



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.05.2011 Bulletin 2011/19

(51) Int Cl.:
D01G 9/06 (2006.01) D01G 9/12 (2006.01)

(21) Application number: **11152607.5**

(22) Date of filing: **17.07.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(72) Inventor: **Mascheretti, Mario**
I-25036, Palazzolo sull'Oglio, BRESCIA (IT)

(30) Priority: **19.07.2007 PCT/IT2007/000512**

(74) Representative: **Pulieri, Gianluca Antonio**
Jacobacci & Partners S.p.A.
Piazza della Vittoria, 11
25122 Brescia (IT)

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
08789344.2 / 2 167 711

Remarks:

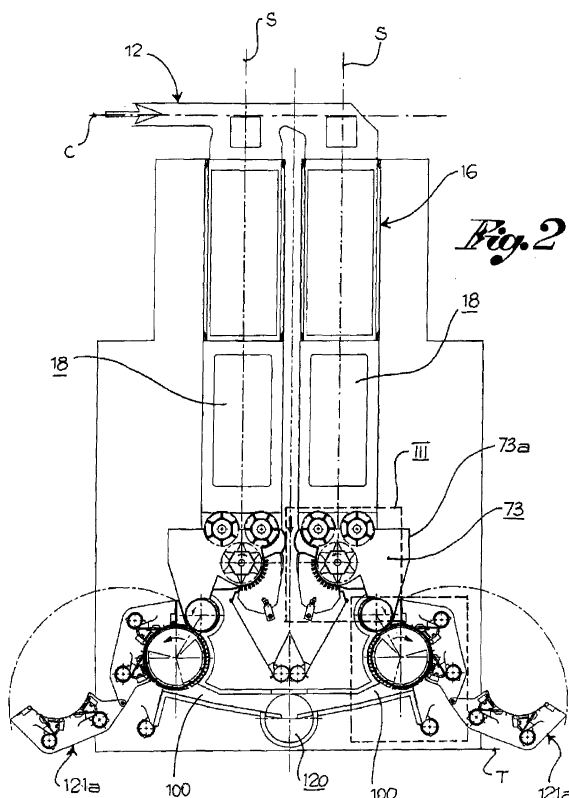
This application was filed on 28-01-2011 as a divisional application to the application mentioned under INID code 62.

(71) Applicant: **Marzoli S.P.A.**
25036 Palazzolo Sull'oglio, Brescia (IT)

(54) **Device for the preparation of flock fibres to be supplied to a carder**

(57) The present invention relates to a batt-forming machine (10) of a system for flock fibre treatment. The machine comprises two silos (16) with respective pair of feeding wheels (20,22), rotating opening wheel (40), ro-

tating conveyor roller (80), rotating opening roller (90) and outlet opening (100), disposed down-line of the opening roller (90). The outlet openings (100) convey the processed fibre into a single joining pipe (120) for feeding the processed fibre towards subsequent processing.



Description

[0001] The following invention relates to a device for the preparation of flock fibres to be supplied to a carder, i.e. a batt-forming machine.

[0002] The term batt-forming line refers to a set of machines for the treatment of fibres, disposed up-line from the carding machine, which treat the fibre accumulated in bales to supply it, in flock and opportune conditions, to the carding machine.

[0003] Batt-forming lines are currently known primarily comprising a machine with a pick-up trolley, for picking up fibre from the bales, a porcupine, for opening and cleaning the fibres, a mixer, for mixing the fibre, and auxiliary devices for moving the fibre and feeding the carding machine.

[0004] The abovementioned machines are disposed according to a preset sequence that assures the obtaining of optimum conditions of the flock fibre supplied to the carding machine.

[0005] The transfer of the fibre from one machine to the next takes place in feeding pipes, generally, in air pressurised or depressurised currents generated by fans.

[0006] Such characteristic of known batt-forming lines however, currently presents a number of drawbacks.

[0007] Such drawbacks include the fact that although transport takes place in air currents, the processing performed by certain machines is in part frustrated.

[0008] For instance, the opening action performed by the openers is partially frustrated by a partial compacting that the fibre undergoes as it accumulates in the mixer and opener silos. It is known that this negatively influences the efficacy of both fibre mixing and cleaning.

[0009] The aim of the present invention is to make a batt-forming machine able to satisfy the aforesaid requirements and overcome the drawbacks mention relating to the current art.

[0010] This aim is achieved by a batt-forming machine made in accordance with claim 1 below. The claims dependent hereof describe variants of the present invention.

[0011] Further characteristics and advantages of the batt-forming machine according to the present invention will be further evident in view of the detailed description of a preferred, though non-limiting example with the aid of the appended drawings, wherein:

[0012] - figure 1 illustrates a batt-forming line comprising a batt-forming machine according to the present invention, in a preferred embodiment;

[0013] - figure 2 illustrates the batt-forming machine of figure 1;

[0014] - figure 3 represents an enlargement of detail III of figure 2;

[0015] - figure 3a illustrates a side view of a batt-forming machine opening wheel;

[0016] - figure 4 represents an enlargement of detail IV of figure 2;

[0017] - figures 5 to 7 illustrate further variants of the batt-forming machine according to the present invention.

[0018] With reference to the appended drawings, 1 is used to indicate the whole stretch of a batt-forming line of a fibre treatment system; the term "batt-forming line" indicates a set of machines disposed up-line from a carding machine to supply it with flock fibres having opportune conditions for carding.

[0019] The batt-forming line comprises a plurality of batt-forming machines 10, at least one inlet pipe 12 for supplying the fibre to be processed to the machine 10 and at least one outlet pipe 14 for the supplying of the processed fibre to a subsequent batt-forming machine 10' or to a subsequent machine for other processing.

[0020] The batt-forming machine 1 comprises at least one silo 16 for accumulating the fibre to be processed, operatively connected to the inlet pipe 12.

[0021] Preferably, the silo 16 has a chamber 18 for accumulating the fibre, open for example on the bottom, to allow the fibres access to a processing area, positioned between the silo 16 and the outlet pipe 14.

[0022] For instance, the silo 16 is formed of a ring-shaped wall that develops around silo axis S vertical with respect to ground level T on which the machine 10 rests, whereas the input pipe 12 develops primarily along the substantially horizontal axis of pipe C.

[0023] In this embodiment, the fibres, by falling and/or under the action of the airflow, pass from the silo 16 to the processing area.

[0024] The processing area comprises at least one pair of feeding wheels 20, 22, that rotate respectively around a first axis of rotation Z.

[0025] The rotation of feeding wheels 20, 22 is such as to convey the fibres that descend from the silo 16 down-line from said wheels, for example, counter-rotating.

[0026] For example, the first feeding wheel 20, shown in figure 3, has a clockwise direction of rotation, whereas the second feeding wheel 22 has an anticlockwise direction of rotation.

[0027] According to a preferred embodiment, the feeding wheel 20, 22 comprises a plurality of profiles 24 that extend primarily along the first axis of rotation Z and comprise a bottom 26 and folded stretches 28, slanting with respect to the bottom 26.

[0028] The wheel 20, 22 is made by bringing together the bottoms 26 of the profiles 24 along an imaginary circumference, so that each bottom is tangent thereto, and making them mutually joined by uniting the folded stretches 28 thereof. This makes a structure formed of a succession of recesses 30 separated by cross members 32 formed by two folded stretches 28 joined to one another.

[0029] The two feeding wheels 20, 22, according to the variant represented, are positioned angularly and relatively to one another so that the imaginary radial extension of the cross member 32 of one of the two wheels 20 crosses the corresponding recess 30 of the other wheel 22.

[0030] Advantageously, the fibre fed by the silo 16 gathers in the recesses 30 of the feeding wheels 20, 22 and is taken down-line thereof undergoing a first channelling, due to the passage restraints made by the relative disposition of the wheels 20, 22.

[0031] Additionally, the batt-forming machine 10 comprises an opening wheel 40, disposed down-line of the feeding wheels 20, 22, turning around a second axis of rotation W, substantially parallel to the first axes of rotation Z.

[0032] Preferably, the second axis of rotation W is disposed between the first axes Z, so that the opening wheel 40 intercepts the fibre driven by the feeding wheels 20, 22.

[0033] According to a preferred embodiment, the opening wheel 40 comprises:

[0034] - a support box 42, having a prevalent extension in an axial direction, for example, with a transverse section (orthogonal to axis of rotation W) polygonal, for example hexagonal, and

[0035] - protruding elements 44, protruding radially from the support box 42, disposed staggered to one another, axially and circumferentially, on the sides of the box 42 (figure 3a).

[0036] Preferably, furthermore, the protruding element 44 comprises a head 46, preferably disposed at the tip of the elongated element, protruding from the body thereof and disposed on the side of the direction of rotation of the opening wheel 40.

[0037] Whilst the fibre is fed by the feeding wheels 20, 22 down-line thereof, it encounters the protruding elements 44 of the opening wheel 40 that tears it into flock and subjects it to a kind of beating to facilitate the elimination of the polluting residues present in the fibre.

[0038] According to a preferred embodiment, the batt-forming machine comprises a cleaning grid 50, disposed in a position suited to intercepting the fibred processed by the opening wheel 40.

[0039] For example, in the embodiment shown, for the right-hand unit, the opening wheel 40 turns in an anti-clockwise direction and the grid 50 extends, at least partially, to the left of the opening wheel 40, to intercept the fibre processed by the same.

[0040] The grid 50 presents a processing wall provided with at least one evacuation opening 52 and distanced from the opening wheel 40 so as to make a gap 54, whose passage section preferentially tends to widen towards the direction of rotation of the opening wheel.

[0041] Preferably, the evacuation openings 52 present an adjustable extension, according to the type of fibre being processed and in particular according to the desired degree of cleaning.

[0042] During processing, the grid wall 60 facing the opening wheel 40 intercepts the fibre drawn without accumulation by the opening wheel 40 in the gap 54. The fibre therefore undergoes further beating and the residues, above all husks, separate from the fibre, falling therein, from where they are evacuated by means of aspiration.

[0043] According to a further embodiment, the batt-forming machine comprises a chute 70, having a prevalent extension along a direction parallel to the axes of rotation Z, W.

5 **[0044]** The chute 70 presents an upper surface 72, forming a gap with the opening wheel 40, such as to extend the gap 54 formed by the grid with the opening wheel 40.

10 **[0045]** In particular, the upper surface 72 extends in the same direction of rotation of the opening wheel, so that the fibre processed by the grid is driven down-line of the opening wheel.

[0046] In particular, the upper surface 72 presents an extension beyond the second axis W, in the fibre movement direction to the outlet from the grid 50.

15 **[0047]** Additionally, the batt-forming machine 10 comprises a driving roller 80, disposed down-line of the opening wheel 40 with respect to the fibre flow, and in particular disposed at the end of the chute 70, so that the fibre processed by the grid 50 falls on the driving roller 80.

20 **[0048]** In particular, the machine comprises a transit pipe 73, between the opening wheel 40 and the driving roller 80, delimited by containment walls.

25 **[0049]** The transit pipe 73 is defined by an area immediately down-line from the feeding wheels 20, 22, as far as an area immediately up-line of the driving roller 80, and extends completely between an upper height, defined by said area immediately down-line of the feeding wheels, and a lower height, defined by said area immediately up-line of the driving roller 80.

30 **[0050]** Preferably, the pipe 73 does not present a "serpentine" course with subsequent stretches that occupy heights even greater than that of the area immediately down-line of the feeding wheels, to reach the devices for further processing in a position distant from the opening wheel.

35 **[0051]** The rotation speed of the driving roller 80 is such to avoid the accumulation of fibre in the area immediately up-line thereof, i.e. on the bottom of the pipe 73.

40 **[0052]** The containment walls of the transit pipe 73 comprise a strike wall 73a facing the opening wheel 40 and/or the chute 70, distant therefrom to allow the fibre coming out of the chute, driven by the protruding elements 44, to beat against it, and then fall on the driving roller 80.

45 **[0053]** The driving roller 80 turns around a third axis of rotation Y, parallel or otherwise to the other rotation axes W, Z.

[0054] The driving roller 80 is superficially covered, for example by a stiff saw-tooth covering to engage the fibre and draw it down-line.

50 **[0055]** Additionally, the batt-forming machine comprises an opening roller 90, disposed down-line of the driving roller 80, turning around a fourth axis of rotation K, parallel to the axes W and Z.

55 **[0056]** The driving roller 80 and the opening roller 90 are preferably rotating in the same direction. According to certain embodiments, these are counter-rotating.

[0057] Preferably, the cover of the opening roller 90 is fitted with a stiff covering, for example, with saw-teeth 91.

[0058] According to one variant, the cover of the opening roller 90 comprises a plurality of spikes 92, protruding from the external surface, able to penetrate into the wads of fibre and tear open the flocks thereof (figure 4, for illustration requirements, shows the roller 90 with both the covering and the spikes).

[0059] In other words, the teeth 91 and/or the spike 92 have a flock tearing action that reduces the compactness of the fibre, better preparing it for the subsequent cleaning processes.

[0060] Additionally, the processing area of the batt-forming machine 10 comprises an outlet opening 100, disposed down-line of the cleaning roller 90, from which the open fibre is aspired, in communication with the outlet pipe 14 of the machine 10.

[0061] On the external surface of the cleaning roller 90, a work portion can be identified, between the area close to the conveyor roller 80, i.e. where the fibres pass from the conveyor 80 to cleaning 90 rollers, and the outlet opening 100.

[0062] Preferably, the batt-forming machine 10 comprises at least one channelling flange 110, suited to pushing the fibre transported by the opening roller 90 towards the teeth 91, to improve the opening efficiency thereof.

[0063] Said channelling flange 110 is disposed around the opening roller 90, for example creating a fibre passage section radially decreasing in the direction of roller rotation, sufficiently close to the surface thereof to create a gap into which the fibre is channelled.

[0064] Preferably, the flange 110 cooperates also with the driving roller 80, to prevent the cleaning roller 90 from tearing flocks that are too large.

[0065] Preferably, additionally, the batt-forming machine 10 comprises at least one composite unit 121 comprising auxiliary devices such as an aspiration opening, a blade, a baffle, variably combined between them in relation to number and type, according to the processing requirements of the fibre or fibres being processed.

[0066] Said composite unit 121 is arranged along the work portion of the surface of the opening roller 90.

[0067] In a preferred embodiment, the composite unit 121 is contained in a box 121 a that can be detached or tilted from the machine cover.

[0068] For example, according to a preferred embodiment, the box 121 a can be tilted towards the exterior of the machine, performing a rotation that moves the cleaning roller 90 away, so as to make said roller accessible to maintenance technicians.

[0069] In particular, the box 121 a is hinged along a box axis C, disposed at a lower height than the rotation axis K of the cleaning roller 90. In accordance with a further variant, the box axis C is disposed at a lower height of any generator of the cleaning roller 90.

[0070] Advantageously, such configurations allow easy access to the cleaning roller and the composite units for maintenance thereof.

[0071] According to a preferred embodiment, the batt-forming machine 10 comprises at least two silos 16 facing the direction of the axis of pipe 12 and in the direction of fibre movement in said pipe 12.

[0072] Each silo 16 feeds a respective processing area, whereas the outlet openings 100 of said processing areas convey the processed fibre into the same joining pipe 120, connected to the outlet pipe 14 of the machine 10.

[0073] In a preferred embodiment of a batt-forming line, two batt-forming machines 10 are fed by the same inlet pipe 12 and the two outlet pipes 14 convey the fibre to the same fan 130, from which a further inlet pipe 12, leads to feed two further machines 10'.

[0074] According to one aspect, the batt-forming machine 10 is devoid of the grid 50 (figures 6 and 7).

[0075] According to a further aspect, the machine 10 comprises, in the processing area of the opening roller 90, a single composite unit 121 (figure 5), comprising a single aspiration opening and a single blade.

[0076] According to a further aspect, the machine 10 is devoid, in the processing area of the opening roller 90, of composite units 121 (figure 6).

[0077] It should also be noted that these variants, in any case, present a box 121 a that can be tilted for maintenance.

[0078] In a still further variant, the batt-forming machine 10 comprises a plurality of silos 16, each one independently fed by its own inlet pipe 12, 12', separated from the other (figure 7). Said variant makes it possible to feed the batt-forming machine with different types of fibre.

[0079] According to a still further variant, the processing area fed by a silo is equipped differently to the processing area fed by another silo (figure 7) and each silo is coupled with a respective fan.

[0080] For example, the processing area of the first silo 16 includes a grid 50 and two composite units 121 in the work stretch of the opening roller 90, whereas the processing area of the second silo 16' does not include the grid 50 and does not include any composite unit 121 in the work stretch of the opening roller 90'.

[0081] Said variants with diversified equipment are particularly advantageous if one intends to obtain a mixture of natural (dirtier) fibres and synthetic (substantially clean) fibres of between natural fibres of different types or of synthetic fibres of different types.

[0082] In such cases, the turning speed of the driving roller 80 is adjusted according to requirements, for example being different for each channel.

[0083] The batt-forming machine according to the present invention overcomes the drawbacks mentioned with regard to the state of the art and in particular with reference to the coupling between a mixer and a porcupine in a conventional batt-forming line.

[0084] In actual fact, the fibre, clean and in any case partially opened by the cleaning roller passes, without undergoing undesired compacting, to the transport roller

- opening roller pair, which can process the fibre in more favourable conditions.

[0085] In conventional lines, conversely, the passage into long and twisted joining pipes between different machines creates partial re-compacting of the fibre, in part frustrating the processing performed previously. 5

[0086] Furthermore, advantageously the adjustable grid makes it possible to perform more or less aggressive processing on the fibre, freeing it of the undesired residues and impurities according to the type of fibre. 10

[0087] According to a still further advantageous aspect, the batt-forming line allows very extreme mixing, even when large volumes of fibre are being processed.

[0088] For example, a stretch of a batt-forming line envisages a pipe feeding two machines of the kind described above, for a total of four silos. 15

[0089] For large-scale production, for example at 1,200 Kg/hour (one thousand and two hundred), each processing unit actually processes 300 Kg of fibre/hour, for the embodiments disclosed hereabove, which is then mixed together. 20

[0090] The possibility of processing large quantities of fibre for each unit enormously favours the efficiency of processing, by obtaining smaller flocks, which facilitate mixing, they present less stressed, cleaner fibres. 25

[0091] Furthermore, advantageously, access to the internal organs of the machine is facilitated, in order to perform maintenance activities in a quick and simple manner.

[0092] According to a still further advantageous aspect, the box with the composite units can be replaced, making it possible to build machines suited to different fibres or mixtures of fibres, according to requirements, in a modular manner. 30

[0093] Obviously a man skilled in the art could make modifications to the machine described above. Such variants are also within the scope of the protection of this invention as defined by the following claims. 35

Claims

1. Batt-forming machine (10) of a batt-forming line (1) of a system for flock fibre treatment, comprising:

- at least one inlet pipe (12) for feeding the fibre to be processed;
- at least two silos (16), operatively connected to the input pipe (12) for the accumulation of the fibre to be processed;
- a processing area, down-line from each silo, comprising: 50

- a) at least one pair of feeding wheels (20,22), placed on the bottom of the silo (16), rotating and counter-rotating, to feed parts of the fibre down-line;
- b) a rotating opening wheel (40), disposed 55

down-line of the feeding wheels (20,22), comprising a plurality of elements (44) protruding from the opening wheel (40) and suited, by rotating, to intercepting the fibre fed by the feeding wheels (20,22);

c) a rotating conveyor roller (80), disposed down-line of the opening wheel (40), covered on the surface to draw the fibre into rotation;

d) a rotating opening roller (90), disposed down-line of the conveyor roller (80) and in the vicinity of the same so as to pick up at least part of the fibre transported by the conveyor roller (80);

e) an outlet opening (100), disposed down-line of the opening roller (90);

said machine being **characterized in that** the outlet openings (100) of said processing areas convey the processed fibre into a single joining pipe (120) for feeding the processed fibre towards subsequent processing.

2. Machine according to claim 1, wherein the axis of rotation (W) of the opening wheel (40) is disposed between the axes of rotation (Z) of the feeding wheels (20,22).

3. Machine according to claim 1 or 2, comprising a cleaning grid (50), disposed in a position suited to intercepting the fibred processed by the opening wheel (40). 30

4. Machine according to claim 3, wherein the grid (50) comprises a processing wall provided with at least one evacuation opening (52) and distanced from the opening wheel (40) so as to make a gap (54), whose passage section tends to widen towards the direction of rotation of the opening wheel. 35

5. Machine according to any one of the preceding claims, comprising a chute (70), having an upper surface (72) forming a gap with the opening wheel (40). 40

6. Machine according to claim 5, wherein the upper surface (72) has an extension beyond the axis of rotation (W) of the opening wheel (40). 45

7. Machine according to any one of the preceding claims, comprising a transit pipe (73) between the opening wheel (40) and the conveyor roller (80), delimited by containment walls, defined by an area immediately down-line from the feeding wheels (20, 22) as far as an area immediately up-line of the conveyor roller (80), said containment walls comprising a strike wall (73a) facing the opening wheel (40) to allow the fibre to beat against it and then fall on the conveyor roller (80). 50

8. Machine according to any one of the preceding claims, comprising at least one channelling flange (110), disposed around the opening roller (90), creating a fibre passage section radially decreasing in the direction of roller rotation, sufficiently close to the surface thereof to create a gap into which the fibre is channelled. 5
9. Machine according to any one of the preceding claims, comprising at least one composite unit (121) comprising auxiliary devices such as an aspiration opening, a blade, a baffle, variably combined between them in relation to number and type, according to the processing requirements of the fibre or fibres being processed, said composite unit (121) being arranged along the work portion of the surface of the opening roller (90). 10
15
10. Machine according to claim 9, wherein the composite unit (121) is contained in a box (121 a) that can be detached or tilted from a machine cover. 20
11. Machine according to claim 10, wherein the box (121a) supports the cleaning roller (90) so that the box (121 a) is suitable to be tilted towards the exterior of the machine, performing a rotation that moves the opening roller (90) away, so as to make said roller accessible to maintenance technicians. 25
12. Machine according to claim 11, wherein the box (121 a) is hinged along a box axis (C), disposed at a lower height than the axis of rotation (K) of the opening roller (90). 30
13. Batt-forming line comprising 35
- a first machine according to any of the previous claims, fed by a single inlet pipe (12), having a first outlet pipe (14);
 - a second machine according to any of the previous claims, fed by the same single inlet pipe (12), having a second outlet pipe (14); 40
 - a fan (130) towards which the first outlet pipe (14) and the second outlet pipe (14) convey the fibre. 45

50

55

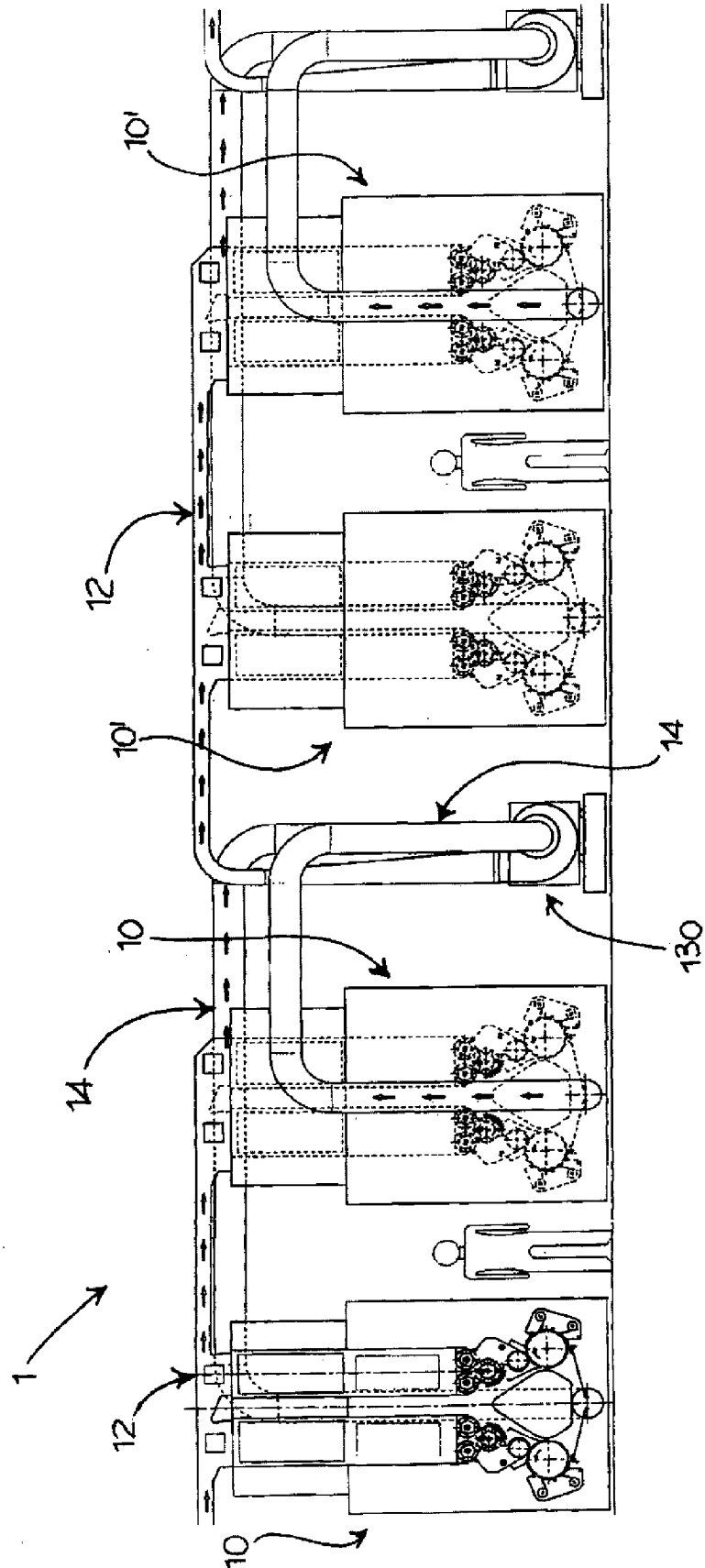
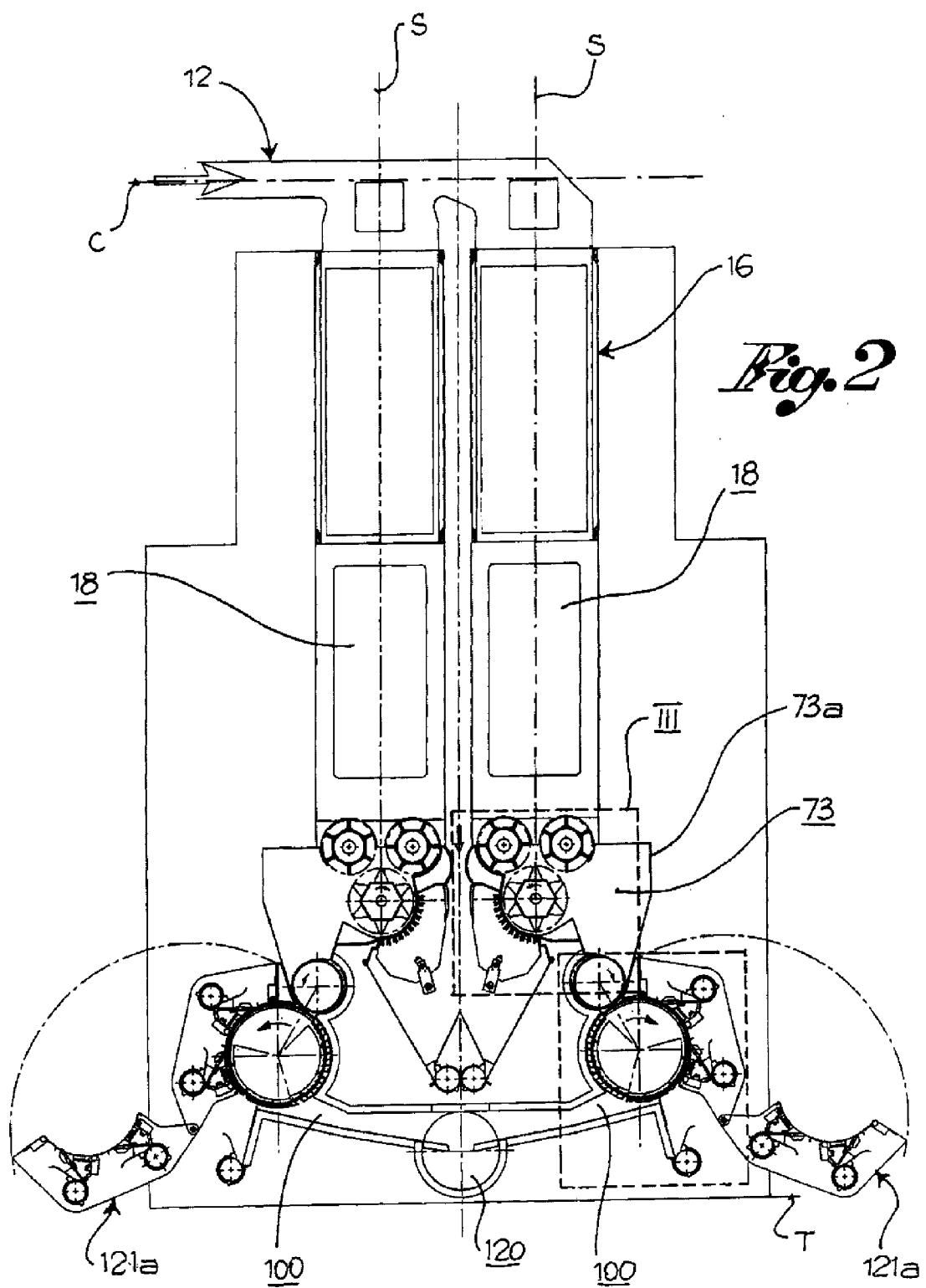


Fig. 1



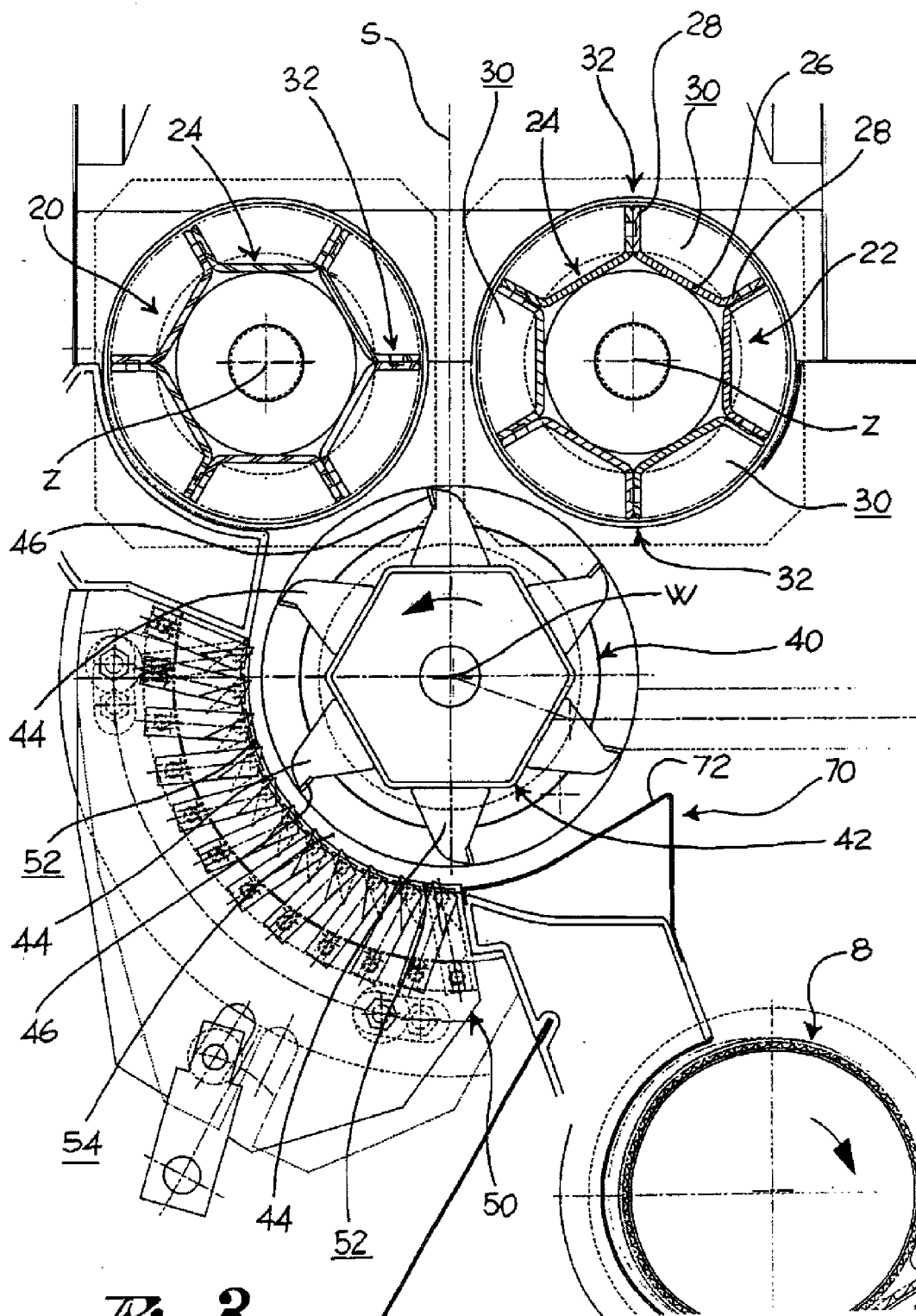


Fig. 3

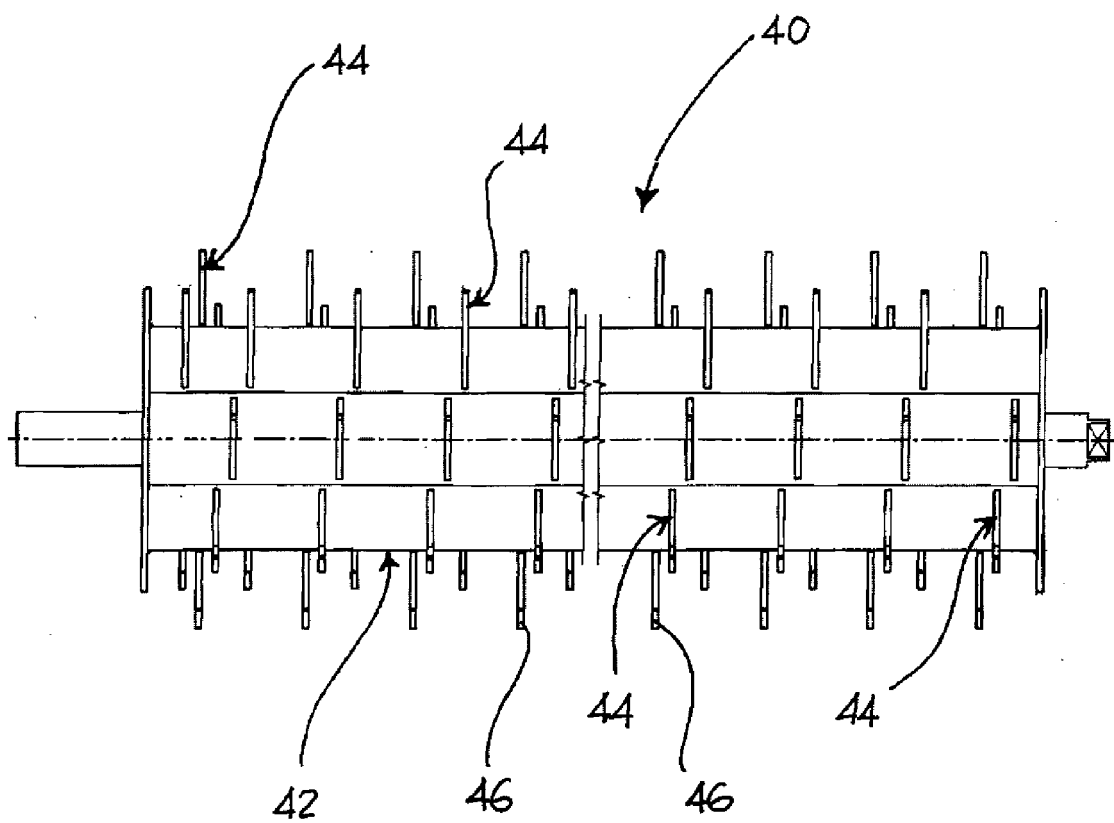


Fig. 3a

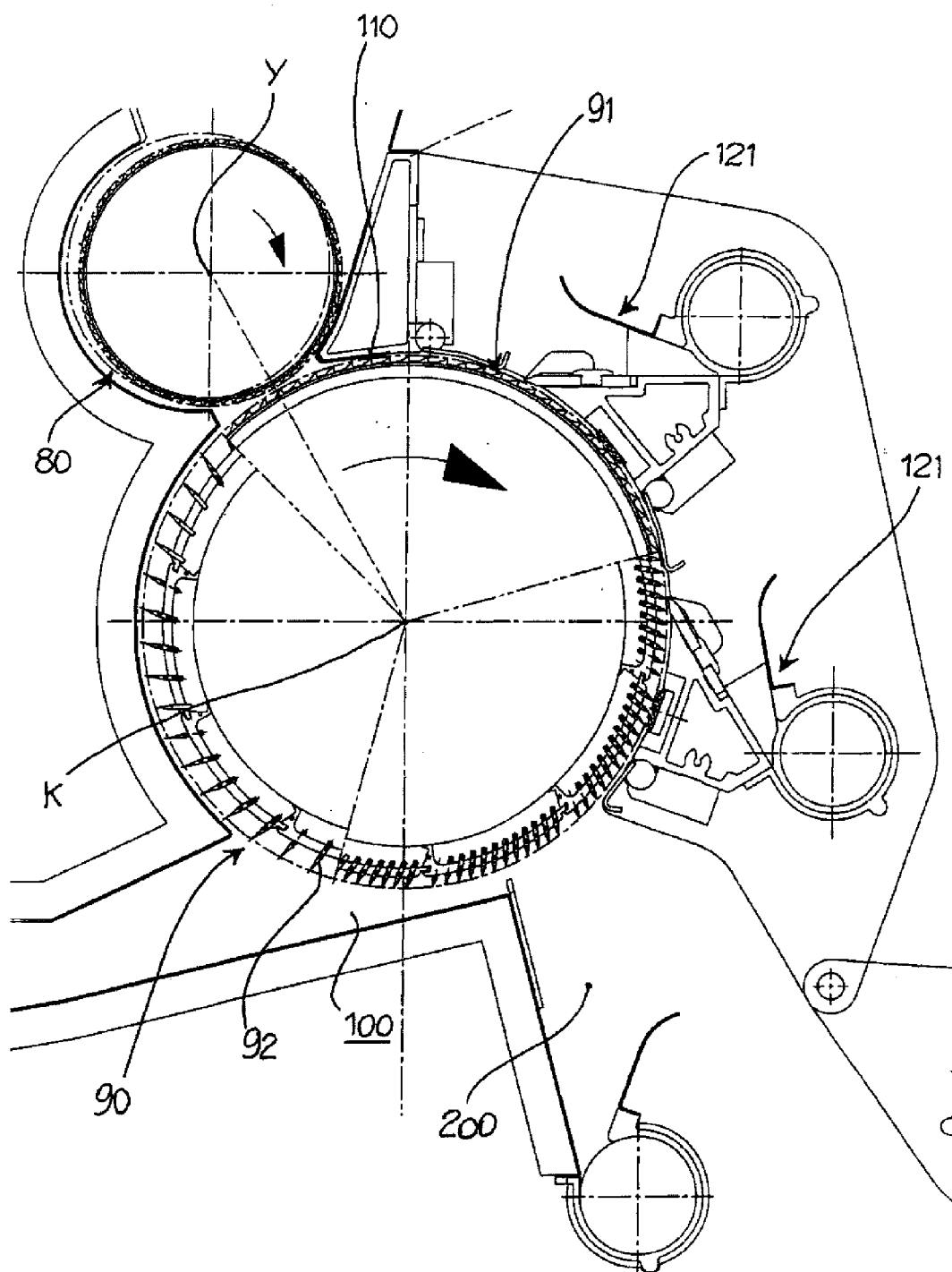
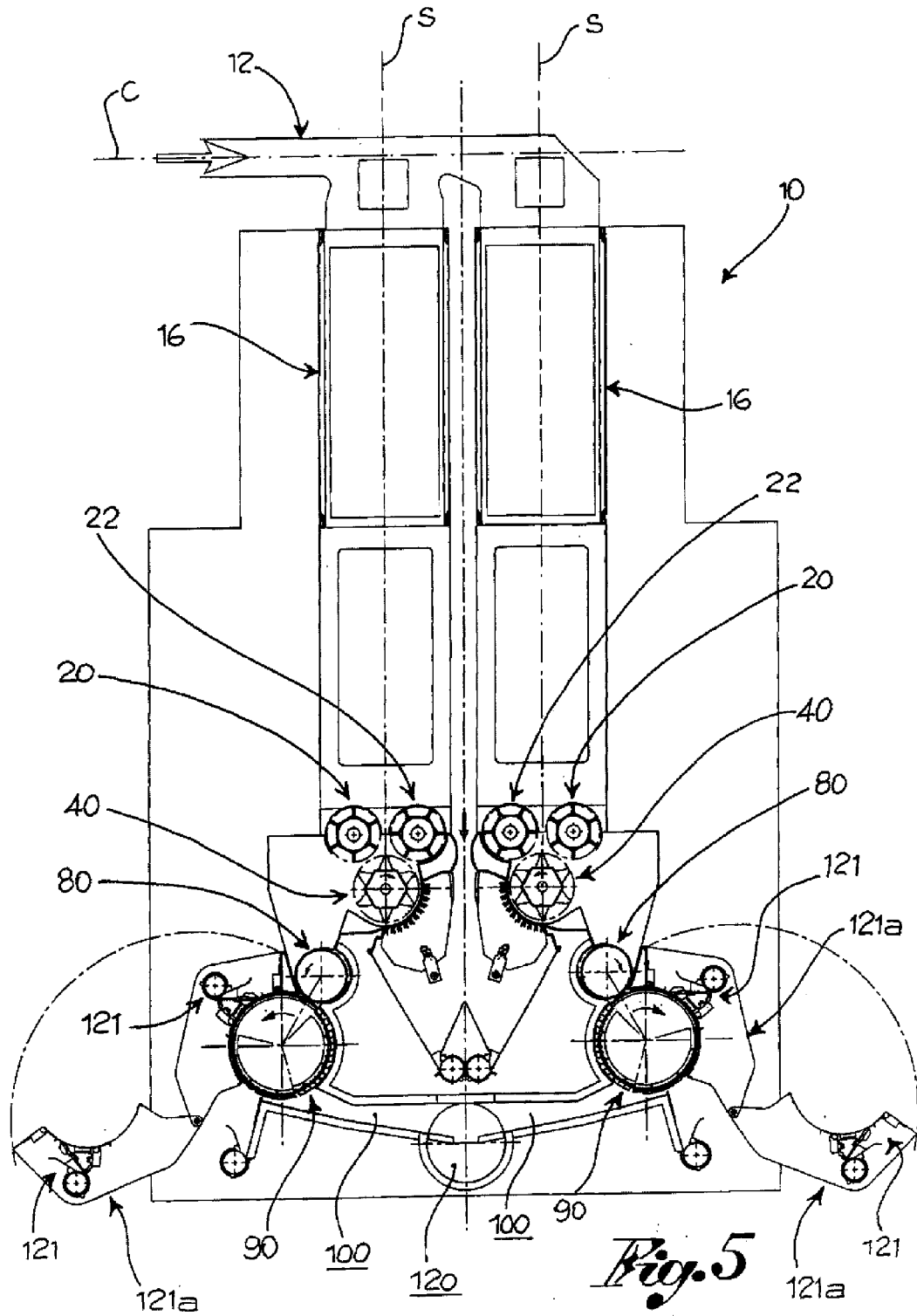
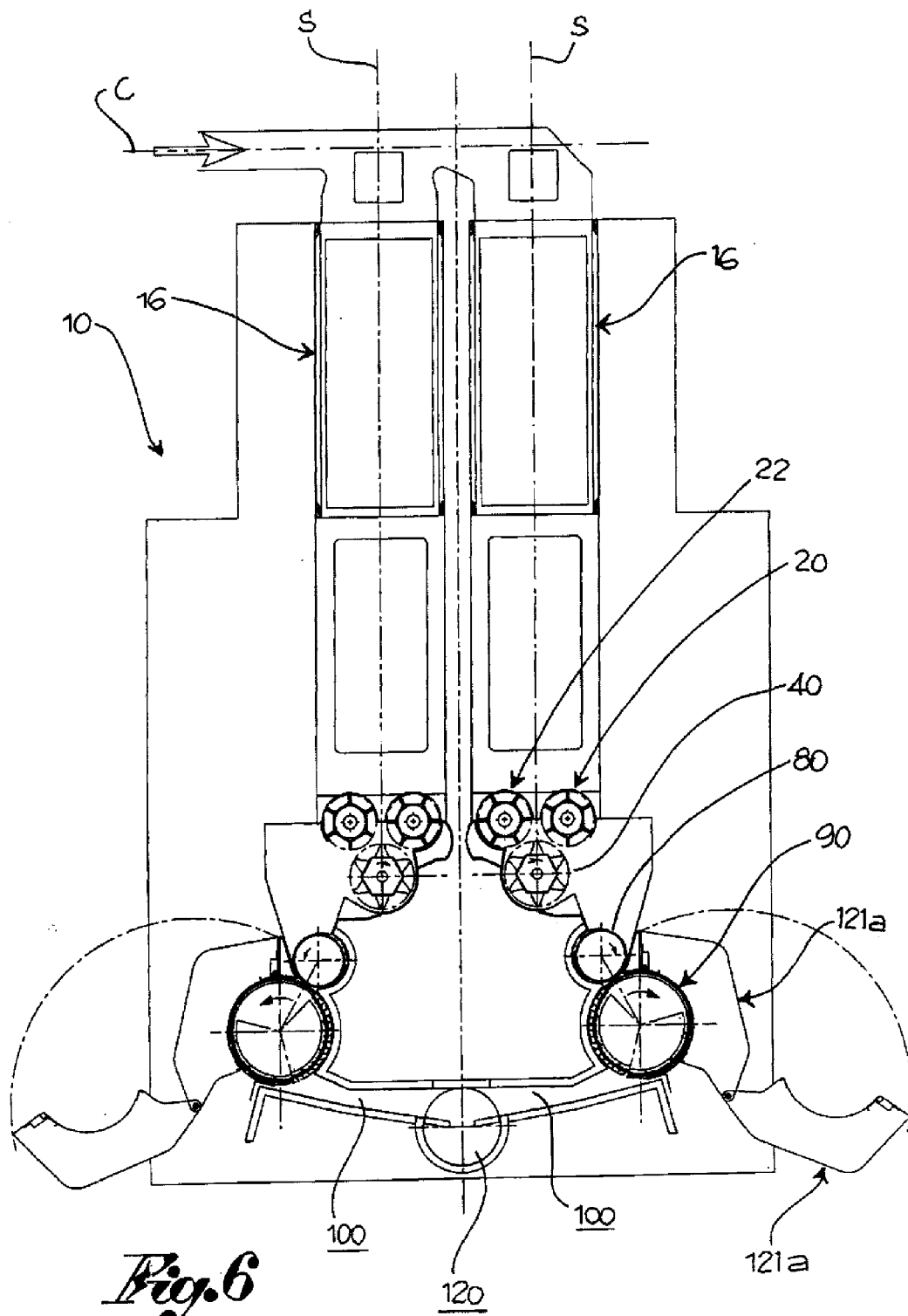
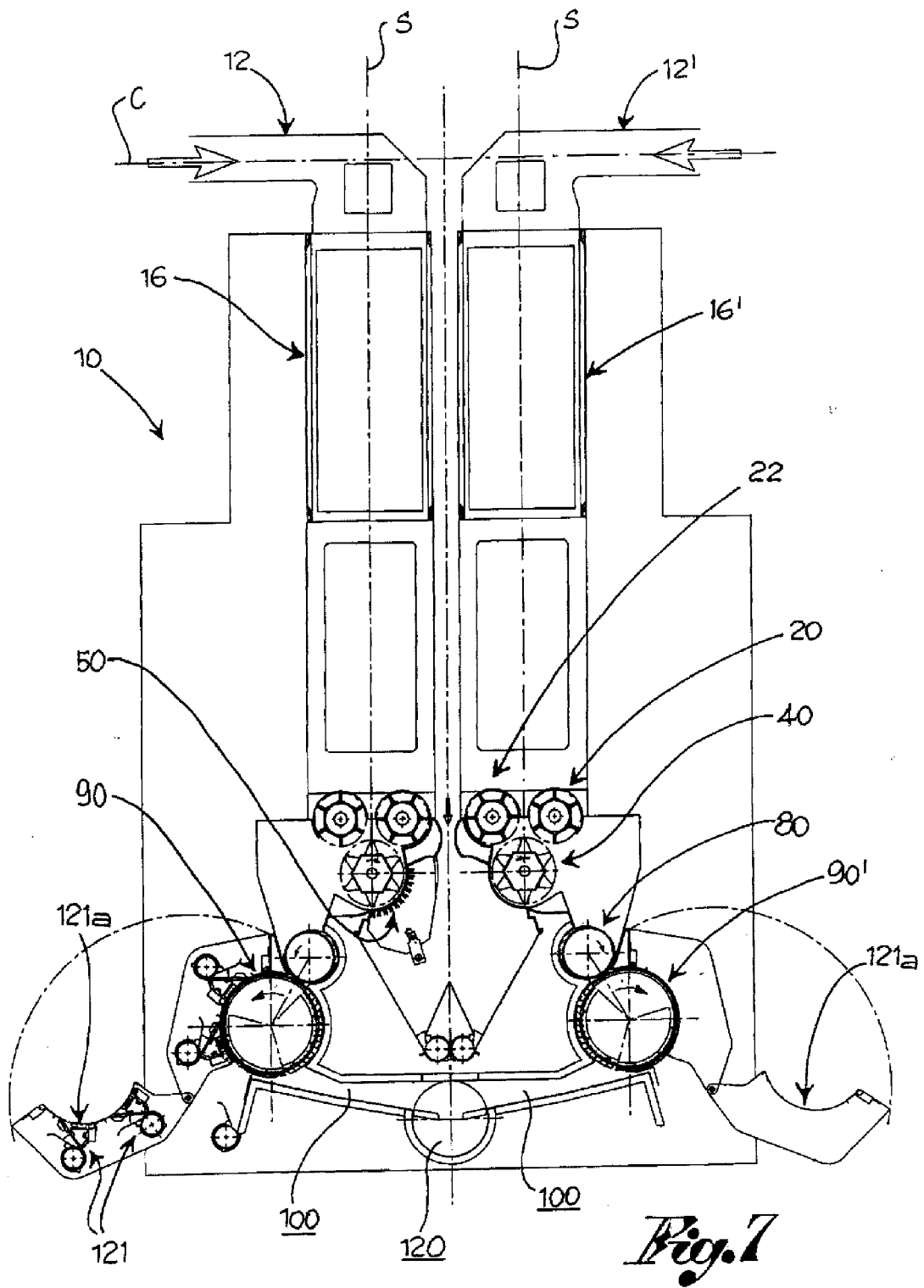


Fig. 4









EUROPEAN SEARCH REPORT

Application Number
EP 11 15 2607

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 262 580 A (MARZOLI SPA [IT]) 4 December 2002 (2002-12-04) * paragraphs [0010] - [0022]; figure 1 * -----	1-13	INV. D01G9/06 D01G9/12
Y	US 3 829 934 A (NEU H) 20 August 1974 (1974-08-20) * column 4, lines 18-51; figures 2,4 * -----	1-13	
A	EP 1 400 615 A (PINTO AKIVA [IL]) 24 March 2004 (2004-03-24) * paragraphs [0024] - [0026]; figure 1 * -----	1	
A	US 4 682 388 A (PINTO AKIVA [US]) 28 July 1987 (1987-07-28) * the whole document * -----	1	
A	US 3 457 595 A (SCHULZE LEROY E) 29 July 1969 (1969-07-29) * the whole document * -----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D01G
Place of search		Date of completion of the search	Examiner
Munich		23 March 2011	Dreyer, Claude
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			

1
EPO FORM 1503 03.82 (P04C01)

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

EP 11 15 2607

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-03-2011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1262580	A	04-12-2002	CN 1389607 A	08-01-2003
			DE 60206690 T2	13-07-2006
			IT T020010518 A1	02-12-2002
			US 2002189053 A1	19-12-2002

US 3829934	A	20-08-1974	BE 781822 A1	31-07-1972
			CH 540998 A	15-10-1973
			DE 2217394 A1	14-12-1972
			ES 412369 A1	01-01-1976
			FR 2133365 A5	24-11-1972
			FR 2175575 A2	26-10-1973
			GB 1382093 A	29-01-1975
			IT 951392 B	30-06-1973
			JP 54038664 B	22-11-1979

EP 1400615	A	24-03-2004	DE 60309799 T2	13-09-2007
			US 6615455 B1	09-09-2003

US 4682388	A	28-07-1987	NONE	

US 3457595	A	29-07-1969	NONE	
