

Description

Technical Field

[0001] The present invention relates to improvements to the fabric processing and treating machines. More in particular, the present invention relates to improvements to the drying ovens for printed fabrics, as well as to the lines comprising ovens and printing machines and to the methods for the use thereof.

State of the Art

[0002] Print decoration of fabrics for clothing and similar uses is increasingly often implemented by using inkjet printing machines or the like. These machines allow processing even very small batches of fabrics, differing from one another in the print type. To pass from processing a batch to processing another batch very simple operations are required, as the drawing can be loaded in an electronic control unit managing the print head. To pass from a batch to the other fabric replacement is usually required.

[0003] Downstream of the printing machine drying ovens are provided, inside which the fabric is dried to cure the ink. The currently used ovens have a heating system with a series of infra-red lamps, below which a fabric feeding and heating path extends. The fabric passes across the oven due to the traction exerted by winding members arranged at the outlet of the feeding and heating path. Along said path the fabric is supported at the bottom by idle rollers or other support systems, and the lamps are arranged above the series of support rollers. An air circulation system generates an air flow, which heats up by flowing around the lamps and is conveyed against and across the fabric to dry it. To introduce a new fabric in the oven, the support rollers are lowered to allow the operator to load, or "draw-in", a new fabric by opening side doors of the oven. This operation is performed very often, as the fabric is processed in small batches.

[0004] These ovens have a lot of drawbacks. The heating system is poorly efficient. Therefore the fabric exiting the oven must be collected in rolls or reels, wound together with blotting paper, which prevents the ink, not yet perfectly dried, from being transferred from one turn to the other of the wound fabric. In the subsequent processing phases the blotting paper must be removed by unwinding the fabric, it must be collected and treated as special waste due to the presence of ink traces, with consequently high disposal costs to be added to the cost of the consumable material, i.e. of the paper.

Summary of the Invention

[0005] According to one aspect, the object of the present invention is to entirely or partially solve one or more of the above mentioned drawbacks of known ovens.

[0006] The object of a preferred embodiment of the invention is to provide an oven wherein fabric insertion, i.e. fabric loading or drawing-in, is simplified with respect to what occurs in known ovens.

[0007] The object of a further embodiment of the invention is to provide a more efficient oven, at whose outlet the fabric is correctly dried, eliminating the need for winding it with the interposition of a blotting paper web.

[0008] In one embodiment the invention substantially provides a drying oven for printed fabrics, comprising a fabric inlet, a fabric feeding and heating path and a fabric outlet, and provided with a fabric drawing-in device along the path. This device simplifies and makes faster the fabric loading or drawing-in, which can be performed without opening the oven and without displacing members or parts of the machine arranged along the fabric feeding and heating path. This second advantage allows the use of heating systems which are more efficient than the traditional systems, so as to dry the ink completely and reliably and to recover the fabric without the need for particular measures, that today are necessary to avoid damages to the not yet perfectly dried ink. In one embodiment the oven comprises in combination:

- a main body comprising: a fabric inlet; a fabric outlet; a fabric feeding and heating path; blowing elements arranged above the fabric feeding and heating path and blowing elements arranged below the fabric feeding and heating path, said blowing elements being connected with a heating unit; supplying means for supplying hot air through said blowing elements and against said fabric moving forward along said feeding and heating path;
- a collection group for collecting the fabric at the exit of said fabric feeding and heating path;
- along said path, a fabric drawing-in device comprising: a pair of endless flexible members, for example endless chains, substantially parallel and spaced from each other, to which a fabric anchoring element is connected extending between said endless flexible members transversally to the fabric feeding and heating path;

wherein said chains define a closed path extending along said fabric feeding and heating path and along a return path, said anchoring element being moved by means of said chains from a position outside said inlet to a position outside said outlet of the fabric feeding and heating path, and can be arranged outside the fabric feeding and heating path when not used.

[0009] In some embodiments the oven comprises at least four groups of blowing elements put one on top of the another. In this case the fabric feeding and heating path defines at least three path portions superposed on one another and arranged in sequence along the fabric feeding direction. The path portions respectively extend: a first portion between a first group of blowing elements and a second group of blowing elements; a second por-

tion between said second group of blowing elements and a third group of blowing elements; and a third portion between said third group of blowing elements and a fourth group of blowing elements. Along at least one of these portions of the feeding path a fabric feeding conveyor is advantageously arranged. The feeding conveyor can be arranged with a feeding branch along the first portion of the feeding path, between the first group of blowing elements and the second group of blowing elements. In advantageous embodiments of the invention the chains extend along said first, second, and third portion of the fabric feeding and heating path.

[0010] Preferably, the heating unit is arranged in a lower area of the main body of the oven, below said blowing elements. In this case, the closed path defined by the chains preferably extends outside and above the oven main body.

[0011] In some embodiments the drawing-in device comprises an anchoring element, for example a transverse bar, movable along the fabric feeding and heating path.

[0012] The anchoring element is preferably movable from a position outside the inlet of the fabric feeding and heating path, to a position outside the outlet of the fabric feeding and heating path, for example between two ends of a trajectory extending up to the outside of a casing forming the oven body. Furthermore, the anchoring element, when not in use, i.e. during the normal operation of the oven, can be preferably arranged outside the fabric feeding and heating path.

[0013] Generally, the drawing-in device can comprise for instance a mechanism for moving the fabric anchoring element, obtained through a cylinder-piston actuator. To increase the stroke of the anchoring element and to simplify the mechanism, the drawing-in device can preferably comprise a flexible member movable along the fabric feeding and heating path, and this endless flexible member is connected to the fabric anchoring element. For instance, a cable can be provided, or a chain or a pair of cables or chains that wind and unwind at the opposite ends of the fabric path. However, according to a preferred embodiment of the invention, the flexible member is an endless member extending along this fabric feeding and heating path and along a return path, i.e. along a closed path. The flexible member can comprise, for instance, a pair of substantially parallel chains, between which a bar is constrained, extending transversally with respect to the fabric feeding and heating path, wherein said fabric can be connected to said bar.

[0014] In some preferred embodiments of the invention, to heat the fabric and dry the ink a series of blowing elements is provided, arranged above and below the fabric feeding and heating path, in connection with a heating unit, and supplying means for supplying hot air through these blowing elements and against said fabric.

[0015] According to a further aspect, the invention relates to a fabric processing line, comprising a textile printing machine and a drying oven as claimed in one or more

of the appended claims.

[0016] The invention also relates to a method for drying the ink on a printed fabric exiting from a textile printing machine by means of an oven comprising a feeding and heating path extending between an inlet and an outlet, characterized by drying said ink by blowing air on both the fabric surfaces through blowing elements, which are opposite to one another and between which said path extends and the fabric is fed.

[0017] Further features of the oven, of the line and of the method according to the invention will be described hereunder and in the appended claims, which form an integral part of the present description.

15 Brief description of the drawings

[0018] The invention will be better understood by following the description below and the attached drawing, which shows a non-limiting practical embodiment of the invention. More in particular, in the drawing:

Fig. 1 shows a section of an oven in a possible embodiment, according to a vertical plane;
Fig. 2 is an axonometric view of the oven of Fig. 1;
Fig. 3 and 4 show a sectional and axonometric view of an enlargement of the oven inlet area;
Fig. 5 shows a section of an oven in a second embodiment, according to a vertical plane.

30 Detailed description of embodiments of the invention

[0019] The oven, indicated as a whole with number 1, is arranged in a fabric processing line, downstream of a printer schematically indicated with number 2. The oven 1 comprises a main body 3 containing the heating and drying system, and a unit 5 for collecting the fabric processed inside the body 3.

[0020] The body 3 has a substantially box-shaped structure with side openings, if necessary, closed by doors 3A. The box-shaped structure defines a heating inner volume inside which a path extends for the fabric to be dried. The path has an inlet 7 for the fabric T fed according to arrow F and coming from the printing machine 2. Opposite to the inlet 7 an outlet 9 is arranged, from which the fabric T is taken to be collected.

[0021] In the illustrated embodiment, the unit 5 has two distinct collection systems and more precisely a collection system in rolls, which allows a fabric roll or reel R to be wound on a winding mandrel or rod 11, as well as a cross lapper 13. In figure 1 the fabric T is shown in the path followed by it to achieve the cross lapper 13, which collects the fabric in folders on a collection table or collection conveyor not shown, with a movement imparted by a wheel 15 to a pivoting arm 17 provided with end rollers 19. The cross lapper 13 operates in a known manner. In other embodiments only one collection system can be provided, for example only in roll or only in folder.

[0022] Inside the box-shaped structure 3 the actual ov-

en is arranged, comprising a heating and drying system for the fabric moving along the feeding and heating path extending between the inlet 7 and the outlet 9.

[0023] In some embodiments, as shown in the drawing, the heating system comprises blowing elements 21 and 23 blowing air towards the fabric T which moves forward along the fabric feeding and heating path.

[0024] In the illustrated embodiment, the blowing elements 21 are arranged above the fabric feeding and heating path and the blowing elements 23 are arranged below said path. The heating elements 21 and 23 are arranged in pairs, two above and two below the fabric path, but in other embodiments also different arrangements can be provided, for example a single upper element and a single lower element, or more than two elements both above and below, or also a different number of heating elements above and below the fabric. Each blowing element is provided with a casing receiving hot air fed by fans inside the casing itself, which is provided, on the side facing the fabric, with respective hot air outlets. In this way the hot air fed inside the casings of the blowing elements 21 and 23 is blown towards and against the fabric T to heat it and to dry the print ink.

[0025] In some embodiments the air is heated by means of an electrical heating unit 25. In other embodiments heating can be obtained by means of a gas burner or other adequate heating means. A diathermal oil heating unit can be for instance provided, the oil being heated in a boiler outside the oven or in any other manner. The arrangement of the blowing elements 21 and 23 is substantially similar to that of a so-called stenter, a machine commonly used in fabric processing for drying the fabrics.

[0026] In some embodiments the fabric T is supported by lower rollers 31 along the feeding and heating path between the blowing elements 21 and 23. In the illustrated example three rollers 31 are provided, arranged: near the inlet 7, in an intermediate position between the blowing elements 21, 23, and near the outlet 9, respectively. It is also possible to provide a greater or lower number of rollers 39. For example, more than two blowing elements 21, 23 can be provided, both above and below the fabric feeding and heating path and a support roller below between each pair of adjacent blowing elements, so as to not interfere with the air flow generated by the blowing elements.

[0027] Such a structure, even if it is known in the so-called stenters, is not currently used in the drying systems for drying the print ink, also due to the fact that an effective and simple system for the fabric drawing-in or loading does not exist in the traditional stenter systems. In the traditional stenters this is not a problem, as the fabric drawing-in occurs with an extremely reduced frequency, as the stenter processes very long fabrics. The stenters are furthermore provided with fabric feed chain systems, with lateral chains engaging the selvages of the fabric and therefore useful not only for feeding but also for drawing-in the fabric.

[0028] To make the loading or drawing-in of small fab-

ric batches in the oven 1 easy, according to the invention a loading, or drawing-in, device is provided, indicated as a whole with reference number 35. In the illustrated example the loading device 35 comprises two endless chains 37 driven along two substantially equal and parallel closed paths laying on vertical planes and intersecting the plane of laying of the fabric T which moves forwards along the path between the inlet 7 and the outlet 9 of the oven.

[0029] More in particular, in the illustrated example the chains 37 are driven between gear wheels 39, 41, 43, 45 defining a closed path. A pair of gear wheels are keyed on a common shaft driven into rotation by a suitable actuating mechanism. In the example shown the gear wheels 39 are carried by a common shaft actuated by a manual crank actuator 47, which can be rotated manually to cause a forward movement of the chains 37 along the respective paths.

[0030] A transverse bar 49 extends between the two chains 37, said bar being fixed near the ends thereof to said chains. The bar 49 can be arranged in a position far from the feeding path of the fabric T when the oven operates in steady-state conditions, with the fabric T correctly loaded and continuously fed through the oven to be dried and collected in reel or folder.

[0031] When a fabric batch has been processed and a new fabric must be loaded in the oven, the following applies. Through the hand wheel or crank 47 the cross bar 49 is brought manually in the position indicated in Fig. 1 in front of the inlet 7 of the box-shaped structure 3 forming the body of the oven 1. The initial end of the fabric is fixed to the bar 49 by means of gripping members 50 or in other adequate manner, for example by winding the fabric head end around the bar 49 and fixing the formed turn around the same bar 49.

[0032] Once it has been fixed, the operator, through the crank 47, actuates the chains 37 that displace the bar 49 from its starting position, in front of the inlet 7, and moves it through the inlet 7 along the fabric feeding and heating path to the outlet 9. As the fabric initial end is fixed to the bar 49, the fabric is drawn through the oven path until it exits at the outlet 9, where the operator can easily remove the fabric from the bar 49 and pass it around the guiding rollers 51, 53, 57 up to the cross lapper 13 or the winding bar 11.

[0033] At this point the cross bar 49 can be brought in a suitable position outside the feeding and heating path of the fabric T, and the processing line can start to work, feeding the fabric in a continuous manner through the printing machine 2 and from the latter towards and through the oven 1 for heating and drying the ink and then collecting the fabric in roll or reel R or in folder through the cross lapper 13.

[0034] Fig. 5 shows a section according to a median vertical plane of an oven according to the invention in a different embodiment. The same reference numbers indicate equal or corresponding parts to those described with reference to the previous figures.

[0035] The oven, indicated as a whole with number 1, comprises a main body 3, to which a collection group 5 is associated for collecting the dried fabric. In this embodiment, the collection group 5 is formed by a cross lapper. In the illustrated embodiment a winding system is not provided, but it should be understood that, similarly to what illustrated with reference to Fig. 1, the cross lapper 5 can be replaced by, or combined with, a winder.

[0036] The main body 3 of the oven 1 comprises an inlet 7 for the fabric T coming from a printing machine, in particular an ink jet printing machine, not shown in Fig. 5. On the opposite side of the main body 3 of the oven 1 a fabric outlet 9 is arranged.

[0037] Inside the main body 3 a chamber 4 is defined, in which blowing elements are arranged, similar to the previously described blowing elements 21, 23. As in the previous embodiment, the blowing elements can be constituted by casings that receive heated air from the underlying heating unit 25, for example an electrical heating unit, or a combustion heating unit, preferably gas-powered.

[0038] In the example illustrated in Fig. 5 four groups of superposed blowing elements are provided. A first group of blowing elements 21A are arranged in the highest position and is constituted by blowing elements opened downward. A second group of blowing elements is indicated with 23A and, in the illustrated example, comprises three blowing elements opposite to the three blowing elements 21A of the first group. Going down along the vertical extension of the main body 3 of the oven 1, below the blowing elements 23A a third group of blowing elements 21B and a fourth group of blowing elements 23B are arranged. The blowing elements 23A are provided with air outlets on the lower surface, the blowing elements 23A of the second group advantageously have air outlets both above and below so as to act on two segments of feeding path of the fabric to dry, as described below. Similarly, the elements of the blowing group 21B have air outlets both above and below, whilst the blowing elements 23B of the lower group have air outlets only on the upper surface.

[0039] In the illustrated example, to the second group of blowing elements 23A a conveyor 24 is associated, comprising a belt, preferably a pervious belt, wherein belt means any plan endless flexible element defining a support surface for the fabric, also in the form of a net, if necessary.

[0040] The conveyor 24 is driven around guide rollers 26, at least one of which can be advantageously motorized. In the illustrated example, one of the guide rollers 26 is outside the main body 3 of the oven, while the other is inside the main body of the oven.

[0041] Between consecutive pairs of groups of blowing elements three segments or portions of the fabric feeding and heating path are defined in all: a first portion between the group of blowing elements 21A and the group of blowing elements 23A; a second path portion between the group of blowing elements 23A and the group of blowing

elements 21B, and a third path portion between the blowing elements 21B and the blowing elements 23B.

[0042] Similarly to what illustrated in the previous embodiment, to the oven 1 a drawing-in device is associated, advantageously comprising a pair of chains or other endless flexible members 37. Only one of the two chains 37 is visible in Fig. 5, as they extend according to two parallel and substantially equal paths. In the illustrated embodiment the chains 37 are driven around chain wheels 39, 41, 43, 45, 46, 48, and 50. With the particular arrangement of these wheels, three portions or segments are defined of the closed path formed by the endless flexible members 37: between the blowing elements 21A, 23A, between the blowing elements 23A and 21B, and between the blowing elements 21B and 23B, at the above defined first, second and third portion of the fabric feeding and heating path. Advantageously, the guide wheels 50 of the chains or other endless flexible members 37 are substantially coaxial to the guide roller 26 of the conveyor 24.

[0043] As in the previous embodiment, the return path of the chains 37 extends outside and preferably above the main body 3 of the oven 1.

[0044] The conveyor 24 is provided in the part of the fabric feeding and heating path nearest to the inlet 7, where the fabric coming from the printing machine upstream is more full of ink. Due to the fresh ink, having a high weight per surface unit, in this portion of the fabric feeding and heating path the fabric T can tend to bend downward. The purpose of the conveyor 24 is to support and feed the fabric also in this area, thus avoiding accidental contact and consequent stripping between the fabric T and the upper surface of the blowing elements 23A. A similar arrangement can be provided also in the other segments or portions of the feeding and heating path. However in this path portions the fabric has been at least partially dried, and therefore the ink weight is substantially reduced. This is particularly true as regards the portion of the feeding and heating path between the blowing elements 21B and 23B of the third and fourth group. To avoid contact and stripping between fabric and blowing elements 21B of the third group of blowing elements, instead of a further conveyor, similar to the conveyor 24, it is advantageously possible to arrange the upper surfaces of the blowing elements 21B at a distance from the fabric path respect greater than the distance of this latter from the lower surfaces of the blowing elements 23A above, as clearly shown in Fig. 5. Thanks to this greater distance, the fabric curvature downward, if any, does not result in contact between fabric and underlying blowing elements 21B.

[0045] It is understood that the drawing only shows an example provided by way of a practical arrangement of the invention, which can vary in forms and arrangements without however departing from the scope of the concept underlying the invention. Any reference numbers in the appended claims are provided for the sole purpose of facilitating reading of the claims in the light of the descrip-

tion and the drawing, and do not in any manner limit the scope of protection represented by the claims.

Claims

1. A drying oven for printed fabrics, comprising:

- a main body (3) comprising: a fabric (T) inlet (7); a fabric (T) outlet (9); a fabric feeding and heating path; blowing elements (21) arranged above the fabric feeding and heating path and blowing elements (23) arranged below the fabric feeding and heating path, said blowing elements (21, 23) being connected with a heating unit (25); supplying means for supplying hot air through said blowing elements and against said fabric moving forward along said feeding and heating path;
- a collection unit (5) for collecting the fabric at the exit of said fabric feeding and heating path;
- a fabric drawing-in device along said path, comprising: a pair of endless flexible members (37), substantially parallel and spaced from each other, to which a fabric anchoring element (49) is connected extending between said endless flexible members (37) transversally to the fabric feeding and heating path;

wherein said endless flexible members define a closed path extending along said fabric feeding and heating path and along a return path, said anchoring element (49) being moved by means of said endless flexible members (37) from a position outside said inlet to a position outside said outlet of the fabric feeding and heating path, and can be arranged outside the fabric feeding and heating path when not used.

2. An oven as claimed in claim 1, wherein said return path of said endless flexible members (37) is outside said main body (3).
3. An oven as claimed in claim 1 or 2, comprising an actuator for moving said endless flexible members (37).
4. An oven as claimed in claim 1, 2, or 3, wherein said collection group comprises a cross lapper system (13) or a winding system (11) for the fabric exiting from said fabric feeding and heating path, or both said cross lapper system and said winding system.
5. An oven as claimed in one or more of the previous claims, wherein support rollers (31) are arranged along said fabric feeding and heating path.
6. An oven as claimed in claim 5, wherein at least one

of said support rollers (31) is positioned between the blowing elements (21, 23) arranged above and below the fabric feeding and heating path.

7. An oven as claimed in one or more of the previous claims, comprising at least four groups of blowing elements put above one another; wherein said fabric feeding and heating path comprises at least three portions of path put above one another and arranged in succession along the fabric feeding direction, extending respectively: a first portion between a first group of blowing elements (21 A) and a second group of blowing elements (23A); a second portion between said second group of blowing elements (23A) and a third group of blowing elements (2 1 B); and a third portion between said third group of blowing elements (2 1 B) and a fourth group of blowing elements (23B); and wherein said endless flexible elements (37) extend along said first, second, and third portion of the fabric feeding and heating path.
8. An oven as claimed in claim 7, wherein along at least one of said three portions of the feeding path a fabric feeding conveyor (24) is arranged.
9. An oven as claimed in claim 8, wherein said feeding conveyor (24) is arranged with a feeding branch along the first portion of the feeding path, between said first group of blowing elements (21A) and said second group of blowing elements (23A); said first, second, and third portion of the fabric feeding and heating path being arranged in succession in the fabric feeding direction.
10. An oven as claimed in one or more of claims 7 to 9, wherein said endless flexible members (37) extend along said first, second, and third portion of the fabric feeding and heating path.
11. An oven as claimed in one or more of the previous claims, wherein said heating unit (25) is arranged in a lower area of the main body (3), below said blowing elements, and wherein the closed path defined by said endless flexible members extends outside and above said main body (3).
12. An oven as claimed in one or more of the previous claims, wherein said endless flexible members (37) are chains.
13. A fabric processing line comprising a textile printing machine and a drying oven as claimed in one or more of the previous claims.
14. A processing line as claimed in claim 13, wherein said textile printing machine is an inkjet printing machine.

15. A method for producing a printed fabric, comprising the steps of:

printing said fabric in a printing machine, feeding
the printed fabric to an oven as claimed in one 5
or more of claims 1 to 13, drying the ink on said
printed fabric exiting from the printing machine
by means of said oven; comprising the steps of:
drawing-in said fabric through said oven by 10
means of the drawing-in device of the oven;
feeding the fabric printed by said printing ma-
chine through said oven; drying the ink applied
by said printing machine by blowing air on both
the surfaces of the fabric through said blowing 15
elements (21, 23) of said oven, which are oppo-
site to one another and between which said path
extends and the fabric is fed.

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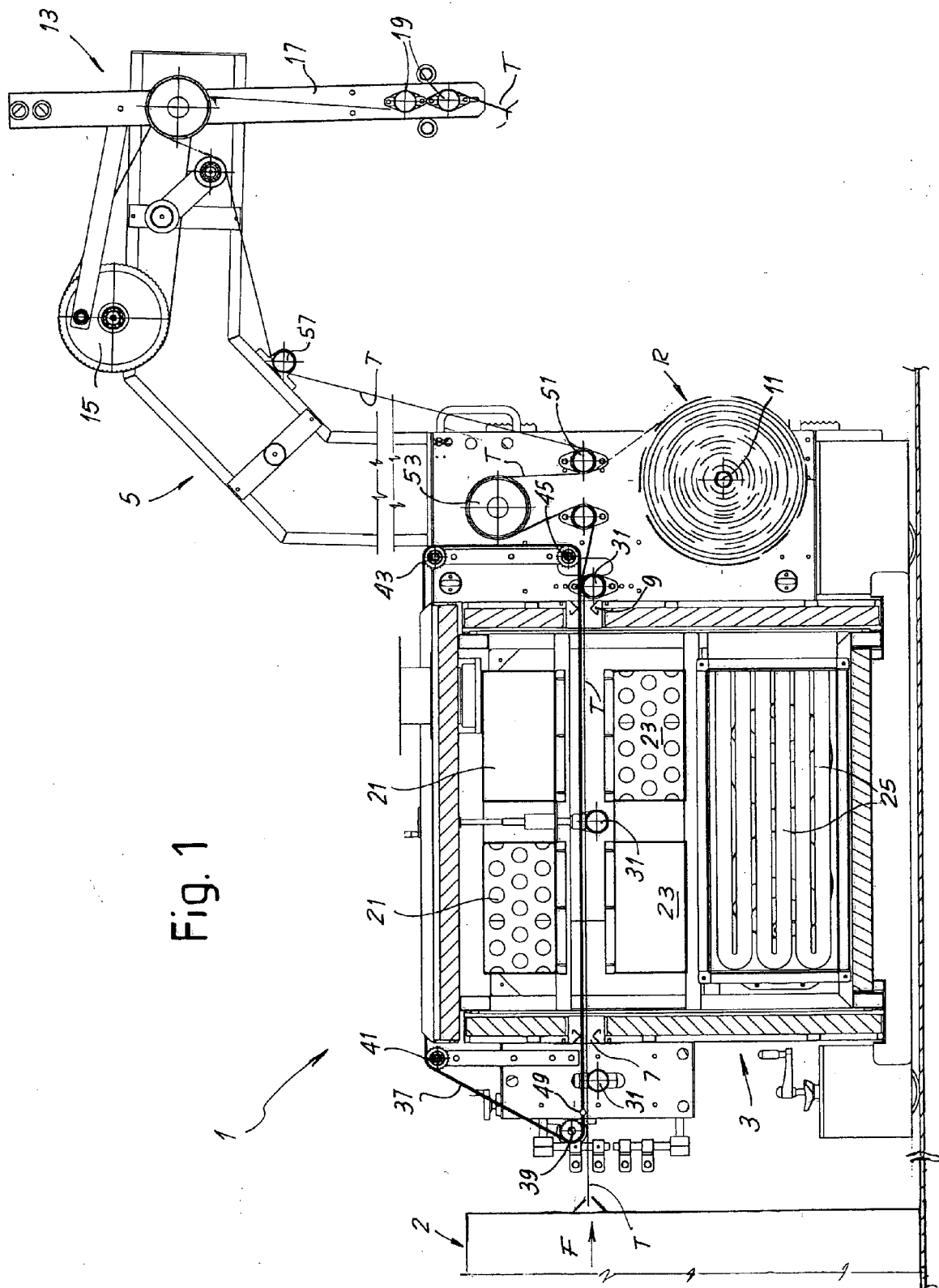


Fig. 1

Fig. 2

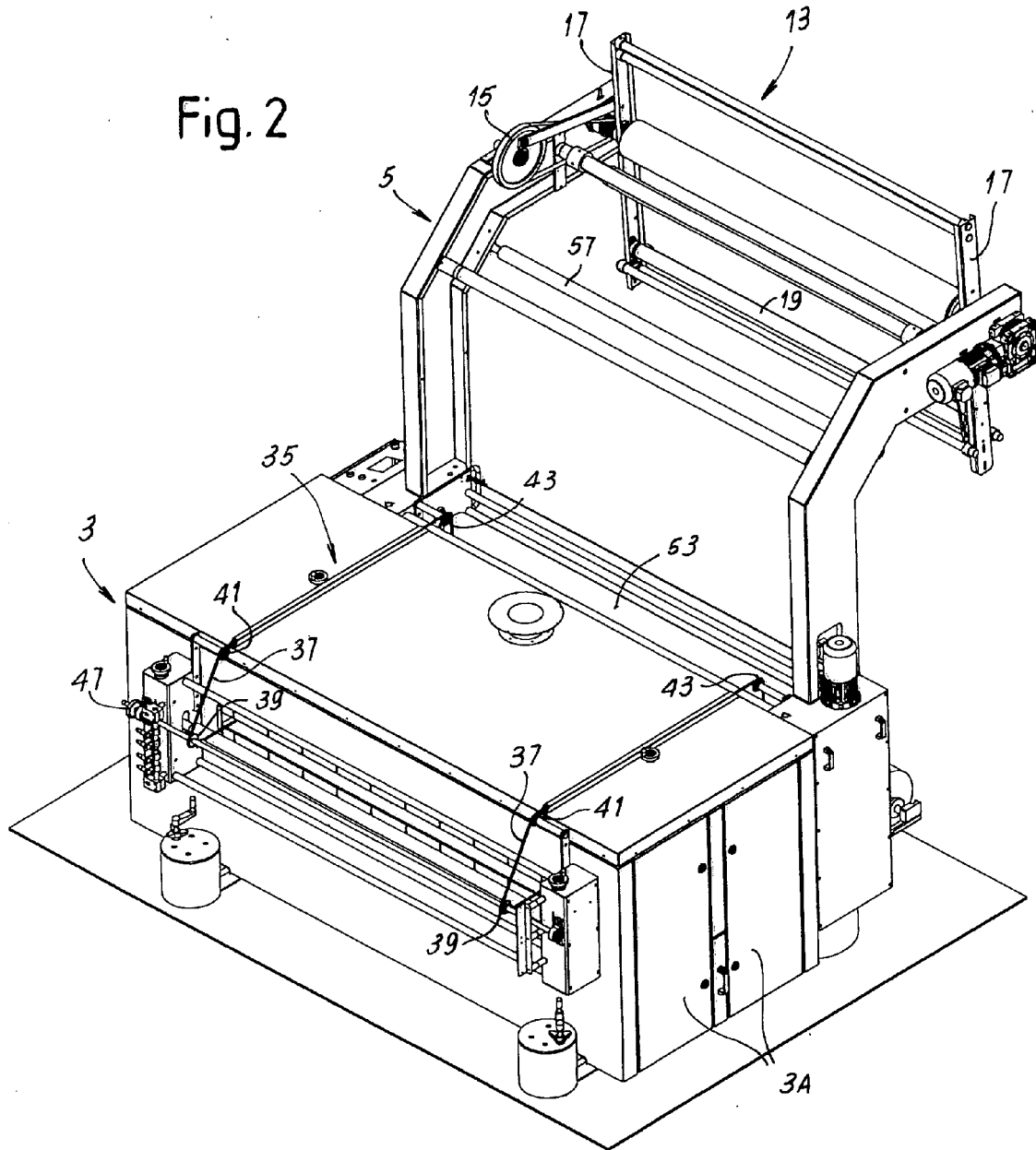


Fig. 3

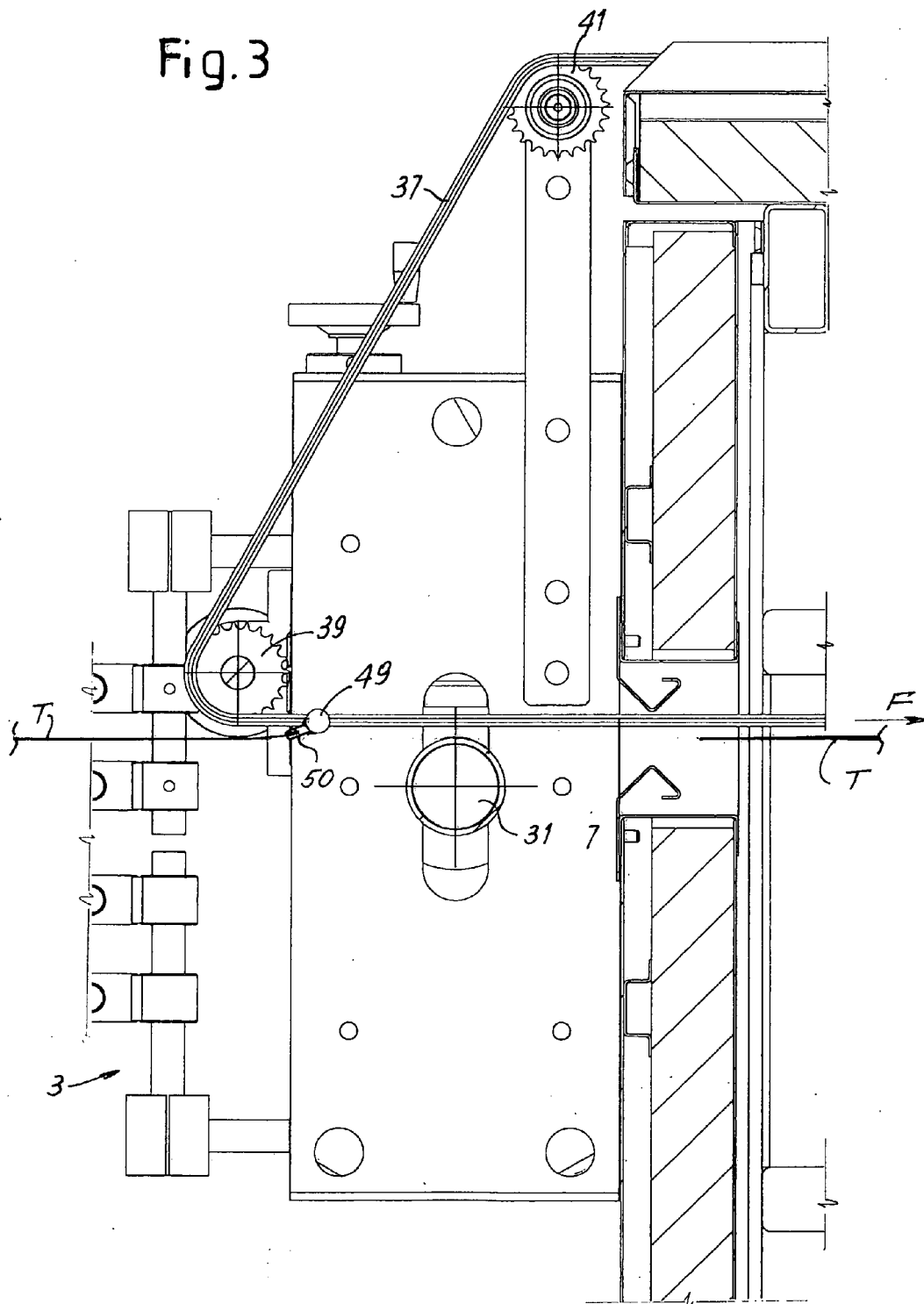
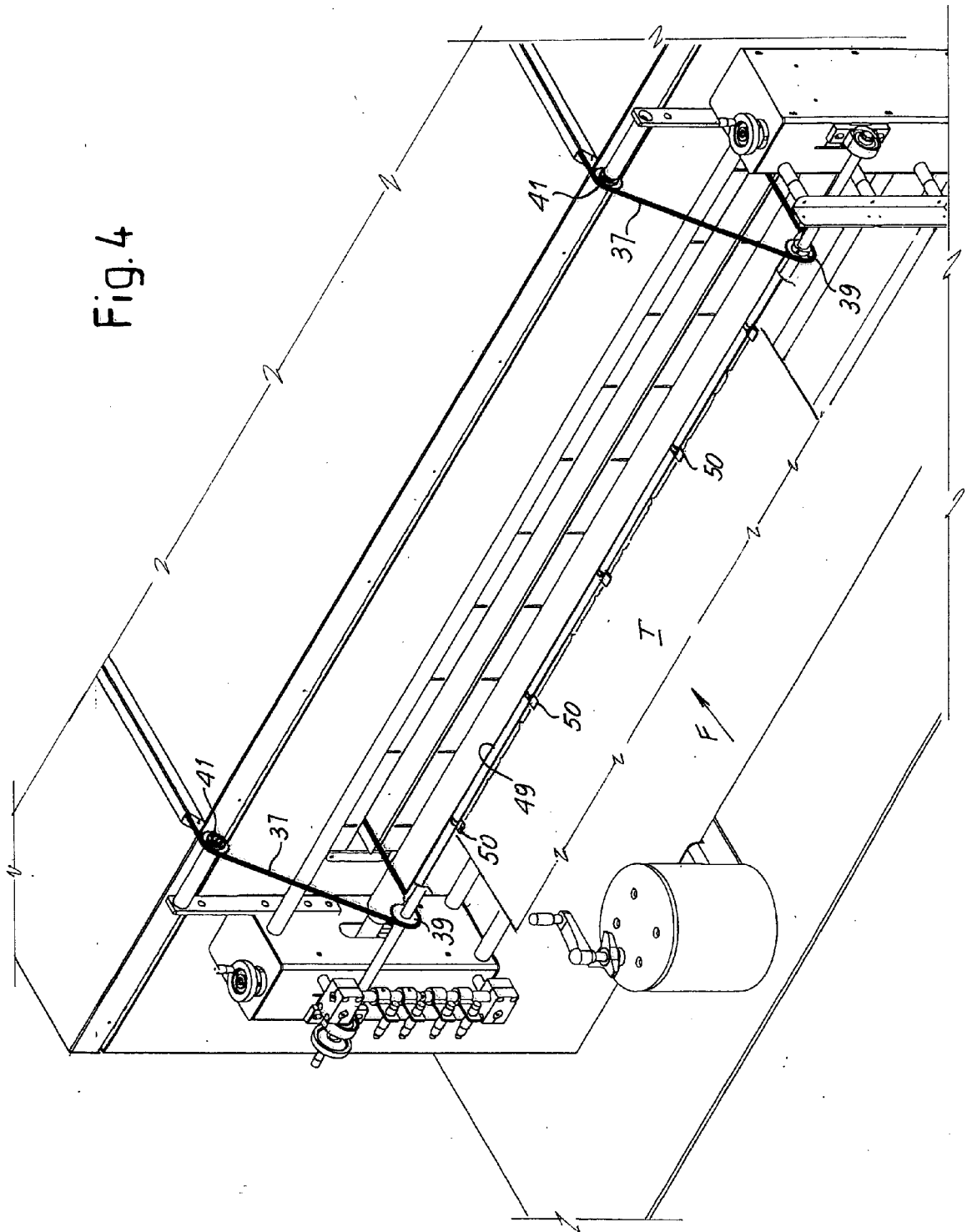
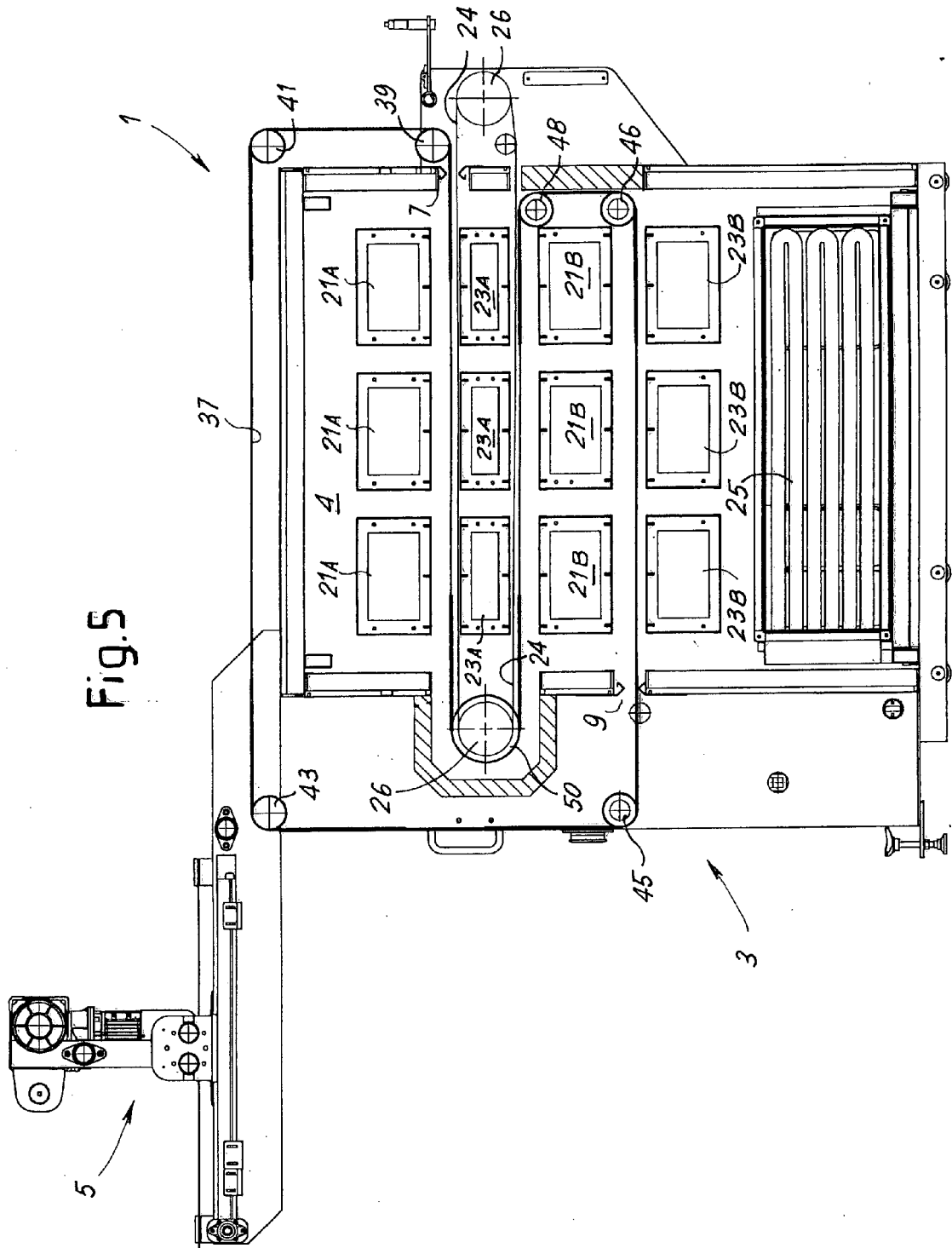


Fig. 4







EUROPEAN SEARCH REPORT

Application Number
EP 11 00 1566

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	US 5 333 771 A (CESARIO DONALD C [US]) 2 August 1994 (1994-08-02) * column 1 - columns 6-19; figures 1,2,6 * * column 5, line 57 - column 6, line 26 * * column 9, line 31 - column 11, line 14 * -----	1-15	INV. F26B13/10
A	US 2 862 705 A (FAEBER HARRY W) 2 December 1958 (1958-12-02) * column 2, lines 5-33 * * column 4, line 44 - column 5, line 2; figures 2,10,11 * -----	1-15	
A	US 5 581 908 A (THEILACKER KLAUS [DE]) 10 December 1996 (1996-12-10) * column 2, line 66 - column 4, line 41 * * column 5, lines 24-43 * -----	1-15	
A	GB 968 619 A (SVENSKA FLAECTFABRIKEN AB) 2 September 1964 (1964-09-02) * page 1, lines 44-72 * * page 2, lines 5-35 * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC)
A	US 5 249 373 A (ROGNE ALLAN W [US] ET AL) 5 October 1993 (1993-10-05) * the whole document * -----	1-15	F26B
A	EP 0 753 406 A1 (HEIDELBERG CONTIWEB BV [NL] HEIDELBERGER DRUCKMASCH AG [DE]) 15 January 1997 (1997-01-15) * column 1, lines 8-40 * * column 4, lines 18-29 * -----	1-15	
A	US 4 341 024 A (WITKIN PHILIP M) 27 July 1982 (1982-07-27) * the whole document * -----	1-15	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 May 2011	Examiner Bichi, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 00 1566

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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13-05-2011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5333771	A	02-08-1994	NONE	
US 2862705	A	02-12-1958	NONE	
US 5581908	A	10-12-1996	DE 4325251 A1	02-02-1995
			FR 2709539 A1	10-03-1995
			GB 2280426 A	01-02-1995
			JP 2629134 B2	09-07-1997
			JP 7076068 A	20-03-1995
GB 968619	A	02-09-1964	BE 613622 A1	29-05-1962
			CH 395727 A	15-07-1965
			DK 103115 C	15-11-1965
			ES 274386 A1	16-07-1962
			SE 302245 B	08-07-1968
US 5249373	A	05-10-1993	NONE	
EP 0753406	A1	15-01-1997	AT 201847 T	15-06-2001
			DE 69613180 D1	12-07-2001
			DE 69613180 T2	18-10-2001
			NL 1000740 C2	08-01-1997
			US 5702043 A	30-12-1997
US 4341024	A	27-07-1982	NONE	

EPO FORM P0459

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