathered in a succession of folds placed neatly on top of one another.

[0056] The installation 1 also comprises an inspecting device 31 for checking the quality of the tubular pieces of fabric. In the embodiment illustrated, the inspecting device is associated with the sewing unit 2. In alternative embodiments not described, the inspecting device 31 might also be associated with the cutting unit 3 or with other components. As illustrated, the inspecting device 31 comprises an illuminated inspection mirror 32 located between the sewing machine 6 and the pulling rollers 9. In other words, the illuminated mirror 32 is directly upstream of the outfeed section 2b of the sewing unit 2. The mirror 32 is at least as wide as the tubular web of fabric just formed at the sewing machine 6. That way, the tubular fabric can be effectively laid out on the mirror 32 of the inspecting device 31. A sensor element 33 is mounted above the mirror 32 in such a way as to inspect the fabric of the continuous tubular web. The sensor element 33 might, for example, be of the optical type. It should be noted that the inspecting device 31 is firmly connected to the mounting structure 19.

[0057] The invention achieves the preset aims.

[0058] The installation for the processing of fabrics according to this invention makes it possible to reduce significantly the number of workers needed to attend to its operation. Indeed, it eliminates the need to transfer and temporarily store the semi-finished fabric between the step of sewing the pieces of fabric together and the step of cutting them lengthways. Thus, a single operator has full, convenient access to both the sewing unit and the cutting unit simultaneously.

[0059] That also has obvious advantages in terms of reducing production times since the time required for the transfer and temporarily storage of the fabric is eliminated.

Claims

1. An installation for the processing of fabrics, comprising:

   a sewing unit (2) for stitching together in series a succession of tubular pieces of fabric;
   a unit (3) for cutting lengthways said succession of tubular pieces; the cutting unit (3) being connected to the sewing unit (2);
   a connecting member (20) located between the sewing unit (2) and the cutting unit (3);

the connecting member (20) comprising a chute (21) located between an outfeed section (2b) of the sewing unit (2) and an infeed section (3a) of the cutting unit (3).

2. The installation according to claim 1, **characterized in that** the outfeed section (2b) of the sewing unit (2) is at a higher level than the infeed section (3a) of the cutting unit (3).

3. The installation according to either of the foregoing claims, **characterized in that** the sewing unit (2) and the cutting unit (3) are positioned along directions substantially perpendicular to each other.

4. The installation according to claim 1 or 2, **characterized in that** the sewing unit (2) and the cutting unit (3) are positioned along directions substantially aligned with each other.

5. The installation according to any of the foregoing claims, **characterized in that** the sewing unit (2) has an infeed section (2a) that is adjacent to the infeed section (3a) of the cutting unit (3).

6. The installation according to any of the foregoing claims, **characterized in that** it comprises a mounting structure (19); the sewing unit (2) and the cutting unit (3) being rigidly associated with said mounting structure (19).

7. The installation according to any of the claims from 2 to 6, **characterized in that** the sewing unit (2) comprises at least a pair of pulling rollers (9) coupled to each other and power driven to form at least part of the outfeed section (2a) of the sewing unit (2).

8. The installation according to any of the foregoing claims, **characterized in that** it also comprises an inspecting device (31) for checking the quality of the tubular pieces and preferably associated with the sewing unit (2).

9. The installation according to claim 8, **characterized in that** the inspecting device (31) comprises an inspection mirror (32) located upstream of the outfeed section (2b) and a sensor element (33) coupled to the mirror (32).

10. The installation according to any of the foregoing claims, **characterized in that** it also comprises a folding device (26) located downstream of the cutting unit (3).

Amended claims in accordance with Rule 137(2) EPC.

1. An installation for the processing of fabrics, having a sewing unit (2) for stitching together in series a succession of tubular pieces of fabric, **characterised in that** it comprises:

a unit (3) for cutting lengthways said succession of tubular pieces; the cutting unit (3) being connected to the sewing unit (2);
a connecting member (20) located between the sewing unit (2) and the cutting unit (3);

the connecting member (20) comprising a chute (21) located between an outfeed section (2b) of the sewing unit (2) and an infeed section (3a) of the cutting unit (3).

2. The installation according to claim 1, **characterized in that** the outfeed section (2b) of the sewing unit (2) is at a higher level than the infeed section (3a) of the cutting unit (3).

3. The installation according to either of the foregoing claims, **characterized in that** the sewing unit (2) and the cutting unit (3) are positioned along directions substantially perpendicular to each other.

4. The installation according to claim 1 or 2, **characterized in that** the sewing unit (2) and the

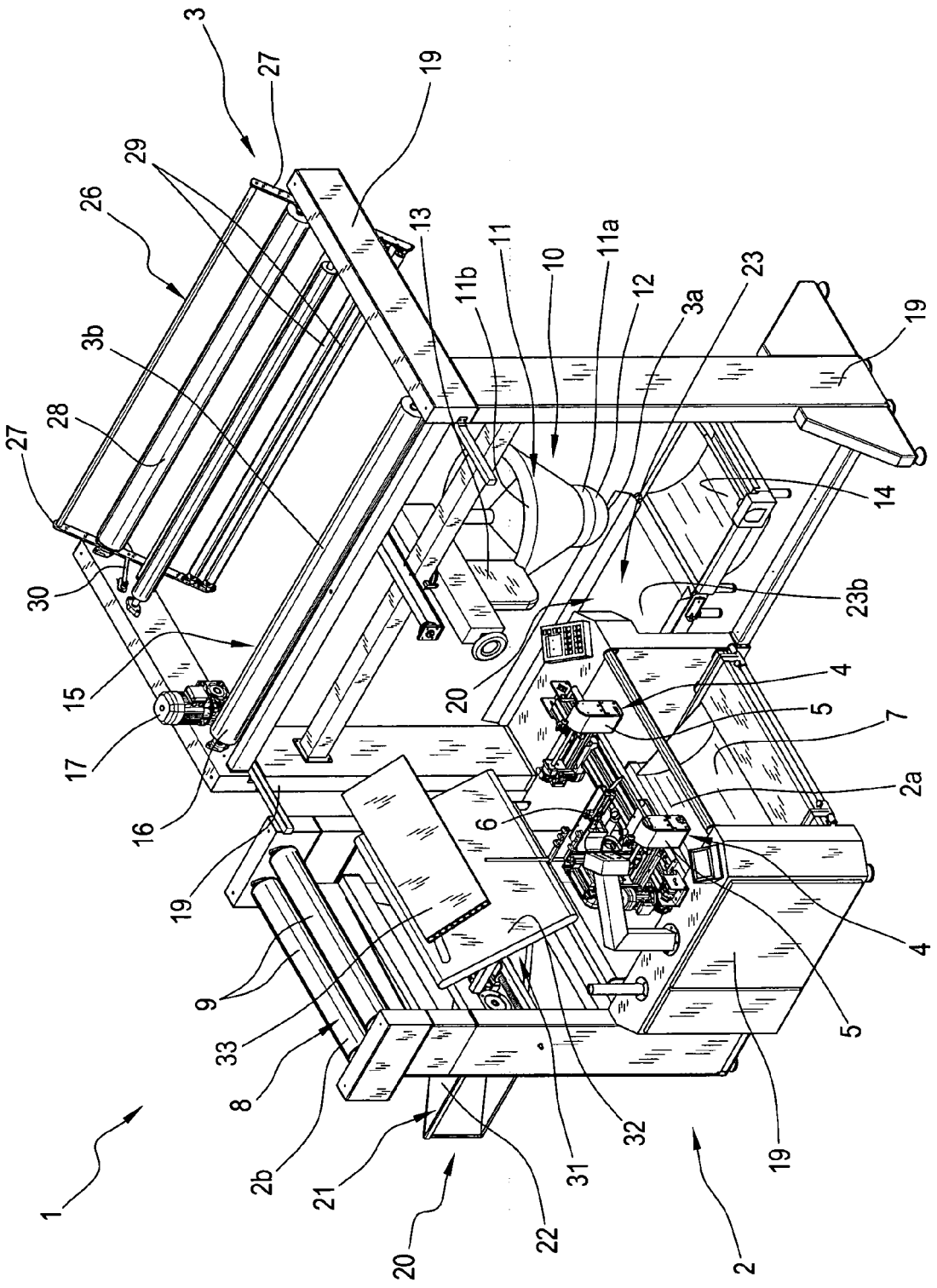

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Fig.1

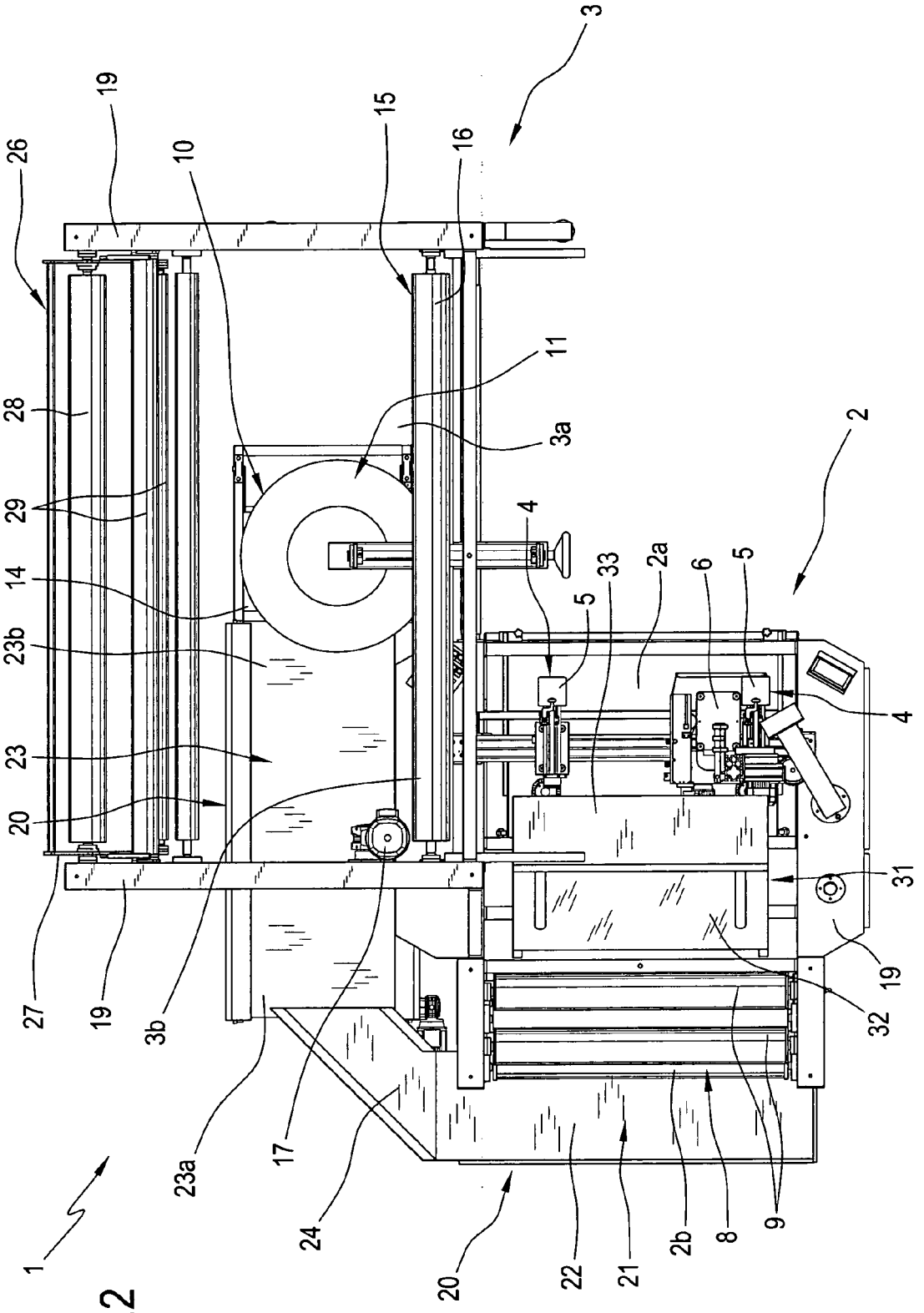

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Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5433

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 39 20 439 A1 (TRIKOTEX VEB [DD]) 22 March 1990 (1990-03-22) * column 2, line 49 - column 4, line 21; figure 1 *	1-10	INV. D05B33/00 D05B35/00
A	US 2 415 824 A (JULIUS KATZ ET AL) 18 February 1947 (1947-02-18) * column 2, line 8 - column 4, line 47; figures 1-4 *	1-10	
A	WO 00/50685 A1 (TEXMA S R L [IT]) 31 August 2000 (2000-08-31) * page 2, line 26 - page 6, line 15; figures 1-6 *	1-10	
A	US 3 389 668 A (NERINO MARFORIO) 25 June 1968 (1968-06-25) * column 3, line 6 - column 5, line 48; figures 1-18 *	1-10	
A	US 4 505 467 A (BROCKLEHURST CHARLES E [US]) 19 March 1985 (1985-03-19) * column 3, line 15 - column 7, line 25; figures 1-9 *	1-10	TECHNICAL FIELDS SEARCHED (IPC) D05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 April 2010	Herry-Martin, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 42 5433

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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13-04-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3920439 A1	22-03-1990	DD 275493 A1	24-01-1990
US 2415824 A	18-02-1947	NONE	
WO 0050685 A1	31-08-2000	IT MI990369 A1	23-08-2000
US 3389668 A	25-06-1968	GB 1117693 A	19-06-1968
US 4505467 A	19-03-1985	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82