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(54) **Opener for fibre in tufts on a carding preparation line**

Öffner für Faser in Büschel in einer Kardierherstellungslinie

Dispositif d'ouverture pour fibre dans des touffes sur une ligne de préparation de cardage

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Description

[0001] The present invention relates to an opener for processing fibre in tufts on a carding preparation line.

[0002] As is known, to obtain a textile yarn from a fibre, multiple processing treatments of the fibre are required to free it of impurities and dirt, align the fibres and draw them. Such treatments produce a fibre web, subsequently processed, for example on a drawing machine, to obtain a yarn.

[0003] The treatments are performed on different machines, in that, to obtain best results, they need to be repeated a number of times in an increasingly thorough manner.

[0004] In particular, on an exemplary fibre processing line, the fibres are picked from bales by a picker, so as to obtain tufts transported by currents of air.

[0005] The fibre in tufts is subsequently processed in a device for removing impurities, such as stones or non-ferrous materials mixed with the tufts, before passing to an opener, where the tufts undergo a first opening of the fibres and a first separation from the impurities.

[0006] Subsequently, the fibres undergo further cleaning, alignment and drawing operations in openers and carding machines to obtain the fibre web.

[0007] One embodiment is the opener B39N "Duo-cleaner" manufactured and marketed by the Applicant, illustrated in the brochure "Nova - Blowroom Machinery".

[0008] Further examples of embodiments are illustrated in the documents WO-A1-2009/084056, WO-A1-2011/001379 and EP-A1-0818566 in the name of the Applicant, and in document WO2007/048262.

[0009] In the specific sector, the need is felt however to improve the processing of fibre in tufts in the opener, and in particular to ensure a high quality level of the processing performed, that is to say a high level of opening and cleaning of the fibres, even in the presence of large quantities of fibre to be processed.

[0010] In particular, it has been observed how if large quantities of fibre are fed to the opener the outgoing fibre tufts still contain impurities and are very entangled, in an unsatisfactory condition for good results from the further processing downline. It has been observed, at the same time, that the outgoing tufts do not have homogeneous physical characteristics when large quantities are used.

[0011] Vice versa, it has been seen that smaller quantities of fibres in the openers gives better quality of the tufts processed, which also have homogeneous characteristics.

[0012] The purpose of the present invention is to make an opener for fibre in tufts on a carding preparation line able to satisfy the above requirements, and in particular to process large quantities of fibre while maintaining high quality and homogeneous characteristics of the processed tufts.

[0013] Such purpose is achieved by an opener made according to claim 1.

[0014] The characteristics and advantages of the

opener according to the invention will be evident from the description below, made by way of a non-limiting example according to the attached figures, wherein:

- 5 - figure 1 shows a schematic side view of an opener according to the invention;
- figure 2 shows a cross section view of the opener in figure 1, along the section line II-II in figure 1;
- 10 - figure 3 shows a cross section view of the opener in figure 1, along the section line III-III in figure 1;
- figure 4 schematically shows two main rollers of the opener in figure 1 and the schematic path of the fibre flow;
- 15 - figure 5 shows a ground view from above of figure 4; and
- figure 6 shows a cover casing and roller of the opener in figure 1.

[0015] With reference to the appended drawings, reference numeral 1 globally denotes an assembly for processing fibres in tufts, constituting a section of a fibre processing line, and in particular a section of a carding preparation line.

[0016] The assembly 1 comprises a feed pipe 2 for the transport of the fibre F to be processed, for example coming from a picker.

[0017] The pipe 2, positioned at a predefined height from the ground plane T, extends along a substantially rectilinear feed axis A preferably parallel to the ground plane T.

[0018] The assembly 1 further comprises a feed device 4 suitable for separating the dusty air from the fibre and, preferably for feeding the fibre in tufts downstream. In particular, the feed device 4 is suitable for deviating the fibre in a feed direction downstream V, for example vertical and perpendicular to the ground plane T (and therefore preferably, perpendicular to the feed axis A).

[0019] Preferably, the assembly 1 comprises a separator device 6, positioned downstream of the feed device 4, suitable for separating the fibre flow F coming out of the feed device 4 into a plurality of separate fibre flows, for example into two fibre flows (F1, F2).

[0020] For example, the separator device 6 comprises a separation pipe 8 which the fibre traverses, for example of a shape converging in the direction of advancement of the fibre, and a separator element 10 suitable for separating the fibre F into flows F1, F2.

[0021] According to one embodiment the separator element 10 is a wall fitted with a separator edge 12 struck by the fibre flow F, housed in the separation pipe 8.

[0022] Preferably, in addition, the separator element 10 comprises a separation wall 14 which extends downstream of the separator edge 12 to keep the fibre flows separate.

[0023] Preferably, in addition, the separator device 6 comprises blower means 20, for example comprising a fan, suitable for blowing a flow of air in the direction of the separator element 10, to facilitate the separation of

the fibre flows F1, F2.

[0024] In addition, the assembly 1 comprises an opener device 30 positioned downstream of the feed device 4, or of the separator device 6, fed with the fibre flows, preferably with the two separated fibre flows F1, F2.

[0025] The opener device 30 has a first compartment 31, for example single, and a first opener roller 32, housed in said first compartment; the first opener roller 32 is motorised and rotatable around a first transversal rotation axis X', that is orthogonal to the feed axis A and the vertical axis V.

[0026] Along said rotation axis X', the first roller 32 extends between a first end 32' and a second end 32".

[0027] The separator device 6 is suitable for transversally separating the fibre flow F into flows F1, F2.

[0028] In addition, preferably, the separation wall 14 extends as far as to lap the outer surface of the first opener roller 32, dividing said roller into portions placed side by side along the rotation axis X' of the first opener roller, joined in rotation, separated, for example imaginarily, by an imaginary first separation line I'.

[0029] In particular, in the embodiment shown, the first opener roller 32 is divided into a first portion 32a and a second portion 32b alongside each other along the rotation axis X'.

[0030] The first roller 32 is provided with opening means distributed on its outer surface, suitable for entangling the tufts to open them when pulled.

[0031] In particular, the first portion 32a is fitted with a plurality of pegs 34a, projecting from the outer surface of the first portion 32a of the roller 32, in a rectilinear, broken or ramified direction to have multiple tips.

[0032] Preferably, the pegs 34a are positioned along an imaginary helical line traced on the outer surface of the roller, from the first separation line I' identified by the separation wall 14 towards the first transversal end 32', according to a first winding angle.

[0033] In addition, the second portion 32b is fitted with a plurality of pegs 34b, projecting from the outer surface of the second portion 32b of the roller 32, in a rectilinear, broken or ramified direction to have multiple tips.

[0034] Preferably, the pegs 34b are positioned along an imaginary helical line traced on the outer surface of the roller, from the first separation line I' identified by the separation wall 14 towards the second end 32', according to a second winding angle.

[0035] Preferably, the two winding angles are equal and opposite.

[0036] In other words, the helical lines are symmetrical in relation to the first separation line I'.

[0037] Preferably, in addition, the opener device 30 comprises at least one partition 40 (or a plurality of transversally separate partitions placed side by side) for each portion 32a, 32b of the first roller 32.

[0038] The partition 40 is fixed in relation to the rotation of the first roller 32 and encompasses at least partially the outer surface, preferably lapping it without interference.

[0039] For each portion 32a, 32b, the partitions 40 form centrifugal conduits 42 around the roller, from the centre towards the ends 32', 32", preferably having a helical direction, along the outer surface of the roller, at least partially encompassing it.

[0040] Preferably, said conduits are positioned on the upper half of the first roller.

[0041] During processing the fibre in tufts is therefore forced to move in the conduits, transversally from the centre towards the ends 32', 32" of the roller, dragged by the negative pressure air flow and by the pegs, which move in said conduits.

[0042] The opener device 30 also envisages a second compartment 51, beside the first compartment 31 along the feed axis A, and a second opener roller 52, housed in said second compartment; the second opener roller 52 is motorised and rotatable around a second transversal rotation axis X", that is orthogonal to the feed axis A and the vertical axis V, parallel to the first rotation axis X'.

[0043] According to one embodiment the first roller 32 and the second roller 52 can be driven in rotation at different rotation speeds.

[0044] Along said second rotation axis X", the second roller 52 extends between a first end 52' and a second end 52".

[0045] For each portion 32a, 32 of the first roller 32, respective entrances 62', 622 open along the first rotation axis X' between the first compartment 31 and the second compartment 51.

[0046] In particular, in the embodiment shown, the conduits 42 of the first compartment 31, at the ends 31', 32" of the first roller 32, come out in the second compartment 51.

[0047] Preferably, the opener device 30 comprise a second separation wall 14" which extends as far as to lap the outer surface of the second opener roller 52, dividing said roller into portions placed side by side along the rotation axis X", joined in rotation, separated, for example imaginarily, by an imaginary second separation line I".

[0048] In particular, in the embodiment shown, the second opener roller 52 is divided into a first portion 52a and a second portion 52b alongside each other along the rotation axis X".

[0049] Similarly to the first roller 32, the second roller 52 is also provided with opener means distributed on the outer surface, and in particular with a plurality of pegs 54a, 54b positioned along imaginary helical lines.

[0050] Preferably, in addition, the opener device 30 comprises at least one partition 60 (or a plurality of transversally separate partitions placed side by side) for each portion 52a, 52b of the roller 52, which form centripetal conduits 72, that is axially converging from the ends 52', 52", towards the centre of the second roller, preferably having a helical direction, along the outer surface of the roller, at least partially encompassing it.

[0051] Preferably, said conduits are positioned on the upper half of the second roller.

[0052] During processing the fibre in tufts enters the second compartment 51 through the entrances 62', 62", divided into two flows F1, F2, and is forced to move in the centripetal conduits, moving axially towards the centre of the second roller 52.

[0053] The second compartment 51 further envisages an exit 80', 80" for each portion 52a, 52b, placed axially inside the respective entrances 62', 62", for example at the second separation line I", in communication with an exit mouth 82.

[0054] Preferably, the two fibre flows F1, F2 come out of the opener device separately, and according to a preferred embodiment are merged into a single flow of processed fibre F'.

[0055] According to a preferred embodiment the opener device 30 comprises, associated with each roller 32, 52, a fixed grid 90, fitted with mobile bars, positioned around the respective opener roller 32, 52, preferably in the area under the roller, suitable for removing husks and dirt from the fibre transported in rotation.

[0056] Innovatively, the assembly according to the present invention makes it possible to achieve high quality of the processed fibre, higher than the level which can be achieved processing a single fibre flow, and at the same time to reduce the space occupied compared to the use of separate machines.

[0057] Clearly a person skilled in the art may make modifications to the assembly described above.

[0058] For example, according to one embodiment variation, the two fibre flows F1, F2 are merged at the exit of the second roller, so as to come out of the opener device in a single flow of processed fibre.

[0059] According to a further embodiment variation, the assembly envisages feeding by means of two or more feed ducts; in such variant, the fibre flows are therefore already separate.

[0060] According to yet a further embodiment variation, the entrance of the separated fibre flows to the first opener roller takes place at the ends and the flows proceed on said roller axially towards the centre thereof, while the entrance of the separated fibre flows to the second opener roller takes place at an intermediate position and the flows proceed on said roller axially towards the ends.

[0061] Such variants are also contained within the sphere of protection as defined by the following claims.

Claims

1. Opener for fibre in tufts on a carding preparation line, comprising an opener device (30) comprising:

- a first compartment (31) and a first opener roller (32), housed in said first compartment, rotatable around a first rotation axis (X'), wherein the first roller (32) extends along said axis between a first end (32') and a second end (32") and

presents a plurality of portions (32a,32b) placed side by side and joined in rotation;

- a centrifugal conduit (42) for each portion (32a, 32b), which winds continuously around the roller (32) from the centre towards its ends (32',32");
- a second compartment (51), beside the first compartment (31), and a second opener roller (52), housed in said second compartment, rotatable around a second rotation axis (X''), beside the first rotation axis (X'), wherein the second roller (52) extends along said axis between a first end (62') and a second end (62") and presents a plurality of portions (52a, 52b) placed side by side and joined in rotation;

- a centripetal conduit (72) for each portion (52a, 52b), which winds around the roller (52) from the respective ends (52', 52") towards its centre;
- wherein each centrifugal conduit (42) comes out in the respective centripetal conduit (72).

2. Opener according to claim 1, wherein the portions (32a, 32b) of the first compartment (31) and the portions (52a, 52b) of the second compartment (51) are provided with a set of pegs (34a,34b;54a,54b), the pegs of each set being respectively positioned along axially symmetric imaginary helical lines.

3. opener according to claim 1 or 2, wherein the first opener roller (32) is fed by a plurality of transversally separate fibre flows (F1,F2), one on each portion (32a, 32b).

4. Opener according to any of the previous claims, wherein the second opener roller (52) is fed by a plurality of fibre flows (F1,F2), through entrances (62',62") positioned at the ends (52', 52") of the second roller (52).

5. Opener according to any of the previous claims, comprising at least a first partition (40) for each portion (32a, 32b) of the first roller (32), fixed in relation to it, which forms, together with the outer surface of the roller (32), a centrifugal conduit (42), which winds around the roller (32) from the centre towards its ends (32', 32"), preferably in a helical pattern.

6. Opener according to any of the previous claims, comprising at least one second partition (60) for each portion (52a,52b) of the second roller (52), fixed in relation to it, which forms, together with the outer surface of the roller (52), a centripetal conduit (62), which winds around the roller (52) from the ends (52', 52") of the roller towards the centre, preferably in a helical pattern.

7. Opener according to any of the previous claims, comprising a separator device (6) suitable to separate the individual fibre flow (F) from the plurality of

transversally separate fibre flows (F1,F2), upstream of the first roller (32).

8. Opener according to any of the previous claims, comprising a fixed grid (90), positioned around the respective opener roller (32, 52), preferably in the area under the roller, suitable for removing husks and dirt from the fibre transported in rotation. 5
9. Opener according to any one of the previous claims, wherein the first opener roller (32) and the second opener roller (52) can be activated in rotation at different rotation speeds. 10
10. Method of processing fibre in tufts on a carding preparation line, comprising the steps of: 15
 - separating an individual fibre flow (F) from a plurality of separate fibre flows (F1, F2);
 - feeding both fibre flows (F1, F2), to a single opener roller (32), in an intermediate position between the ends (32', 32'') of the roller (32);
 - making the fibre flows (F1, F2) advance on the opener roller (32) centrifugally from the centre towards the ends (32', 32'') to perform processing of said fibres; 20
 - separately feeding both fibre flows (F1,F2), to a second opener roller (52), through entrances (62', 62'');
 - making the fibre flows (F1,F2) advance on the second opener roller (52) centripetally from the entrances (62', 62'') towards the centre to perform further processing of said fibres. 25

Patentansprüche

1. Öffner für Faser in Flocken auf bzw. in einer Kardier- vor- bzw. 40
 - aufbereitungsstraße, umfassend eine Öffner- vorrichtung (30) umfassend:
 - ein erstes Fach (31) und eine erste Öff- 45
 nerrolle (32), die in dem ersten Fach unter- gebracht ist, und zwar drehbar um eine erste Drehachse (X'), wobei sich die erste Rolle (32) entlang der Achse zwischen einem ers- ten Ende (32') und einem zweiten Ende (32'') erstreckt und eine Mehrzahl von Ab- 50
 schnitten (32a, 32b) darstellt, die Seite an Seite platziert und in Drehung verbunden sind;
 - einen Zentrifugalkanal (42) für jeden Ab- schnitt (32a, 32b), der kontinuierlich um die Rolle (32) herum von der Mitte aus zu ihrem Ende hin (32', 32'') weht;
 - ein zweites Fach (51) neben dem ersten

Fach (31) und eine zweite Öffnerrolle (52), die in dem zweiten Fach untergebracht ist, und zwar drehbar um eine zweite Drehachse (X'') neben der ersten Drehachse (X'), wobei sich die zweite Rolle (52) entlang der Achse zwischen einem ersten Ende (62') und einem zweiten Ende (62'') erstreckt und eine Mehrzahl von Abschnitten (52a, 52b) darstellt, die Seite an Seite platziert und in Drehung verbunden sind;

- einen Zentripetalkanal (72) für jeden Ab- schnitt (52a, 52b), der um die Rolle (52) he- rum von den jeweiligen Enden (52', 52'') aus zu ihrer Mitte hin weht;
- wobei jeder Zentrifugalkanal (42) in dem jeweiligen Zentripetalkanal (72) heraus- kommt.

2. Öffner nach Anspruch 1 wobei die Abschnitte (32a, 32b) des ersten Fachs (31) und die Abschnitte (52a, 52b) des zweiten Fachs (51) mit einem Satz von Auf- hängern (34a, 34b; 54a, 54b) versehen sind, wobei die Aufhänger jedes Satzes jeweils entlang achs- symmetrischer, imaginärer Schrauben- bzw. Schne- ckenlinien positioniert sind.
3. Öffner nach Anspruch 1 oder 2, wobei die erste Öff- nerrolle (32) durch eine Mehrzahl transversal sepa- raten Faserströme bzw. -verläufe (F1, F2) gespeist wird, und zwar einem an jedem Abschnitt (32a, 32b).
4. Öffner nach einem der vorhergehenden Ansprüche, wobei die zweite Öffnerrolle (52) durch eine Mehr- zahl von Faserströmen bzw. -verläufen (F1, F2) ge- speist wird, und zwar durch Eingänge (62', 62''), die an den Enden (52', 52'') der zweiten Rolle (52) po- sitioniert sind.
5. Öffner nach einem der vorhergehenden Ansprüche, umfassend zumindest eine erste Trennung (40) für jeden Abschnitt (32a, 32b) der ersten Rolle (32), der bzw. die in Relation dazu fixiert ist, die zusammen mit der äußeren Fläche bzw. Oberfläche der Rolle (32) einen Zentrifugalkanal (42) bildet, der um die Rolle (32) herum von der Mitte aus zu ihren Enden (32', 32'') hin weht, und zwar vorzugsweise in einem schnecken- bzw. schraubenförmigen Muster.
6. Öffner nach einem der vorhergehenden Ansprüche, umfassend zumindest eine zweite Trennung (60) für jeden Abschnitt (52a, 52b) der zweiten Rolle (52), der bzw. die in Relation dazu fixiert ist, die zusammen mit der äußeren Fläche bzw. Oberfläche der Rolle (52) einen Zentripetalkanal (62) bildet, der um die Rolle (52) herum von den Enden (52', 52'') der Rolle zu der Mitte davon weht, und zwar vorzugs- weise in einem schnecken- bzw. schraubenförmigen Muster.

7. Öffner nach einem der vorhergehenden Ansprüche, umfassend eine Separatorvorrichtung (6), die geeignet ist, den einzelnen Faserstrom (F) von der Mehrzahl transversal separater Faserströme (F1, F2) stromaufwärts der ersten Rolle (32) zu separieren. 5
8. Öffner nach einem der vorhergehenden Ansprüche, umfassend ein festes Gitter (90), das um die jeweilige Öffnerrolle (32, 52) herum positioniert ist, und zwar vorzugsweise in dem Bereich unter der Rolle, geeignet zum Entfernen von Schalen und Schmutz aus der Faser, die in Drehung transportiert wird. 10
9. Öffner nach einem der vorhergehenden Ansprüche, wobei die erste Öffnerrolle (32) und die zweite Öffnerrolle (52) in Drehung mit unterschiedlichen Drehgeschwindigkeiten aktiviert werden können. 15
10. Verfahren zum Verarbeiten von Faser in Flocken auf bzw. in einer Kardiervor- bzw. -aufbereitungsstraße, umfassend die Schritte: 20
- Separieren eines einzelnen Faserstroms bzw. -verlaufs (F) aus einer Mehrzahl von separaten Faserströmen bzw. -verläufen (F1, F2); 25
 - Zuführen beider Faserströme (F1, F2) zu einer einzelnen Öffnerrolle (32) in einer Zwischenposition zwischen den Enden (32', 32'') der Rolle (32);
 - Veranlassen, dass die Faserströme (F1, F2) an bzw. auf der Öffnerrolle (32) zentrifugal von der Mitte aus zu den Enden (32', 32'') hin vorrücken, um eine Verarbeitung der Fasern durchzuführen; 30
 - separates Zuführen beider Faserströme (F1, F2) zu einer zweiten Öffnerrolle (52) durch Eingänge (62', 62''); 35
 - Veranlassen, dass die Faserströme (F1, F2) an bzw. auf der zweiten Öffnerrolle (52) zentripetal von den Eingängen (62', 62'') aus zu der Mitte hin vorrücken, um eine Weiterverarbeitung der Fasern durchzuführen. 40
- rotation ;
- une conduite centrifuge (42) pour chaque partie (32a, 32b) qui s'enroule en continu autour du rouleau (32) du centre vers ses extrémités (32', 32'') ;
 - un second compartiment (51) à côté du premier compartiment (31) et un second rouleau ouvreuse (52) logé dans ledit second compartiment, pouvant tourner autour d'un second axe de rotation (X'') à côté du premier axe de rotation (X'), dans lequel le second rouleau (52) s'étend le long du dit axe entre une première extrémité (62') et une seconde extrémité (62'') et présente une pluralité de parties (52a, 52b) placées côte à côte et jointes en rotation ;
 - un conduit centripète (72) pour chaque partie (52a, 52b) qui s'enroule autour du rouleau (52) des extrémités respectives (52', 52'') vers son centre ;
 - dans lequel chaque conduit centrifuge (42) sort dans le conduit centripète correspondant (72).
2. Dispositif d'ouverture selon la revendication 1, dans lequel les parties (32a, 32b) du premier compartiment (31) et les parties (52a, 52b) du second compartiment (51) sont dotées d'un ensemble de chevilles (34a, 34b ; 54a, 54b), les chevilles de chaque ensemble étant respectivement positionnées le long de lignes hélicoïdales imaginaires axialement symétriques.
3. Dispositif d'ouverture selon la revendication 1 ou 2, dans lequel le premier rouleau ouvreuse (32) est amené par une pluralité de flux de fibres séparés transversalement (F1, F2), un sur chaque partie (32a, 32b).
4. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, dans lequel le second rouleau ouvreuse (52) est amené par une pluralité de flux de fibres (F1, F2) par des entrées (62', 62'') positionnées sur les extrémités (52', 52'') du second rouleau (52).

Revendications

1. Dispositif d'ouverture pour fibre dans des touffes sur une ligne de préparation de cardage, comprenant un dispositif ouvreuse (30) comprenant : 45
- un premier compartiment (31) et un premier rouleau ouvreuse (32) logé dans ledit premier compartiment, pouvant tourner autour d'un premier axe de rotation (X'), dans lequel le premier rouleau (32) s'étend le long dudit axe entre une première extrémité (32') et une seconde extrémité (32'') et présente une pluralité de parties (32a, 32b) placées côte à côte et jointes en 50
5. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, comprenant au moins une première séparation (40) pour chaque partie (32a, 32b) du premier rouleau (32), fixée par rapport à celui-ci qui forme conjointement avec la surface extérieure du rouleau (32), un conduit centrifuge (42) qui s'enroule autour du rouleau (32) du centre vers ses extrémités (32', 32'') de préférence de manière hélicoïdale. 55
6. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, comprenant au moins une seconde séparation (60) pour chaque partie (52a, 52b) du second rouleau (52), fixée par rapport

à celui-ci, qui forme conjointement avec la surface extérieure du rouleau (52), une conduite centripète (62) qui s'enroule autour du rouleau (52) des extrémités (52', 52'') du rouleau vers le centre, de préférence de manière hélicoïdale.

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7. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, comprenant un dispositif séparateur (6) adapté pour séparer le flux de fibres individuel (F) de la pluralité de flux de fibres séparés transversalement (F1, F2), en amont du premier rouleau (32). 10
8. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, comprenant une grille fixe (90) positionnée autour du rouleau ouvreur respectif (32, 52) de préférence dans la zone sous le rouleau, adaptée pour retirer des enveloppes et des salissures de la fibre transportée en rotation. 15
20
9. Dispositif d'ouverture selon l'une quelconque des revendications précédentes, dans lequel le premier rouleau ouvreur (32) et le second rouleau ouvreur (52) peuvent être activés en rotation à différentes vitesses de rotation. 25
10. Procédé de traitement de fibre dans des touffes dans une ligne de préparation de cardage, comprenant les étapes suivantes : 30
 - la séparation d'un flux de fibres individuel (F) d'une pluralité de flux de fibres séparés (F1, F2) ;
 - l'amenée de deux flux de fibres (F1, F2) à un seul rouleau ouvreur (32) dans une position intermédiaire entre les extrémités (32', 32'') du rouleau (32) ; 35
 - la réalisation de l'avancement des flux de fibres (F1, F2) sur le rouleau ouvreur (32) de manière centrifuge du centre vers les extrémités (32', 32'') pour réaliser le traitement desdites fibres ; 40
 - l'amenée séparée des deux flux de fibres (F1, F2) à un second rouleau ouvreur (52) par des entrées (62', 62'') ;
 - la réalisation de l'avancement des flux de fibres (F1, F2) sur le second rouleau ouvreur (52) de manière centripète des entrées (62', 62'') vers le centre pour réaliser la suite du traitement desdites fibres. 45
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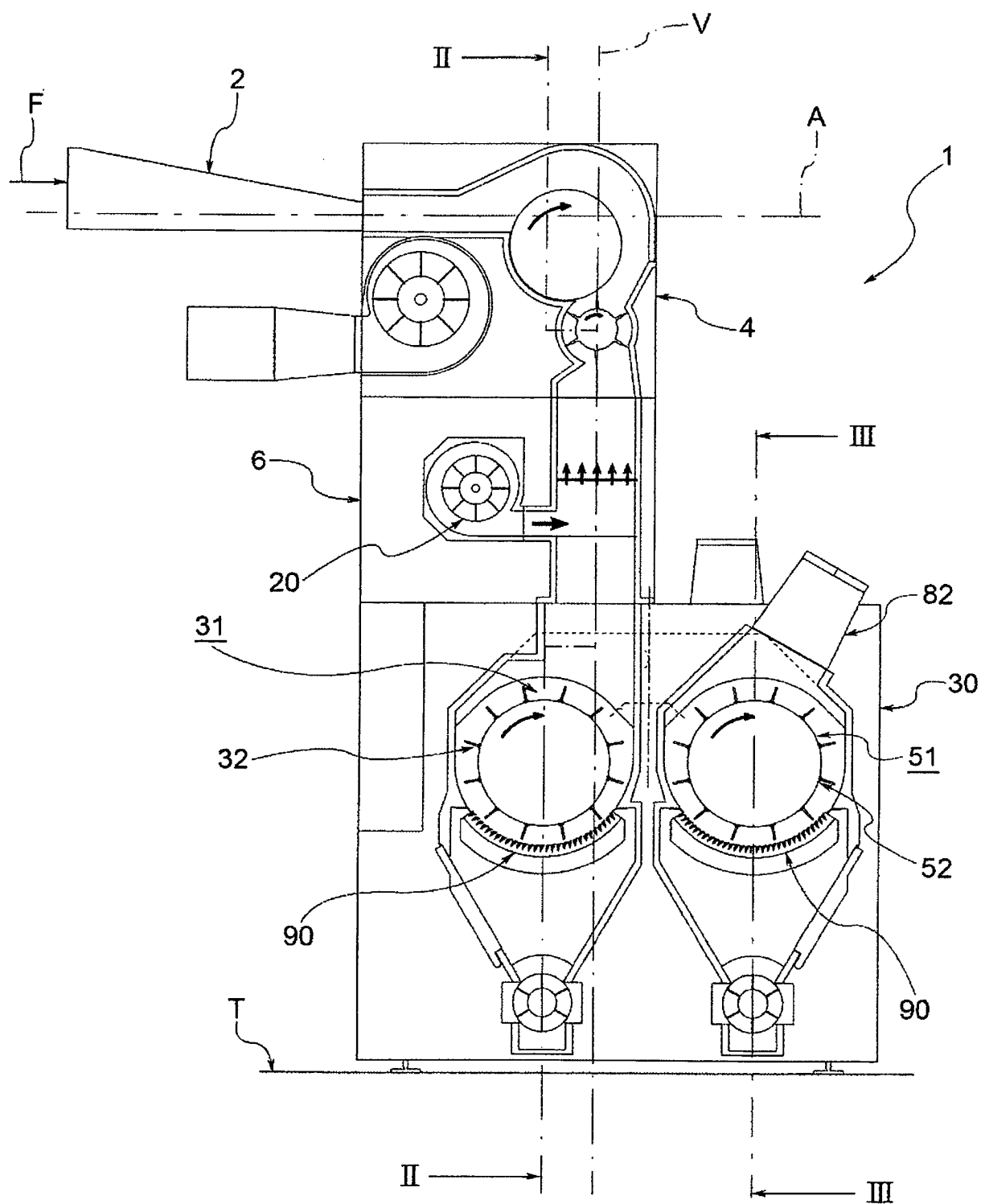
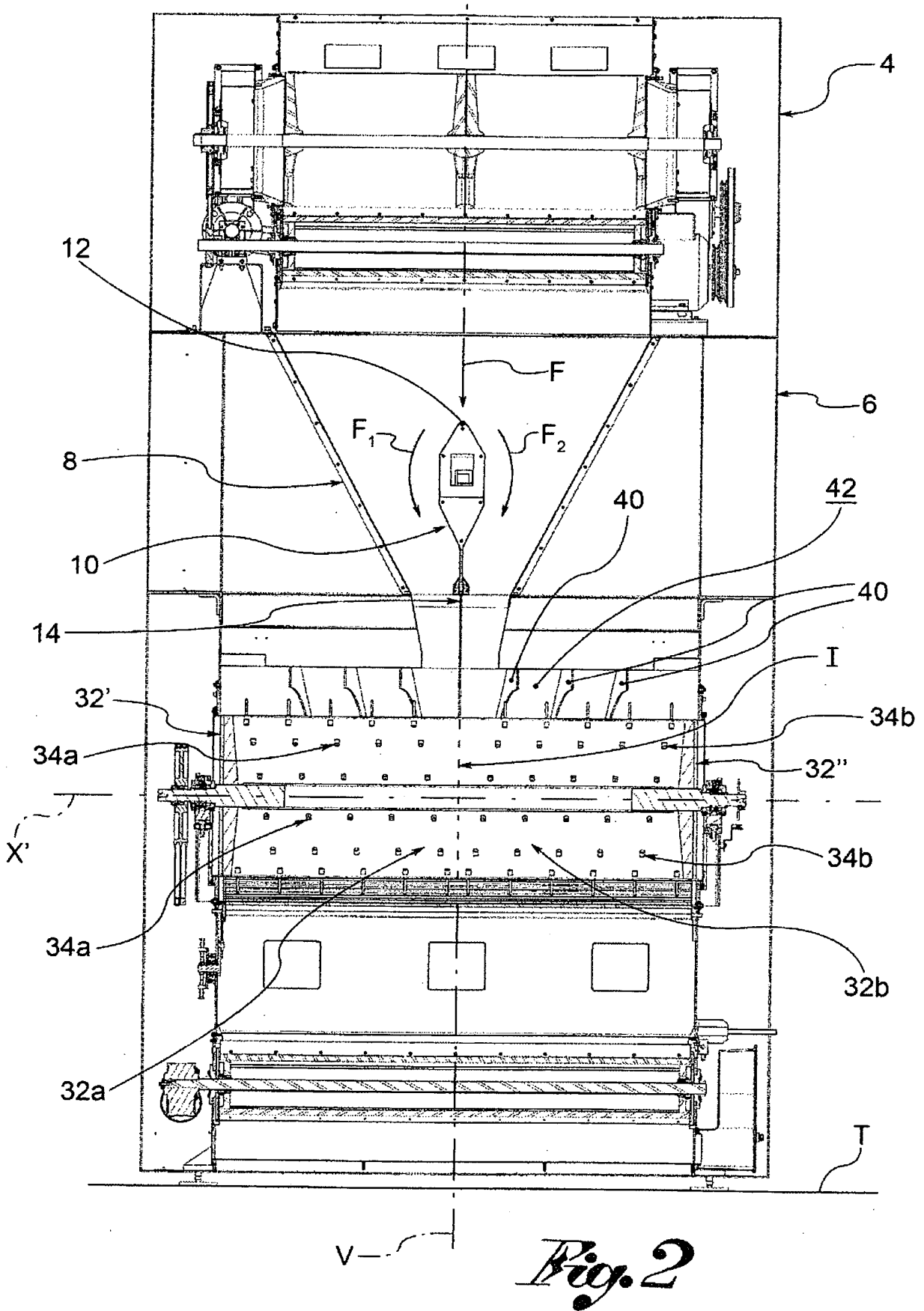


Fig. 1



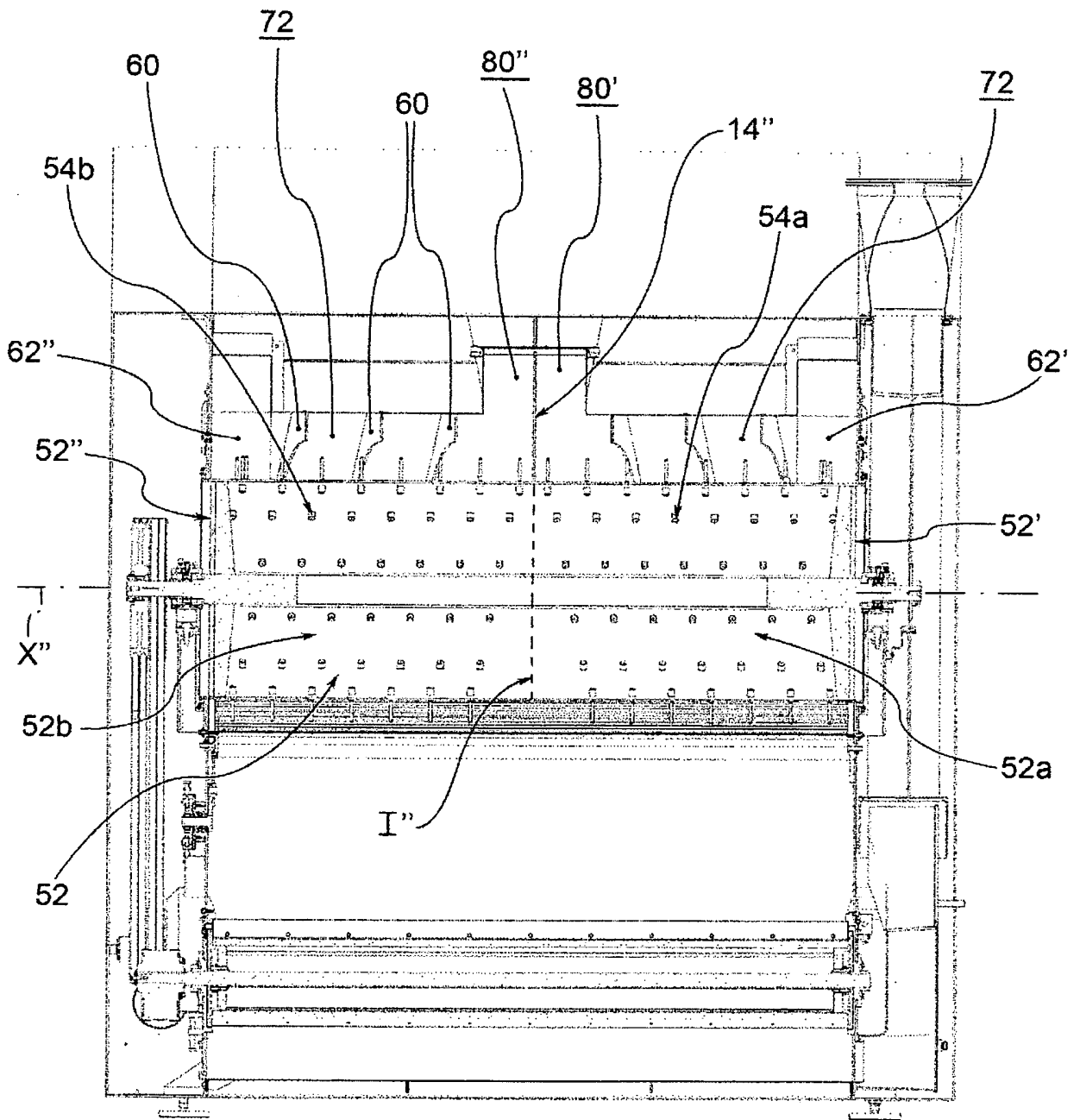
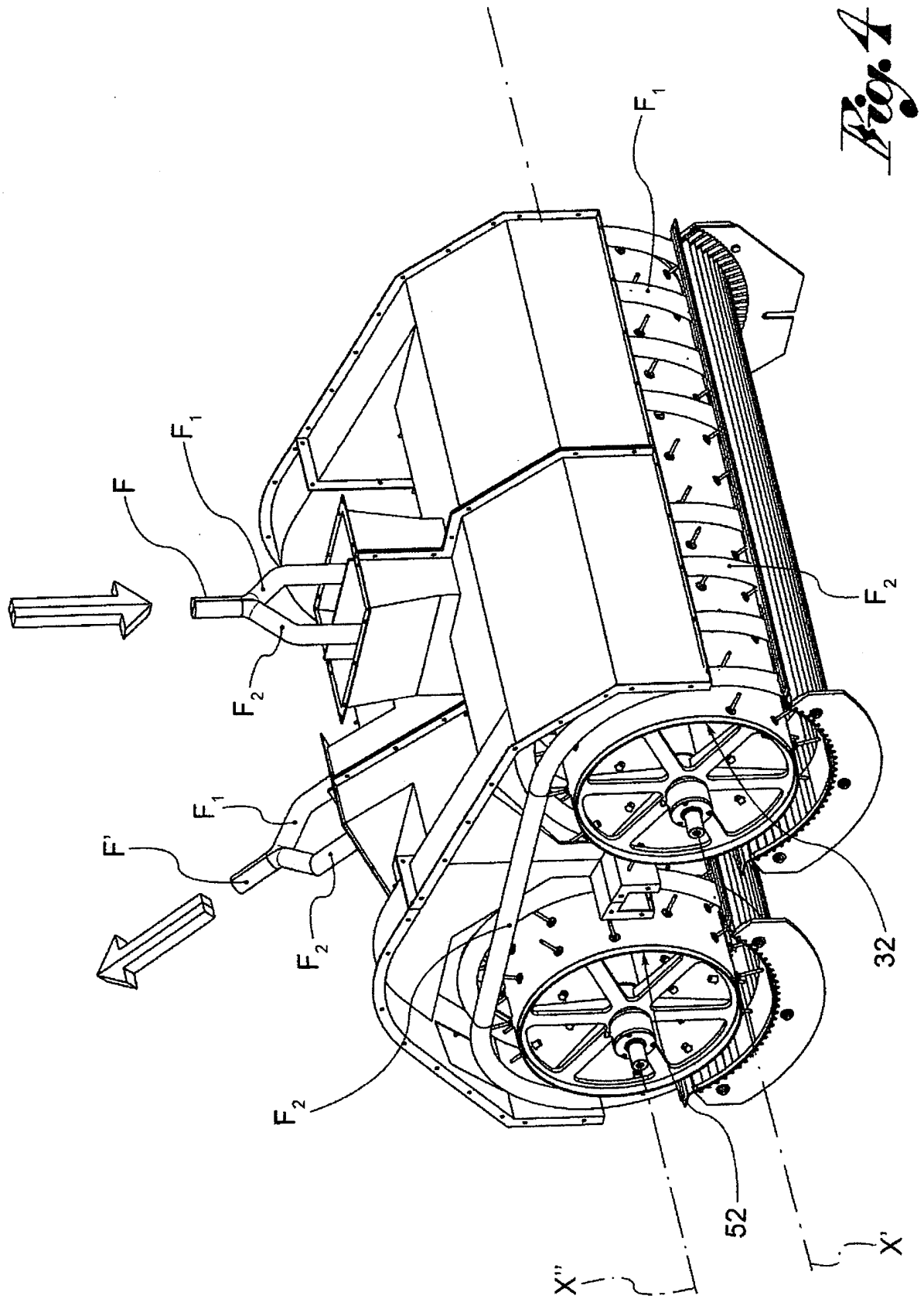
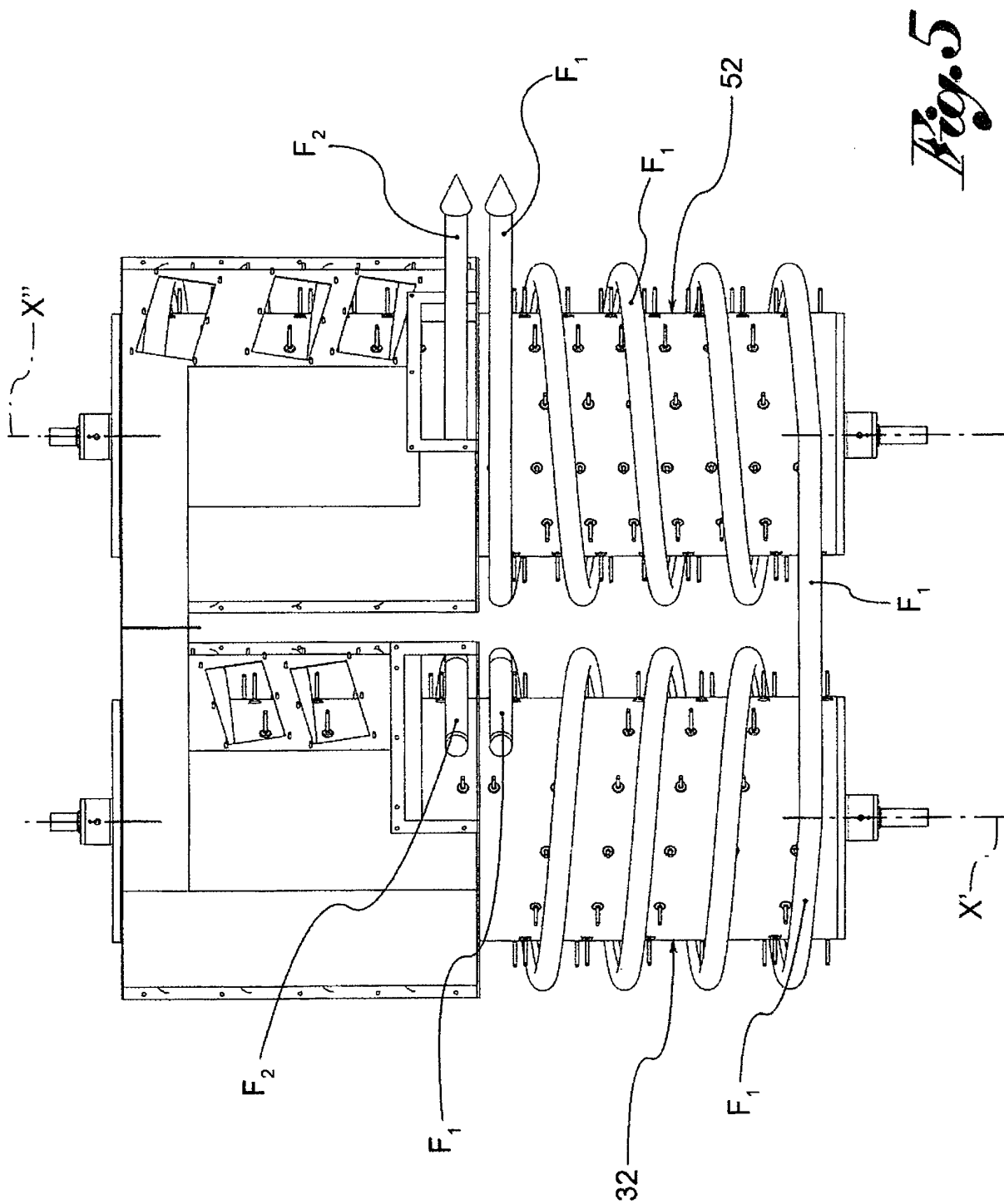


Fig. 3





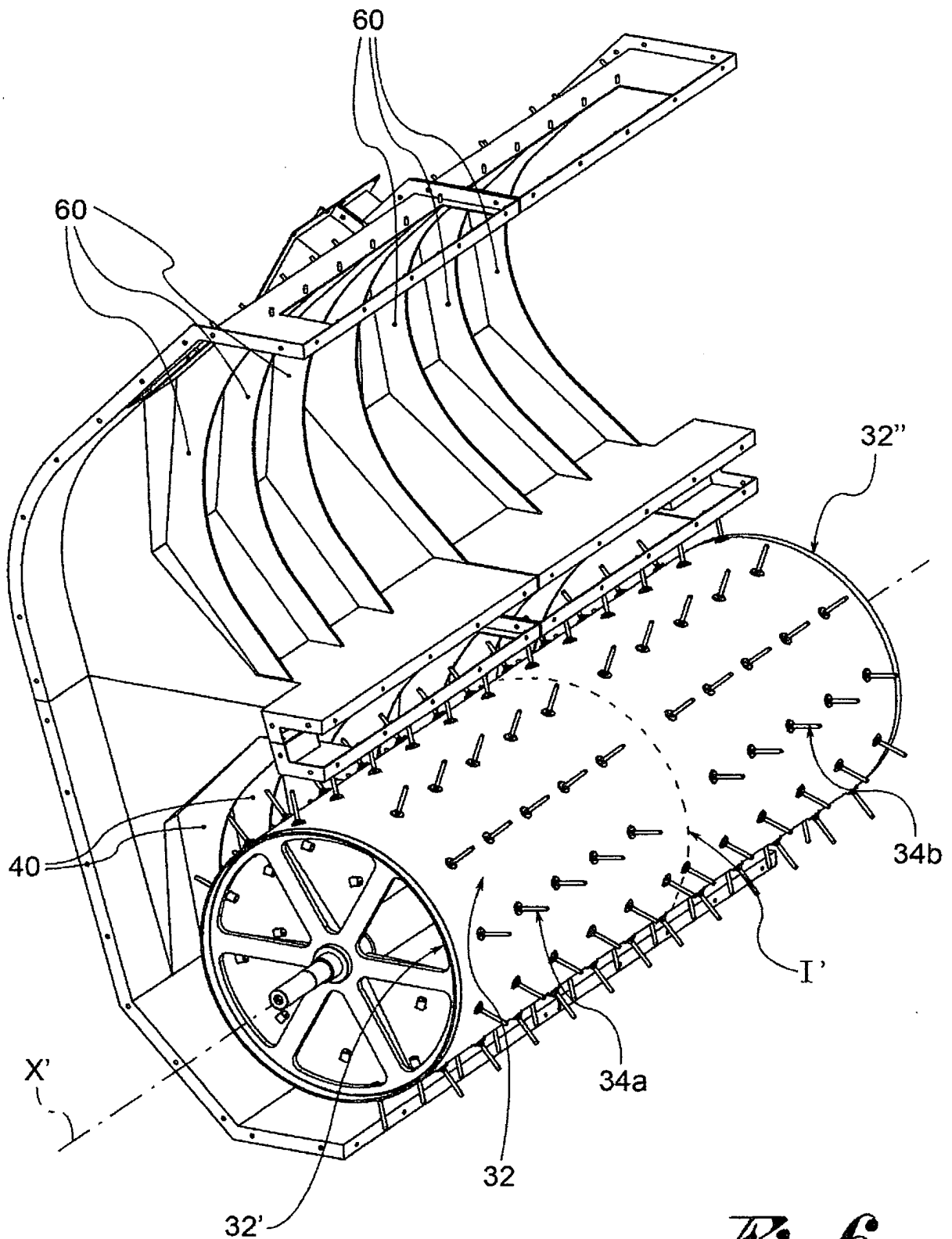


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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