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(54) **Piece-pulling device for a circular knitting machine and machine comprising said piece-pulling device**

Abzugsvorrichtung für eine Rundstrickmaschine und damit ausgerüstete Maschine

Dispositif de stockage pour un métier à tricoter circulaire et métier comprenant ledit dispositif

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(56) References cited:
EP-A- 0 456 576 **EP-A- 0 696 658**

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Description

Technical field

[0001] The present invention relates to a so-called "piece-pulling device", that is a device designed to draw the knitted fabric produced by a circular machine and wind it in a roll.

[0002] The invention also relates to a circular knitting machine, and in particular to a machine with rotating cylinder, equipped with a piece-pulling device of the aforesaid type.

State of the Art

[0003] In the knitted fabric manufacturing sector the use of piece-pulling devices which are positioned underneath the cylinder of the knitting machine and rotate with it to receive and wind the fabric on a piece-winding beam or roller as it is produced by the cylinder of the machine are known. Equipping these piece-pulling devices with a cutting means which gradually cut the tubular fabric being drawn along a longitudinal line, to open it out, so that it is wound as a simple fabric rather than a tubular fabric on the piece-winding roller is also known. An example of piece-pulling device of this type is described in EP-A-0456576.

[0004] These piece-pulling devices have a pair of diverter rollers, with axes parallel and reciprocally side by side, positioned directly underneath the needle cylinder of the knitting machine. The tubular fabric which is delivered in cylindrical form from the needle bed is guided between the diverter rollers to be laid flat with a double thickness. Positioned immediately downstream of these diverter rollers is the blade which cuts the tubular fabric along a longitudinal line and positioned downstream of the cutting blade are a pair of divaricating rods which, with an effect combined with the effect of the two diverter rollers, open out the fabric to lay it flat. The fabric laid out flat then passes through a series of spreading, traction and guide rollers to be wound on the piece-winding beam or roller.

[0005] Whilst the piece-pulling device is drawn in rotation by a mechanical coupling (obtained by means of drawing arms) to the rotating needle cylinder of the knitting machine to which it is interlocked, the parts on the piece-pulling device receive motion typically from a pulley or gearwheel fixed to the base and cooperating with a mechanical drive which distributes motion to the rollers of the piece-pulling device. The rotary movement imparted to the piece-pulling device causes transmission of motion to its parts.

[0006] The fabric, opened out and laid flat, is pulled by one or more rollers positioned downstream of the zone in which the tubular fabric is cut longitudinally and laid flat. This means that the point in which the fabric is pulled is distant from the point in which the longitudinal cut is made. Due to the distance between the cutting device and the first motorized roller which imparts traction to the fabric to impart the correct tension to the fabric in the cutting and opening out zone, the traction exerted by the underlying rubber rollers must be increased.

[0007] In a machine to produce tubular fabric the distance between the zone in which knitted fabric is produced and the pair of piece-pulling rollers, that is the pair of motorized rollers which the fabric encounters first, is approximately 65 cm. When, on the other hand, there is a cutting device and the relative parts to lay the open fabric flat, due to the complex feed path of the fabric, the distance between the zone in which the knitted fabric is produced and the zone in which the traction rollers of the fabric are positioned increases to approximately 180 cm, meaning that the feed path of the fabric between the zone in which the knitted fabric is produced and the point in which traction is applied to draw the fabric from the production zone to the winding zone is approximately 180 cm.

[0008] This makes it necessary to apply considerable traction to the fabric. This increased traction (compared with machines in which the fabric is not cut and laid flat) causes:

- change in the structure of the knitted fabric, with deterioration in the quality of the fabric;
- increase in the difference between the beginning and end of the roll of wound fabric. This difference is always present, due to the type of winding utilized, which is a peripheral type winding, that is obtained with a friction force applied to the outside of the roll being formed. This difference becomes unacceptable when the length of fabric wound in a roll is substantial and when the traction applied to the fabric is considerable. This unacceptableness is due on the one hand to the difference in weight per square meter between the beginning and end of each piece of fabric wound on each single roll, and on the other hand to the narrowing of the width of the roll from the beginning to the end of the piece of fabric.

[0009] A device according to the preamble of claim 1 is known from EP-A-696658. The motorized diverter rollers are arranged upstream of the cutting device and the traction on the fabric being cut is again entirely provided by traction and guide rollers arranged downstream of the cutting device and associated fabric divaricating rods. This known device has the same drawbacks mentioned above.

Objects and Summary of the Invention

[0010] The object of the present invention is to produce a piece-pulling device which limits or overcomes the aforesaid drawbacks, reducing tensile stress on the fabric and the relevant consequences in terms of quality of the finished piece. This object is achieved with a device according to claim 1. The dependent claims relate to fur-

ther advantageous features and embodiments of the device. The motorized diverter rollers are arranged underneath the cutting device such as to exert a traction force on the fabric.

[0011] In this way a traction force is exerted on the fabric in proximity to the cutting device and therefore much nearer to the zone in which the knitted fabric is produced, compared with normal piece-pulling devices. The entire fabric is thus subjected to less tensile stress, with consequent advantages to the quality of the fabric.

[0012] Although it is possible to provide a dedicated transmission to operate the diverter rollers, according to an advantageous embodiment the diverter rollers take their motion from said at least one motorized roller of the series of traction and guide rollers positioned downstream of the cutting device and which drive and guide the fabric laid flat.

[0013] In a manner known per se, the piece-pulling device may comprise a pair of supporting uprights of the series of traction and guide rollers and a pair of bars, each supported at a first end by one of said uprights and converging with the respective second ends to form a support for the diverter rollers. According to the invention, in this case a kinematic transmission may be developed along at least one of said bars to transmit motion to the diverter rollers. The kinematic transmission may comprise a shaft housed inside said bar. The shaft may be equipped with end universal joints for connection to axles keyed on which are respective pinions which receive and transmit motion by means of flexible organs, in particular chains or equivalent.

[0014] Further advantageous characteristics and embodiments of the device and of the machine according to the invention are indicated in the attached claims.

Brief description of the Drawings

[0015] The invention willl be better understood by following the description and attached drawing, which shows a non-limiting example of the invention. In the drawing:

Fig.1 shows a partly sectional elevation of a knitting machine equipped with the improved piece-pulling device according to the invention;
Fig.2 shows a section according to the line II-II in Fig.1;
Fig.3 shows a plan view of the piece-pulling device of the machine, according to the line III-III in Fig.2;
Fig.4 shows the detail IV in Fig.1 enlarged and sectioned according to a vertical axial plane; and
Fig.5 shows a perspective view of a detail of the bar which transmits motion to the diverter rollers.

Detailed Description of the Preferred Embodiment of the Invention

[0016] The circular knitting machine comprises a fixed annular structure 1 (Fig.1) supporting a needle cylinder 7, developed around a vertical axis Z-Z, rigidly fixed to which are three supporting legs 3 positioned, in plan, at about 120° from one another. Traditionally, this annular structure 1 supports, by means of ball bearings, a cylinder-supporting ring 5, rigidly fixed to which are the needle cylinder 7 and a drawing gear 9 which receives motion from a motor by means of a transmission not shown in the drawing. The supporting legs 3 are fixed to the lower part of the annular support 1 and extend radially outward to leave, under the support 1, a large space which houses a piece-pulling device 11, described hereunder and which rotates rigidly with the needle cylinder 7 around the axis Z-Z.

[0017] At the end resting on the ground, the legs 3 are connected rigidly to one another by means of a flat base 13 (see also Fig.3) in metal section bars welded to one another, extending in proximity to the ground. A support 15, designed to sustain the piece-pulling device 11 to allow rotation around the axis Z-Z, is rigidly fixed to the base 13, in correspondence of the axis Z-Z.

[0018] The support 15 (see Fig. 4) comprises a coupling flange 15A rigidly fixed to a counterflange 13A, welded to the base 13, and integral with a pin 15B extending upward and coaxial with the axis Z-Z. Inserted on the pin 15B, with the interposition of a double ball bearing 15E, is an idle hub 15C, designed to axially and radially sustain the entire mass of the piece-pulling device and of a piece-winding roller or beam on which the fabric is wound. For this purpose, a flange 16, fixed by means of bolts to the hub 15C, has wings 16A facing outward and upward, fixed by means of bolts to a lower crosspiece 17 of the piece-pulling device. Fixed to the upper end of the pin 15B is a toothed pulley 15F for a belt transmission designed to motorize the rollers of the piece-pulling device 11, as shall be better explained hereunder.

[0019] The end of the lower crosspiece 17 of the piece-pulling device 11 is fitted with respective uprights 19, 21 (see Figs. 1 and 2), the upper parts of which are connected to each other by means of a horizontal front bar 23 and a pair of rear bars 25 joined to each other at one end at the level of the sagittal plane of the line a-a (Fig 3) of the piece pulling device. The piece-pulling device 11 is made to rotate around the axis Z-Z together with the needle cylinder 7 by means of two drawing arms 8 (see in particular Fig.1). Each of these arms 8 is fixed at one end to the cylinder-supporting ring 5, and at the other end to the corresponding upright 19 or 21 of the piece-pulling device 11 by interposing a torque limiting pin 8A, designed to break or release itself when something accidentally prevents rotation of the piece-pulling device 11, to thus safeguard the integrity of the machine.

[0020] Respective supports 27, 29 (see in particular Figs. 2 and 3) are fixed to the middle part of the bar 23 and at the joining end of the bars 25 to sustain a pair of diverter rollers 31 with axis horizontal and orthogonal to the front bar 23. The two diverter rollers 31 are parallel

to and side by side with each other so that the tubular fabric produced by the needle cylinder of the circular machine is flattened and made to lie on a vertical plane passing between the two rollers 31, which cooperate with parts to be described hereunder to open the fabric out flat after it has been cut longitudinally in the manner to be described.

[0021] Fixed to the ends of the bar 23 are respective horizontal rectilinear divaricating rods 33, 35 (Figs. 2 and 3), underneath the rollers 31 and inclined by about 45° in plan in relation to the bar 23; these rods join in a uniting element 37 provided (in the example shown) with an idle wheel 39 with a horizontal axis. Respective rollers 33A, 35A, which may be fixed or idle, are inserted on the rods 33, 35.

[0022] Underneath the rollers 33A, 35A, the piece-pulling device 11 comprises a series of drive rollers 41, 43, 45, 47, 49, 51, 53, 55, 57 (in order according to the direction of advance of the fabric), some of which (41, 43, 49, 51, 53, 55) are made of steel and have (with the exception of the roller 53), in a known manner, a double helical groove designed to lay the fabric flat, and the others 45, 47, 57 are covered with a peripheral layer of rubber to guarantee that the fabric is drawn. At least a few of said transmission rollers 41-57 (and in particular the roller 45) are motorized by means of the mechanical transmission (not shown in the drawing) which takes its movement from the toothed pulley 15F.

[0023] The tubular fabric 59A coming from the needles of the cylinder 7 is conveyed between the diverter rollers 31 and is maintained laid flat by means of a guide structure 60 formed of two pairs of rods 61, 63 with the ends bent downward and joined to each other. At one end, the rods 61, 63 are fixed to a rounded guide wheel 65 of the fabric, while at the other end only the rods 61 are connected and joined to each other, as the rods 63 sustain a cutting device 66 equipped, in this example, with a blade 67 designed to cut the tubular fabric according to a generatrix during its production. The blade may be substituted by other fixed or mobile (rotating) cutting devices. The rods 61, 63 are integral with a hub 69, which contains a regulation device. The knitted fabric spreading device may be without the hub 69, as it is also possible to regulate each component manually rather than through centralized regulation. The entire guide structure 60 is in fact suspended integral with a central shaft descending from the top part of the fixed structure of the machine.

[0024] The fabric is therefore cut open by the blade 67 and laid in two layers 59B, 59C (Fig.1) - joined to each other at the level of the generatrix passing through the vertex of the divaricator constituted by the rollers 33A-35A (which coincides with the wheel 39 in the example). The layers are guided onto the inclined rollers 33A, 35A. The fabric is then conveyed by means of the rollers 41-57 laid in a single layer 59D, to be wound in a roll 70.

[0025] The roll 70 rests on the rubber end roller 57 and is wound on a piece-winding beam or roller 70A, the ends of which are guided in respective grooves approximately vertical or inclined, produced inside each upright 19, 21 of the piece-pulling device 11.

[0026] The diverter rollers 31 are coated in rubber or another material with a high friction coefficient and are made to rotate by motion deriving from the pulley 15F and more precisely said motion deriving from the motorized roller 45 which in turn receives motion, in a manner known per se, from the pulley 15F.

[0027] For this purpose, keyed on the axle of the roller 45, in proximity to the upright 21, is a wheel 101 around which a first chain 103 is driven to transmit the rotating motion of the roller 45 to a first pinion 105 keyed on a short axle 107. The axle 107 is connected, by means of a universal joint 109, to a first end of a shaft 111 extending inside the bar 25 with a box-shaped structure. The opposite end of the shaft 111 is connected, by a second universal joint 113, to an axle 115 carried by the support 29 and onto which a second pinion 117 is keyed.

[0028] A second chain 119 driven around the second pinion 117, transmits motion from this to a third pinion 121. This third pinion is keyed on the axle of one of the two diverter rollers 31, on which a gearwheel 123 is also keyed. This gearwheel meshes with an identical gearwheel 125, keyed on the axle of the other of the two diverter rollers 31.

[0029] According to the layout described hereinbefore, when the circular machine and thus the piece-pulling device rotate around the vertical axis Z-Z, the rotatory movement transmitted, by means of the pulley 15F, to the traction roller 45, is transmitted to the diverter rollers 31, which rotate in opposite directions and in agreement with the direction of advance of the fabric which is in contact with them. The rollers 31, being coated in a material with a high friction coefficient, apply a traction force to the fabric 59A, reducing the traction that must be exerted on this by the roller 45 and therefore reducing deformations in the knitted fabric.

[0030] It is possible to modify the transmission ratio to the rollers 31 by replacing one of the pinions of the kinematic chain and in particular the pinion 121, which is the most easily accessible. In this way it is also possible to modify the conditions of traction to which the fabric is subjected along its feed path.

[0031] Transmission of motion to the rollers 31, 31 could also be produced at the end of the rollers, that is at the level of the support 27, although the layout described is more advantageous as it creates smaller dimensions and difficulties in the zone to be accessed to change the piece of fabric.

[0032] Moreover, transmission of motion may also be provided with different mechanical systems to those illustrated in the specific embodiment, for example by means of a flexible shaft, by hydraulic motors operated by the rollers. In the mechanical transmission described, moreover, the joints at the ends of the shaft 111 may be replaced with other means, such as pairs of bevel gears, that is with angular drives.

[0033] It is understood that the drawing shows merely

an example provided purely as a practical demonstration of the invention, as the invention may vary in forms and layouts without however departing from the scope of the concept forming the invention. Any reference numerals provided in the attached claims are for the purpose of facilitating reading of the claims with reference to the description, and do not limit the scope of protection represented by the claims.

Claims

1. A piece-pulling device (11) to collect and wind a fabric produced by a circular knitting machine, comprising a pair of motorized diverter rollers (31, 31) with axes parallel to and side by side with each other, associated with a cutting device (67) which cuts the tubular fabric (59A) produced by the circular machine along a longitudinal cutting line; downstream of the cutting device, an underlying pair of divaricating rods (33, 35) which open the fabric and lay it flat; underneath said rods (33, 35), a series of traction and guide rollers (43 - 57), at least one of which is motorized, to draw the fabric and wind it on a piece-winding roller (70A); **characterized in that** said diverter rollers (31, 31) are arranged downstream of said cutting device (67), to exert a traction force on the fabric after cut.

2. Device according to claim 1, **characterized in that** said diverter rollers are arranged orthogonal to said guide rollers (43 - 57) and between said cutting device and said divaricating rods (33, 35).

3. Device according to claim 1 or 2, **characterized in that** said diverter rollers (31, 31) take their motion from said at least one motorized roller (45) of said series of traction and guide rollers.

4. Device according to claim 1 or 2 or 3, **characterized in that** it comprises a pair of uprights (19, 21) to support said series of traction and guide rollers (43-57) and a pair of bars (25) each supported at a first end by one of said uprights and converging with the respective second ends to form a support (29) for said diverter rollers (31, 31), and in which a kinematic transmission (101-121) is developed along at least one of said bars (25) to transmit motion to said diverter rollers (31, 31).

5. Device according to claim 4, **characterized in that** said kinematic transmission comprises a shaft (111) housed inside said bar (25).

6. Device according to claim 5, **characterized in that** said shaft (111) is connected at a first end, by means of a first joint (109), to a respective first axle (107) supporting a first pinion (105) which receives motion from said motorized roller (45), and at a second end by means of a second joint (113) to a second axle (115) supporting a second pinion (117) which transmits motion to said two diverter rollers (31, 31).

7. Device according to claim 6, **characterized in that** driven on said first pinion (105) is a first chain (103), which receives motion from a gearwheel (101) keyed on the axle of said motorized roller (45).

8. Device according to claim 6 or 7, **characterized in that** said second pinion (117) transmits motion to a second chain (119) driven around a third pinion (121) keyed on the axle of one of said two diverter rollers (31, 31), and **in that** said two diverter rollers are kinematically connected to each other to rotate in opposite directions at the same surface speed.

9. Device according to claim 8, **characterized in that** said two diverter rollers (31, 31) are kinematically connected to each other by means of a pair of gearwheels (123, 125).

10. A circular knitting machine comprising a piece-pulling device according to one or more of the claims from 1 to 9.

Patentansprüche

1. Abzugsvorrichtung (11) zum Aufnehmen und Aufwickeln eines von einer Rundstrickmaschine erzeugten Gestricks, umfassend ein Paar von motorgetriebenen Umlenkrollen (31, 31) mit parallel zu einander und nebeneinander angeordneten Achsen, denen eine Schneidvorrichtung (67) zu geordnet ist, die das von der Rundstrickmaschine erzeugte schlauchförmige Gestrick (59A) an einer längsverlaufenden Schneidelinie schneidet; stromabwärts der Schneidevorrichtung ein darunter befindliches Paar von Spreizstangen (33, 35), die das Gestrick öffnen und flachlegen; unterhalb der Stangen (33, 35) eine Folge von Zug- und Führungsrollen (43 - 57), von dem mindestens eine motorgetrieben ist, um das Gestrick zu ziehen und auf einer Aufwickelwalze (70A) aufzuwickeln, **dadurch gekennzeichnet, dass** die Umlenkrollen (31, 31) stromabwärts der Schneidvorrichtung (67) angeordnet sind, um auf das Gestrick nach dem Schneiden eine Zugkraft auszuüben.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Umlenkrollen senkrecht zu den Führungsrollen (43 - 57) und zwischen der Schneidvorrichtung und den Spreizstangen (33, 35) angeordnet sind.

3. Vorrichtung nach Anspruch 1 oder, **dadurch ge-**

kennzeichnet, dass die Umlenkrollen (31, 31) ihren Antrieb von der mindestens einen motorgetriebenen Rolle (45) der Folge von Zug- und Führungsrollen erhalten.

4. Vorrichtung nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** sie ein Paar von Ständern (13, 21) zum Abstützen der Folge von Zug- und Führungsrollen (43 - 57) und ein Paar von Trägem (25) aufweist, die jeweils an einem ersten Ende von einem der Ständer abgestützt sind und mit ihren jeweiligen zweiten Enden konvergieren, um eine Halterung (29) für die Umlenkrollen (31, 31) zu bilden, wobei sich eine kinematische Transmission (101 - 121) längs mindestens eines der Träger (25) erstreckt, um den Antrieb zu den Umlenkrollen (31, 31) zu übertragen.

5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die kinematische Transmission eine im Inneren des Trägers (25) untergebrachte Welle (111) aufweist.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Welle (111) an einem ersten Ende mittels eines ersten Gelenks (109) mit einer jeweiligen ersten Achswelle (107) verbunden ist, die ein erstes Zahnrad (105) trägt, welches von der motorgetriebenen Rolle (45) angetrieben wird, und die an ihrem zweiten Ende mittels eines zweiten Gelenks (113) mit einer zweiten Achswelle (115) verbunden ist, die ein zweites Zahnrad (117) trägt, welches den Antrieb auf die beiden Umlenkrollen (31, 31) überträgt.

7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** von dem ersten Zahnrad (105) eine erste Kette (103) angetrieben wird, die ihren Antrieb von einem auf der Welle der motorgetriebenen Rolle (45) aufgekeilten Zahnrad erhält.

8. Vorrichtung nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** das zweite Zahnrad (107) den Antrieb auf eine zweite Kette (119) überträgt, die um ein drittes Zahnrad (121) geführt ist, welches auf der Welle einer der beiden Umlenkrollen (31, 31) aufgekeilt ist, und dass die beiden Umlenkrollen miteinander kinematisch derart verbunden sind, dass sie in entgegengesetzten Richtungen mit der gleichen Oberflächengeschwindigkeit rotieren.

9. Vorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die beiden Umlenkrollen (31, 31) mit eines Paares von Zahnrädern (123, 125) kinematisch verbunden sind.

10. Rundstrickmaschine mit einer Abzugvorrichtung gemäß einem oder mehreren der Ansprüche 1 bis 9.

Revendications

1. Dispositif de traction de pièce (11) pour collecter et enrouler un tissu produit par une machine à tricoter circulaire, comprenant une paire de rouleaux motorisés dérouteurs (31, 31) avec des axes parallèles et côte à côte, associés à un dispositif de coupe (67) qui coupe le tissu tubulaire (59a) produit par la machine circulaire le long d'une ligne longitudinale de coupe ; en aval du dispositif de coupe, une paire sous-jacente de tiges de bifurcation (33, 35) ouvrant le tissu et le posant à plat ; en dessous desdites tiges (33, 35), une série de rouleaux de traction et de guidage (43 à 57) dont au moins un est motorisé pour tirer le tissu et l'enrouler sur un rouleau d'enroulement de pièce (70a), **caractérisé en ce que** lesdits rouleaux dérouteurs (31, 31) sont disposés en aval dudit dispositif de coupe (67) pour exercer une force de traction sur le tissu après la découpe.

2. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits rouleaux dérouteurs sont disposés orthogonaux auxdits rouleaux de guidage (43 à 57) et entre ledit dispositif de coupe et lesdites tiges de bifurcation (33, 35).

3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** lesdits rouleaux dérouteurs (31, 31) sont mis en mouvement à partir dudit au moins un rouleau motorisé (45) de ladite série de rouleaux de traction et de guidage.

4. Dispositif selon la revendication 1 ou 2 ou 3, **caractérisé en ce qu'**il comprend une paire de montants (19, 21) pour supporter ladite série de rouleaux de traction et de guidage (43 à 57) et une paire de barres (25) supportées chacune à une première extrémité par un desdits montants et convergeant vers les secondes extrémités respectives afin de former un support (29) pour lesdits rouleaux dérouteurs (31, 31), et dans lequel une transmission cinématique (101 à 121) est développée le long d'au moins une desdites barres (25) pour transmettre le mouvement auxdits rouleaux dérouteurs (31, 31).

5. Dispositif selon la revendication 4, **caractérisé en ce que** ladite transmission cinématique comprend un arbre (111) logé à l'intérieur de ladite barre (25).

6. Dispositif selon la revendication 5, **caractérisé en ce que** ledit arbre (111) est connecté à une première extrémité au moyen d'un premier joint (109) à un premier axe respectif (107) supportant un premier pignon (105) recevant un mouvement à partir dudit rouleau motorisé (45) et à une seconde extrémité au moyen d'un second joint (113) à un second axe (115) supportant un second pignon (117) transmettant un mouvement auxdits deux rouleaux dérouteurs

(31,31).

7. Dispositif selon la revendication 6, **caractérisé en ce qu'**une première chaîne (103) est entraînée par ledit premier pignon (105) recevant le mouvement à partir d'une roue dentée (101) clavetée sur l'axe dudit rouleau motorisé (45).

8. Dispositif selon la revendication 6 ou 7, **caractérisé en ce que** ledit second pignon (117) transmet le mouvement à une seconde chaîne (119) entraînée autour d'un troisième pignon (121) claveté sur l'axe d'un desdits deux rouleaux dérouteurs (31, 31), et **en ce que** lesdits deux rouleaux dérouteurs sont connectés, de façon cinématique, l'un à l'autre pour tourner dans des directions opposées à la même vitesse de surface.

9. Dispositif selon la revendication 8, **caractérisé en ce que** lesdits deux rouleaux dérouteurs (31, 31) sont connectés de façon cinématique l'un à l'autre au moyen d'une paire de roues dentées (123, 125).

10. Métier à tricoter circulaire, comprenant un dispositif de traction de pièce selon une ou plusieurs des revendications 1 à 9.

Fig.1

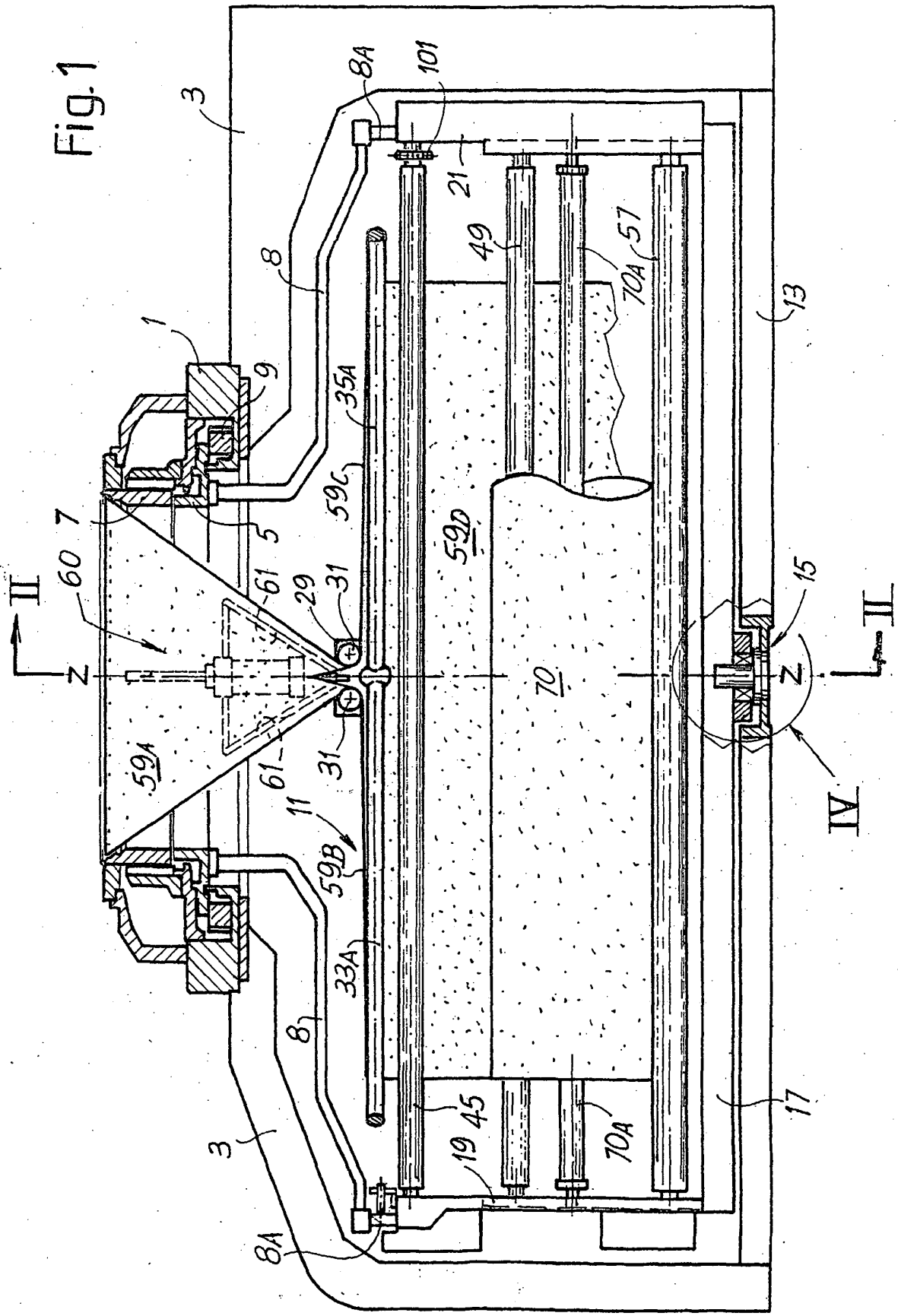

II
II
IV
Z
Z
3
8A
101
21
49
57
70A
13
1
9
35A
8
59C
59D
7
60
5
61
29
31
15
70
59A
11
59B
33A
8
3
45
19
17
8A

Fig.2

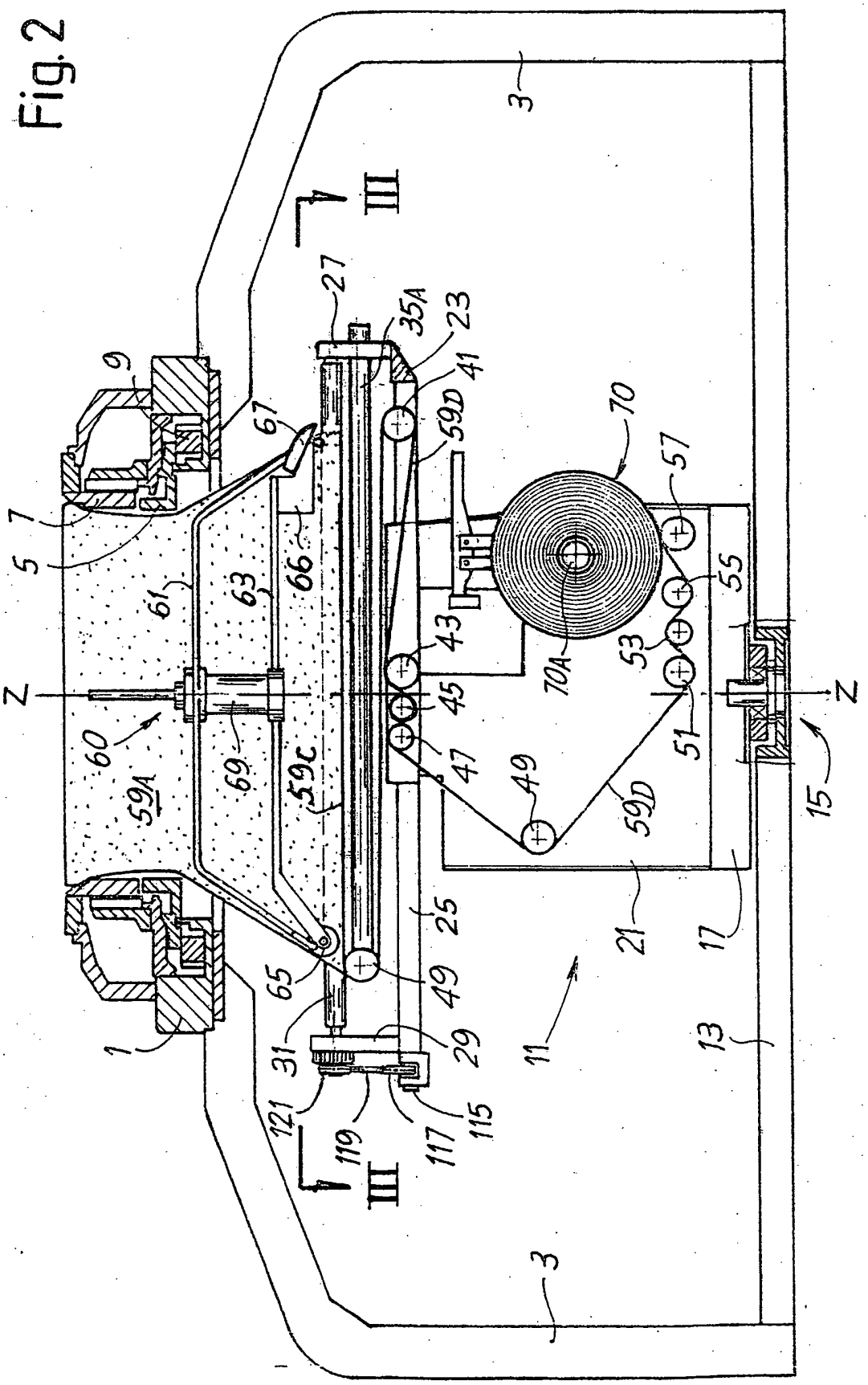
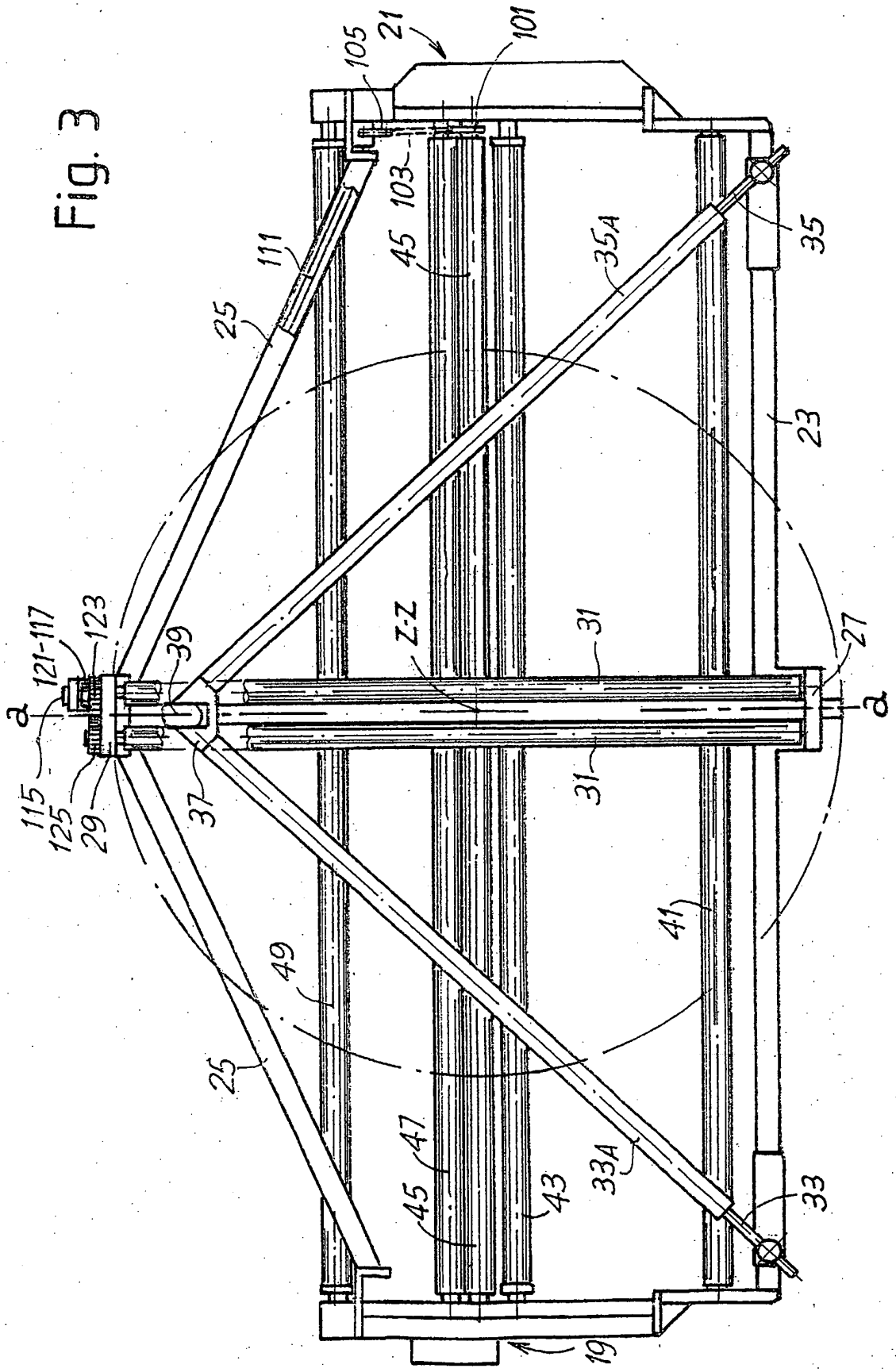

III
III
Z
Z
1
3
3
5
7
9
11
13
15
17
21
23
25
27
29
31
35A
41
43
45
47
49
49
51
53
55
57
59A
59C
59D
59D
60
61
63
65
66
67
69
70
70A
115
117
119
121

Fig. 3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101
103
45
111
35A
35
25
23
121-117
123
39
Z-Z
31
27
a
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115
125
29
37
31
41
49
25
47
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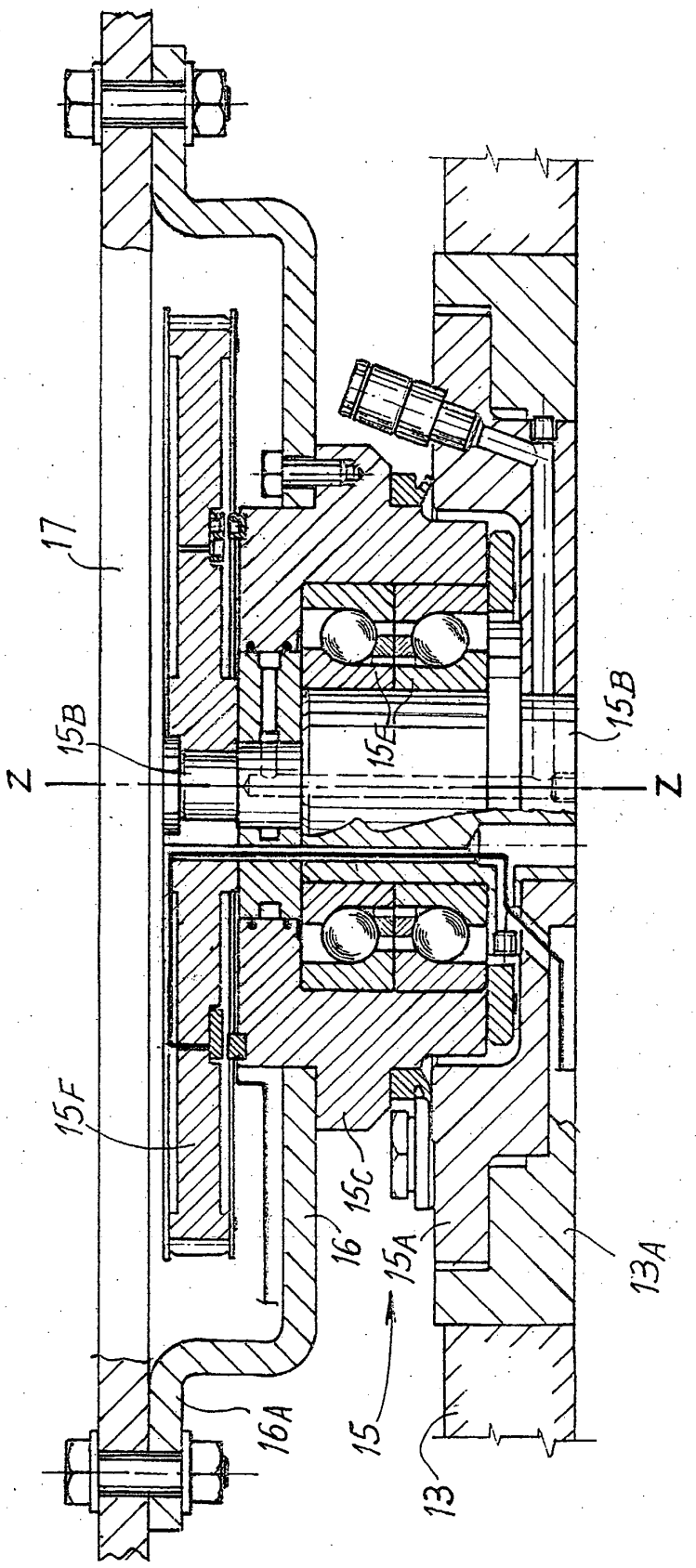
43
33A
33
19

Fig. 4



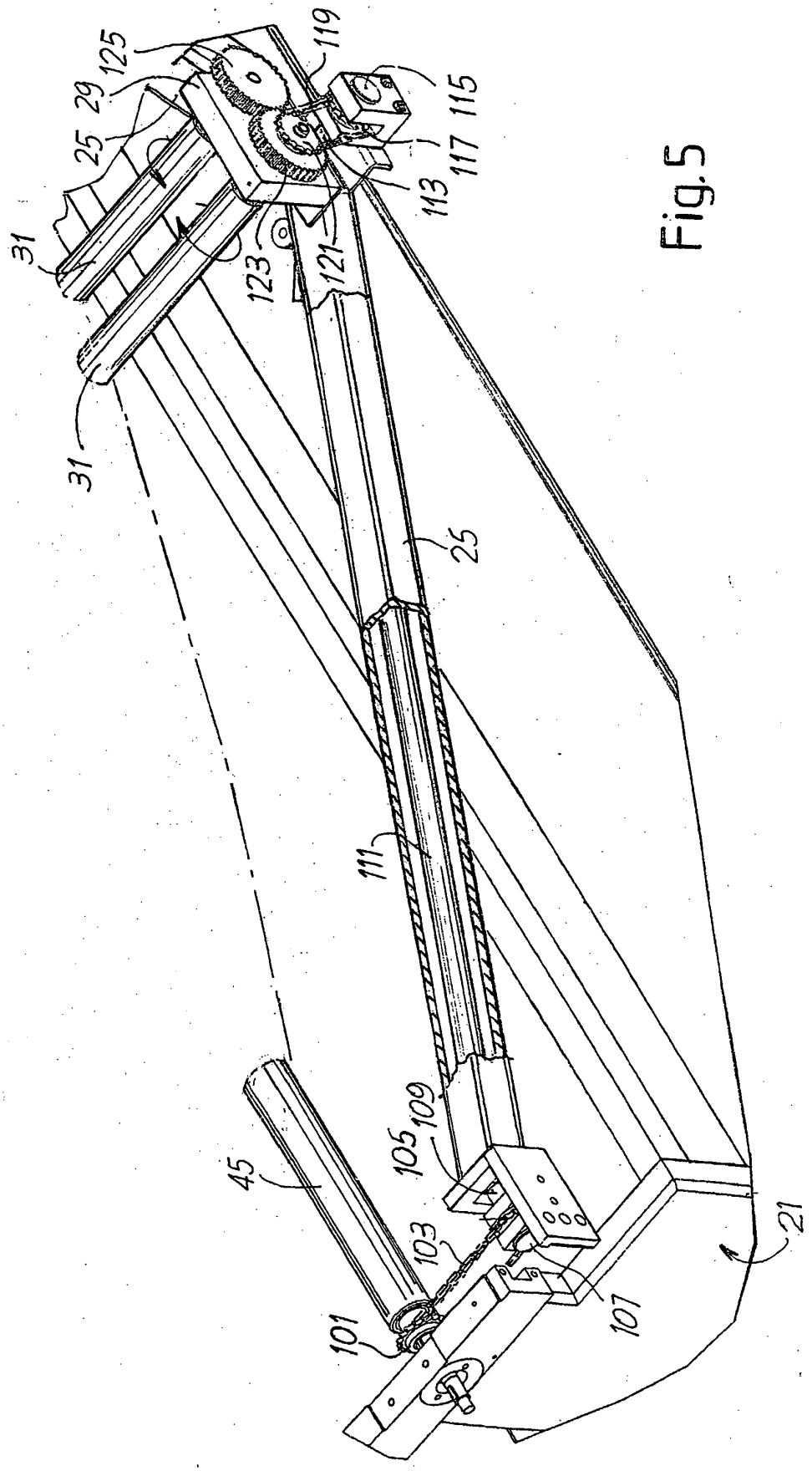

119
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Fig.5