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(54) **REREELER AND METHOD FOR REREELING FIBER WEBS**

(57) The invention relates to a rereeler comprising an unwinder (10) for unwinding a fiber web (W) from a parent roll (11) on a reel spool (12) and a reeler (30) for reeling the fiber web (W). The rereeler (50) further comprises a slitting section (20) located between the unwinder (10) and the reeler (30) for slitting the fiber web (W) before the reeling in the reeler (30) to at least two partial fiber webs, that the reeler (30) comprises a reeling cylinder (36) and reel spools (32A, 32B). The reeling cylinder (36) is configured to form reeling nips on the reeling cylinder (36) with partial parent rolls (31A, 31B) to be reeled

around the reel spools (32A, 32B). The invention also relates to a method for rereeling fiber webs, in which a fiber web (W) is unwound from a parent roll (11) on a reel spool (12) in an unwinder (10) and reeled in a reeler (30) with a reeling cylinder (36). In the method the fiber web is slitted to at least two partial fiber webs in a slitting section (20) located between the unwinding and the reeling and the slitted, partial fiber webs are reeled in the reeler (30) by reeling nips formed on each side (A, B) of the reeling cylinder (36) with partial parent rolls (31A, 31B) to be reeled around reel spools (32A, 32B).

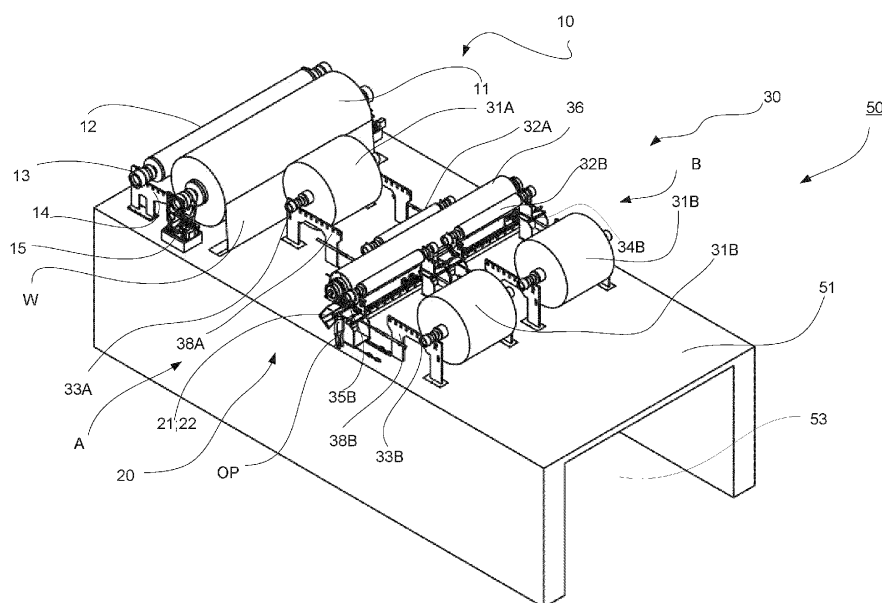


Fig. 1

Description

Technical field

[0001] In general, present invention relates to production of fiber webs. More especially the present invention relates to a rereeler according to preamble part of the independent rereeler claim and to method for rereeling fiber webs according to preamble part of the independent method claim.

Background

[0002] As known from the prior art in fiber web producing processes typically comprise an assembly formed by a number of apparatuses arranged consecutively in a production line. A typical production and treatment line comprises a head box, a wire section and a press section as well as a subsequent drying section and a reel-up. The production and treatment line can further comprise other sections and devices for finishing the fiber web, for example a sizer, a coating device and a calender. The production and treatment line also typically comprises at least one slitter-winder for forming customer rolls as well as a roll packaging apparatus. And as known, fiber webs, such as paper or board webs, are manufactured in machines together forming a fiber web manufacturing line, which may be hundreds of meters long. The sections and devices for finishing the fiber web, for example a sizer, a coating device and a calender, can be arranged in the production and treatment line on-line or off-line. The slitter-winder/-s for forming customer rolls can also be arranged on-line or off-line in the production and treatment line.

[0003] In fiber web manufacturing lines, manufacturing operates as a continuous process and the process is generally run with constant speed and with constant basis weight, when producing selected fiber web grade. The finished fiber web being output from the machine is reeled with a reel-up around a reeling shaft, i.e. a reel spool, into a parent roll (a machine roll), the diameter of which may be more than 5 meters, and which may weigh more than 160 tons. The purpose of the reeling is to transfer the fiber web from its planar manufacturing form into a form in which it can be handled more easily. The reel-up is thus a device that reel a material, which is produced as a continuous fiber web in a fiber web method, into form of a roll; the parent roll. In the production process of the fiber web, the reeling is generally a first process part, wherein a continuous process is discontinued to be continued in sequences. The parent roll is formed around a reel spool, i.e. a reeling shaft that functions as a core of reeling, i.e. the fiber web on one parent roll around one reeling shaft has a beginning and an end.

[0004] In connection with production lines for fiber webs also rereelers are used to produce a good and continuous parent roll for next production or treatment stage, typically in connection with an off-line section of device

of the production and treatment line of fiber webs. Rereelers are also used for splicing, in case in earlier stages web breaks has occurred, for patching holes, for cutting edges to eliminate possible defects in edge areas and/or for providing a uniform width of the fiber web, for joining two or more smaller parent rolls to create one bigger parent roll. Due to the nature of use the rereeler may be stopped and started several times during rereeling of one parent roll. In order to keep the rereeler up with production or treatment speed, the speed of the rereeler is typically even 2000 - 2500 m/min i.e. significantly greater than the production or treatment speed. In FI patent publication 124956 is disclosed a rereeler for reeling fiber web comprising an unwinder, a reel spool storage, a spreader roll, a reeler, which reeler comprises a reeling cylinder forming a reeling nip with the parent roll to be reeled. In the rereeler the reeling cylinder of the reel-up comprises at least two positions in vertical direction, of which positions one is a reeling position, in which the reeling cylinder forms the reeling nip with the parent roll to be reeled and the rereeler comprises an edge-cutting unit.

[0005] The fiber web of the parent roll generated during manufacture is full-width and even more than 100 km long and in production of fiber webs sometimes exists a need to provide a narrower parent roll for further treatment of the fiber web, especially during finishing of the fiber web in off-line sections and/or devices of the production and treatment line. An object of the invention is to provide a solution to this need.

[0006] An object of the invention is to create a rereeler and a method for rereeling fiber webs, in which the disadvantages and problems of prior art are eliminated or at least minimized.

[0007] A particular object of the invention is to create a rereeler and a method for rereeling fiber webs, in which from a full-width parent roll narrower parent rolls are provided.

Summary

[0008] In order to achieve the above mentioned objects, the rereeler according to the invention is mainly characterized by the features of the characterizing clause of the independent rereeler claim and the method for rereeling fiber webs according to the invention is mainly characterized by the features of the characterizing clause of the independent method claim. Advantageous embodiments and features are disclosed in the dependent claims.

[0009] According to the invention the rereeler comprises an unwinder for unwinding a fiber web from a parent roll on a reel spool and a reeler for reeling the fiber web, wherein the rereeler further comprises a slitting section located between the unwinder and the reeler for slitting the fiber web before the reeling in the reeler to at least two partial fiber webs, the reeler comprises a reeling cylinder and reel spools, the reeling cylinder is configured to form reeling nips on the reeling cylinder with partial

parent rolls to be reeled around the reel spools.

[0010] According to an advantageous feature of the invention at least one reeling nip is formed on each side of the reeling cylinder.

[0011] According to an advantageous feature of the invention the rereeler is configured to slit the fiber web unwound from the parent roll on the reel spool provided with a clutch in the unwinder in the slitting section to the at least two partial fiber webs, the partial fiber webs are reeled in the reeler to partial parent rolls around the reel spools provided with coupling parts, which connect to transfer and reeling arms, on the two sides of the reeling cylinder of the reeler.

[0012] According to an advantageous feature of the invention the slitting section comprises slitting blades and the slitting section is located in immediate vicinity of the reeling cylinder of the reeler so that the run from slitting blades of the slitting section to the reeling nip on the reeling cylinder is not more than 2 m.

[0013] According to an advantageous feature of the invention positions of slitting blades in cross-direction of the rereeler are automatically adjustable.

[0014] According to an advantageous feature of the invention wrap angle around the reeling cylinder to each reel spool is at least 90 °.

[0015] According to an advantageous feature of the invention total length of the reel spools of the reeler is substantially longer than length of the reel spool of the unwinder.

[0016] According to an advantageous feature of the invention the reeler comprises reeling frames configured to provide the reeling frames a cross-movement, i.e. in cross direction in view of the main running direction of the fiber web i.e. in view of the machine direction, such, that position of the partial fiber webs on the corresponding reel spools is adjustable.

[0017] According to an advantageous feature of the invention the reeling frames are provided by linear bearing structure for the cross-movement.

[0018] According to an advantageous feature of the invention the rereeler is located on a base foundation and the rereeler comprises support frames to support the reel spools of the unwinder and the finished partial parent rolls in the reeler support frames.

[0019] According to an advantageous feature of the invention the rereeler comprises a reel spool storage located in connection with the reeler for providing the reeler with reel spools.

[0020] According to the invention in the method for rereeling fiber webs a fiber web is unwound from a parent roll on a reel spool in an unwinder and reeled in a reeler with a reeling cylinder, wherein the fiber web is slitted to at least two partial fiber webs in a slitting section located between the unwinding and the reeling, that the slitted, partial fiber webs are reeled in the reeler by reeling nips formed on the reeling cylinder with partial parent rolls to be reeled around reel spools.

[0021] According to an advantageous feature of the

invention in the reeler the partial parent rolls are reeled around the reel spools by reeling nips, of which at least two reeling nips are located on opposite sides the reeling cylinder.

[0022] According to an advantageous feature of the invention the partial parent rolls are moved on the reeling frames by means of the transfer and reeling arms or carts to adjust reeling nip load and to carry out the rereeling.

[0023] According to an advantageous feature of the invention in the reeler position of the partial fiber webs on the corresponding reel spools is adjustable by a cross-movement of reeling frames.

[0024] According to an advantageous aspect of the invention in the reeler three partial parent rolls are reeled and one partial parent roll is on the side of the unwinder in respect of the reeling cylinder and two partial parent rolls are on the other side of the reeling cylinder. This provides for the possibility of extending the reeling frames further to a cart location for moving the finished partial rolls to further handling. Thus, no crane is needed.

[0025] According to an advantageous aspect the rereeler is provided with edge cutting means for cutting edge trimmings.

[0026] According to an advantageous aspect the rereeler is provided with middle cutting means for cutting middle trimming.

[0027] By the invention provided a solution to the need for a narrower parent roll for further treatment of the fiber web, especially during finishing of the fiber web in off-line sections and/or devices of the production and treatment line. In connection with production and treatment lines for wide fiber webs the invention and its advantageous features provides for the possibility of using off-line finishing and/or treatment sections and devices for narrower fiber webs. Thus, the whole production of the production line does not need to produce same fiber web grade, but instead different grades can be produced from the partial parent rolls. Also, investment costs are then decreased. Therefore, the invention is very suitable for example in connection with production of special fiber grades.

Brief description of the drawings

[0028] In the following the invention is explained in detail with reference to the accompanying drawing to which the invention is not to be narrowly limited.

In figure 1 is shown schematically a 3D view of an advantageous example of a rereeler according to the invention.

In figure 2 is shown schematically a side view of the example of figure 1 of an advantageous example of a rereeler according to the invention.

In figure 3 is shown schematically a top view of the example of figures 1-2 of an advantageous example

of a rereeler according to the invention.

In figure 4 is shown schematically a side view of an advantageous example of a reel spool storage in connection with an advantageous example of a rereeler according to the invention.

[0029] During the course of the following description relating to the figures 1-4 like numbers and signs will be used to identify like elements according to the different views which illustrate the invention and its advantageous examples. In the figures some repetitive reference signs have been omitted for clarity reasons.

Detailed description

[0030] In the figures 1-4 is shown an advantageous example of the rereeler 50, which comprises an unwinder 10, a slitting section 20 with slitter blades 21, 22, a reeler 30, which reeler comprises a reeling cylinder 36 forming a reeling nip with parent rolls 31A, 31B to be reeled around the reel spools 32A, 32B with coupling parts 33A, 33B. The rereeler 50 advantageously also comprises a reel spool storage 40 as shown in figure 4. The rereeler 50 is located on a base foundation 51 and to support reel spools 12 of the unwinder 10 and the finished partial parent rolls 31A, 31B in the reeler 30 support frames 14, 38A, 38B are provided. The reel spools 32A, 32B of the reeler 30 and the partial parent rolls under reeling in the reeler 30 are supported on to reeling frames 34A, 34B. Additionally, the base foundation 51 is provided with a space 53 within the base foundation 51. The base foundation 51 also comprises support beam and/or plate structures 52 for providing further support to the parts of and the rereeler 50. The support frames 14, 34A, 34B, and reeling frames 38A, 38B form support rails for movements of the reel spools 12 of the unwinder 10, the reel spools 32A, 32B of the reeler 30 and the parent roll 12 in the unwinder 10 and the partial parent rolls 31A, 31B in the reeler 30. The operator of the rereeler is in the figures indicated by reference sign OP.

[0031] In the rereeler 50 from the parent roll 11 to be reeled the fiber web W is unwound in the unwinder 10 from the reel spool 12. The reel spool 12 comprises a clutch 13 to be connected to the drive 15 of the unwinder 10.

[0032] The fiber web is guided to the slitting section 20 to be slitted to at least two partial fiber webs, in the example of the figures to three partial fiber webs, between the slitting blades 21, 22. The slitting section 20 comprises slitting blades 21, 22 in accordance with the need of partial fiber webs. Positions of slitting blades 21, 22 in cross-direction of the rereeler 50 are automatically adjustable. The slitting section 20 is located in immediate vicinity of the reeling cylinder 36 of the reeler 30 so that the run from the slitting blades to the reeling nip on the reeling cylinder 36 is not more than 2 m.

[0033] In the reeler 30 the partial fiber webs are reeled

around the reel spools 32A, 32B to partial parent rolls 31A, 31B by means of reeling nips formed between the reeling cylinder 36 of the reeler 30 and the partial parent rolls 31A, 31B under reeling. In the reeler 30 the partial parent rolls 31A, 31B are reeled on two positions on both sides A, B of the reeling cylinder 36 around the reel spools 32A, 32B correspondingly. As the reeling progresses the partial parent rolls 31A, 31B are moved on the reeling frames 38A, 38B by means of the transfer and reeling arms or carts 35A, 35B or corresponding transfer means to adjust reeling nip load and to carry out the rereeling. When the partial parent rolls 31A, 31B are reeled they are moved away from the reeling positions by means of the transfer and reeling carts or arms 35A, 35B or corresponding transfer means on the support frames 34A, 34B and new empty reel spools 32A, 32B are brought to the reeling positions. The reel spools 32A, 32B are provided with coupling means 33A, 33B, which connect to the transfer and reeling arms 35A, 35B, correspondingly.

[0034] In the reeler 30 the reeling frames 34A, 34B are configured to provide reeling frames 34A, 34B with a cross-movement such, that the partial fiber web W can be located in the middle of the corresponding reel spool 32A, 32B, when widths of the partial fiber webs change and they are attached by linear bearing structure 37A, 37B providing the cross-movement to the upper surface of the base foundation 51 i.e. to the floor structure.

[0035] In the unwinder 10 the empty reel spool 12 is moved to a storage position to be transferred to a reel-up for reeling of a new parent roll 11. The fiber web W is guided from the unwinder 10 downward and via the space within the base foundation 51 by guide rolls. The run of the fiber web is turned upwards as the slitting section 20 approaches and then the fiber web is guided through the slitting section 20 to be slitted to partial fiber web and to the reeler 30 to be reeled to the partial parent rolls 31A, 31B.

[0036] The rereeler 50 is configured to divide a wide fiber web W from the parent roll 11 on the reel spool 12 provided with the clutch 13 in the slitting section 20 to at least two partial fiber webs, which are reeled in the reeler 30 to partial parent rolls 31A, 31B around the reel spools 32A, 32B provided with coupling parts 33A, 33B on two sides A, B of the reeling cylinder 36 of the reeler 30. In the reeler 30 the wrap angle around the reeling cylinder 36 to each reel spool 32A, 32B is at least 90 ° and in the reeler 30 total length of the reel spools 32A, 32B is substantially longer than length of the reel spool 12 of the unwinder 10.

[0037] In figure 4 a reel spool storage 40 is located in connection with the reeler 30 of the rereeler 50 for providing the reeler 30 with reel spools 32A, 32B. The reel spool storage comprises a vertically extending beam 41 to provide an upper storage facility for the reel spools 32. The beam 41 is provided with a vertically moving arm 42 for moving the reel spools 32 from the storage to the reeler 30 as shown by the arrow Y to be transferred to the reeling frames 34A, 34B.

[0038] In the description in the foregoing, although some functions have been described with reference to certain features and examples, those functions may be performable by other features and examples whether described or not. Although features have been described with reference to the certain examples, those features may also be present in other examples whether described or not.

[0039] Above only some advantageous examples of the inventions have been described to which examples the invention is not to be narrowly limited and many modifications and alterations are possible within the invention.

Claims

1. Rereeler comprising an unwinder (10) for unwinding a fiber web (W) from a parent roll (11) on a reel spool (12) and a reeler (30) for reeling the fiber web (W), **characterized in that** the rereeler (50) further comprises a slitting section (20) located between the unwinder (10) and the reeler (30) for slitting the fiber web (W) before the reeling in the reeler (30) to at least two partial fiber webs, that the reeler (30) comprises a reeling cylinder (36) and reel spools (32A, 32B), that the reeling cylinder (36) is configured to form reeling nips on the reeling cylinder (36) with partial parent rolls (31A, 31B) to be reeled around the reel spools (32A, 32B).
2. Rereeler according to claim 1, **characterized in that** at least one reeling nip is formed on each side (A, B) of the reeling cylinder (36).
3. Rereeler according to claim 1 or 2, **characterized in that** the rereeler (50) is configured to slit the fiber web (W) unwound from the parent roll (11) on the reel spool (12) provided with a clutch (13) in the unwinder (10) in the slitting section (20) to the at least two partial fiber webs, that the partial fiber webs are reeled in the reeler (30) to partial parent rolls (31A, 31B) around the reel spools (32A, 32B) provided with coupling parts (33A, 33B), which connect to transfer and reeling arms (35A, 35B), on the two sides (A, B) of the reeling cylinder (36) of the reeler (30).
4. Rereeler according to any of claims 1-3, **characterized in that** the slitting section (20) comprises slitting blades (21, 22) and that the slitting section (20) is located in immediate vicinity of the reeling cylinder (36) of the reeler (30) so that the run from slitting blades (21, 22) of the slitting section (20) to the reeling nip on the reeling cylinder (36) is not more than 2 m.
5. Rereeler according to claim 4, **characterized in that** positions of slitting blades (21, 22) in cross-direction of the rereeler (50) are automatically adjustable.
6. Rereeler according to any of the claims 1-5, **characterized in that** wrap angle around the reeling cylinder (36) to each reel spool (32A, 32B) is at least 90 °.
7. Rereeler according to any of the claims 1-6, **characterized in that** total length of the reel spools (32A, 32B) of the reeler (30) is substantially longer than length of the reel spool (12) of the unwinder (10).
8. Rereeler according to any of the claims 1-7, **characterized in that** the reeler (30) comprises reeling frames (34A, 34B) configured to provide the reeling frames (34A, 34B) a cross-movement such, that position of the partial fiber webs (W) on the corresponding reel spools (32A, 32B) is adjustable.
9. Rereeler according to claim 8, **characterized in that** the reeling frames (34A, 34B) are provided by linear bearing structure (37A, 37B) for the cross-movement.
10. Rereeler according to any of the claims 1-9, **characterized in that** the rereeler (50) is located on a base foundation (51) and the rereeler (50) comprises support frames (14, 38A, 38B) to support the reel spools (12) of the unwinder (10) and the finished partial parent rolls (31A, 31B) in the reeler (30) support frames (14, 38A, 38B).
11. Rereeler according to any of the claims 1-10, **characterized in that** the rereeler (50) comprises a reel spool storage (40) located in connection with the reeler (30) for providing the reeler (30) with reel spools (32A, 32B).
12. Method for rereeling fiber webs, in which a fiber web (W) is unwound from a parent roll (11) on a reel spool (12) in an unwinder (10) and reeled in a reeler (30) with a reeling cylinder (36), **characterized in that** in the method the fiber web is slitted to at least two partial fiber webs in a slitting section (20) located between the unwinding and the reeling, that the slitted, partial fiber webs are reeled in the reeler (30) by reeling nips formed on the reeling cylinder (36) with partial parent rolls (31A, 31B) to be reeled around reel spools (32A, 32B).
13. Method according to claim 12, **characterized in that** in the reeler (30) the partial parent rolls (31A, 31B) are reeled around the reel spools (32A, 32B) by reeling nips, of which at least two reeling nips are located on opposite sides (A, B) of the reeling cylinder (36).
14. Method according to claim 12 or 13, **characterized in that** in the partial parent rolls (31A, 31B) are

moved on the reeling frames (38A, 38B) by means of the transfer and reeling arms or carts (35A, 35B) to adjust reeling nip load and to carry out the rereeling.

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15. Method according to any of claims 12-14, **characterized in that** in the reeler (30) position of the partial fiber webs (W) on the corresponding reel spools (32A, 32B) is adjustable by a cross-movement of reeling frames (34A, 34B).

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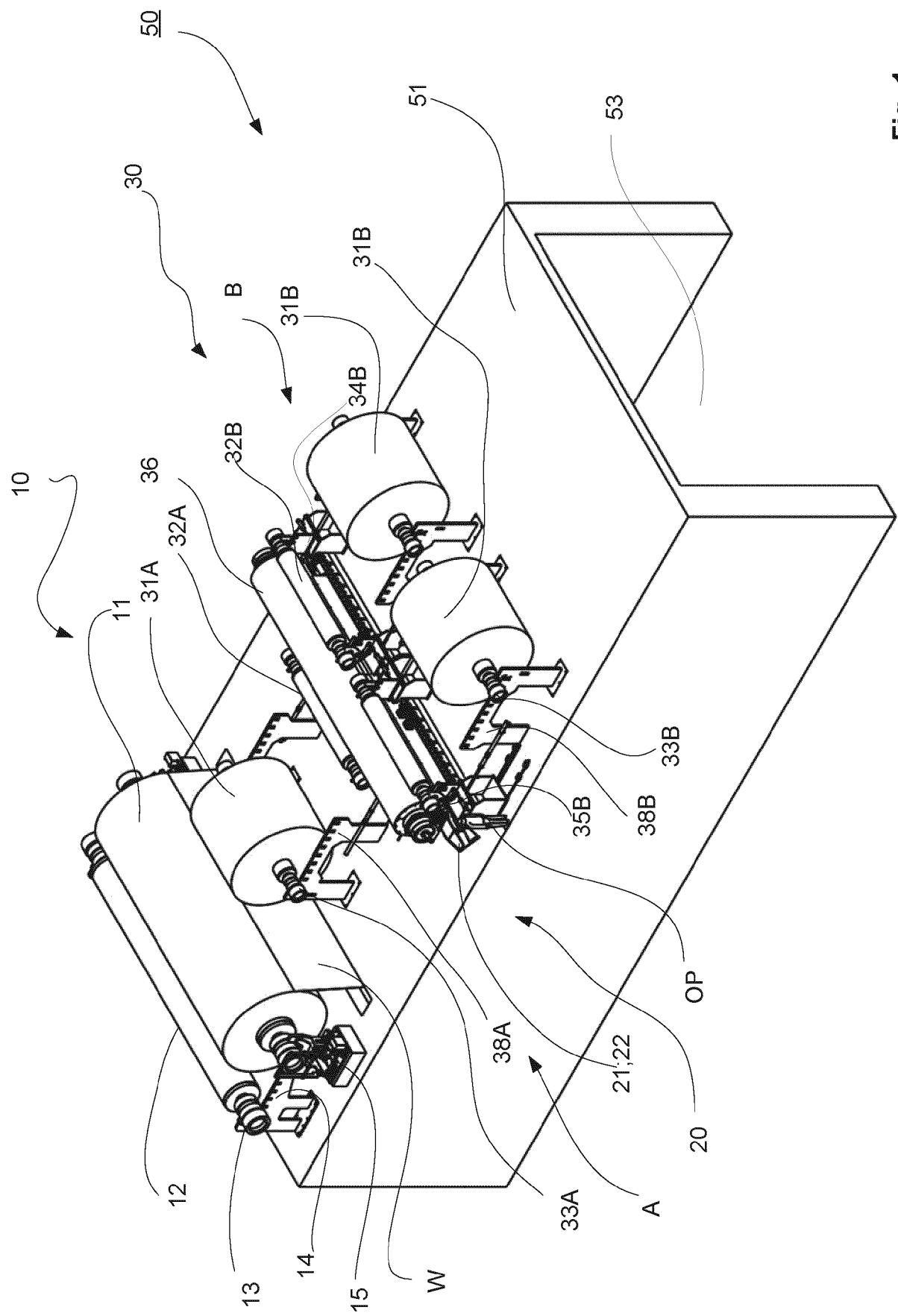


Fig. 1

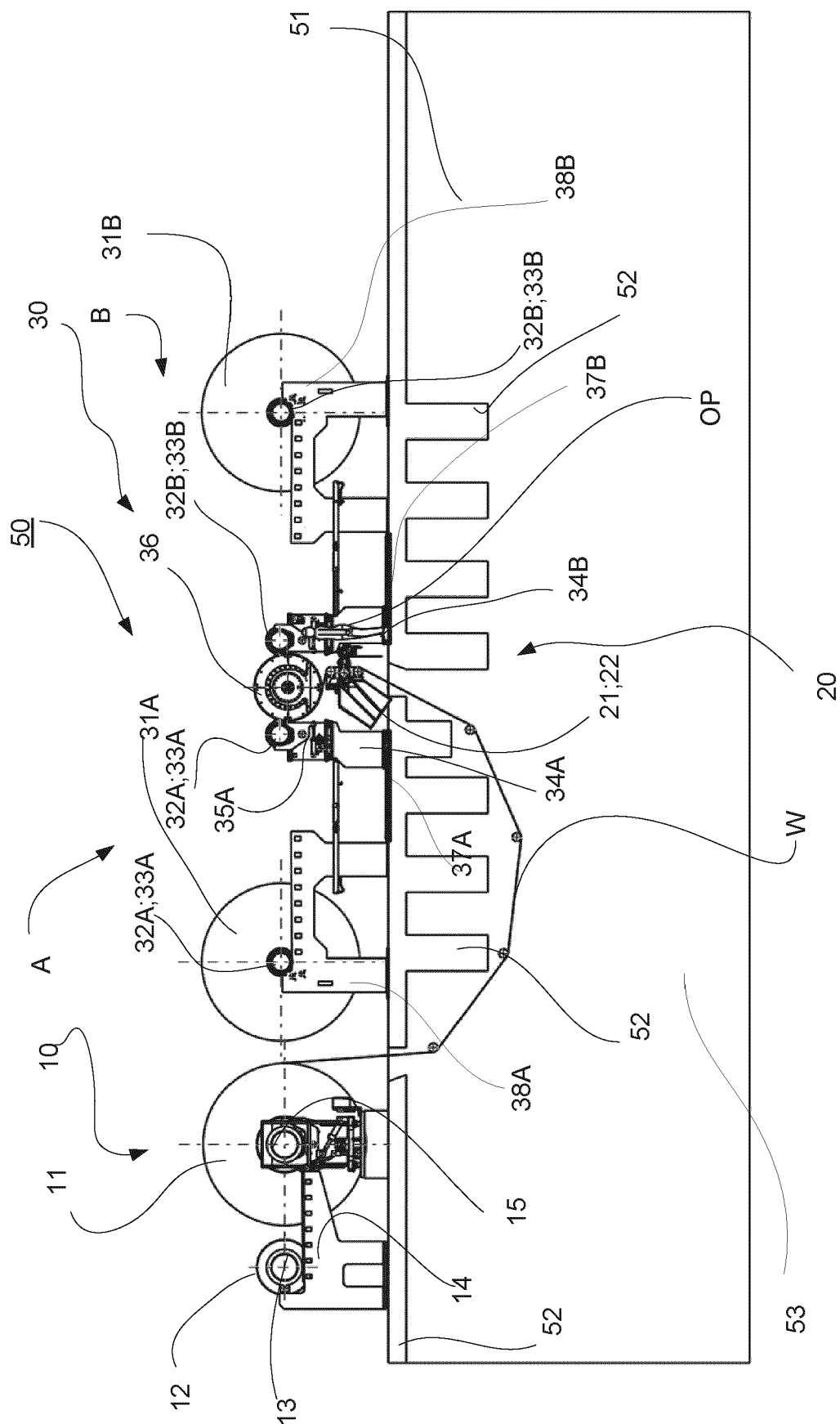
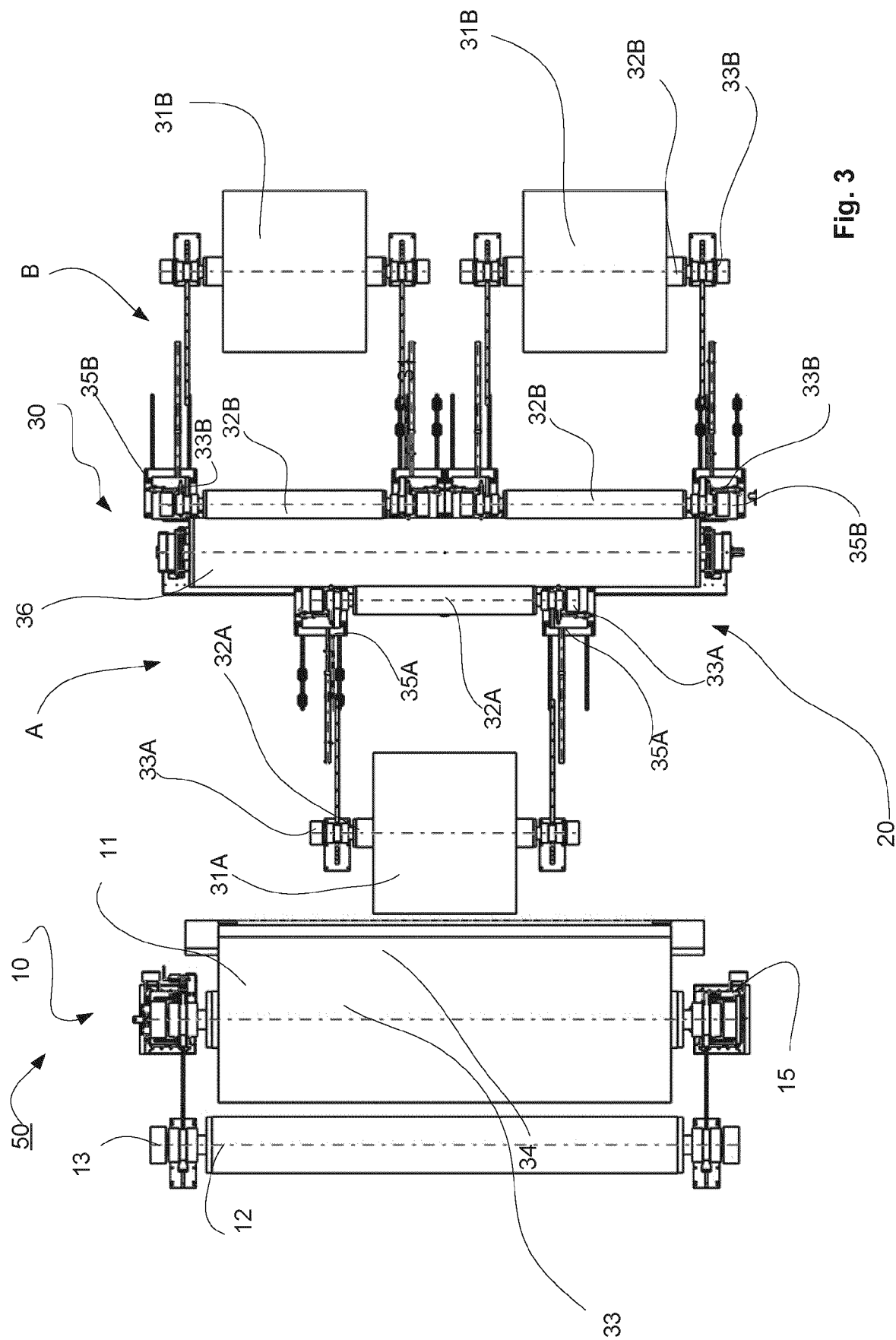


Fig. 2



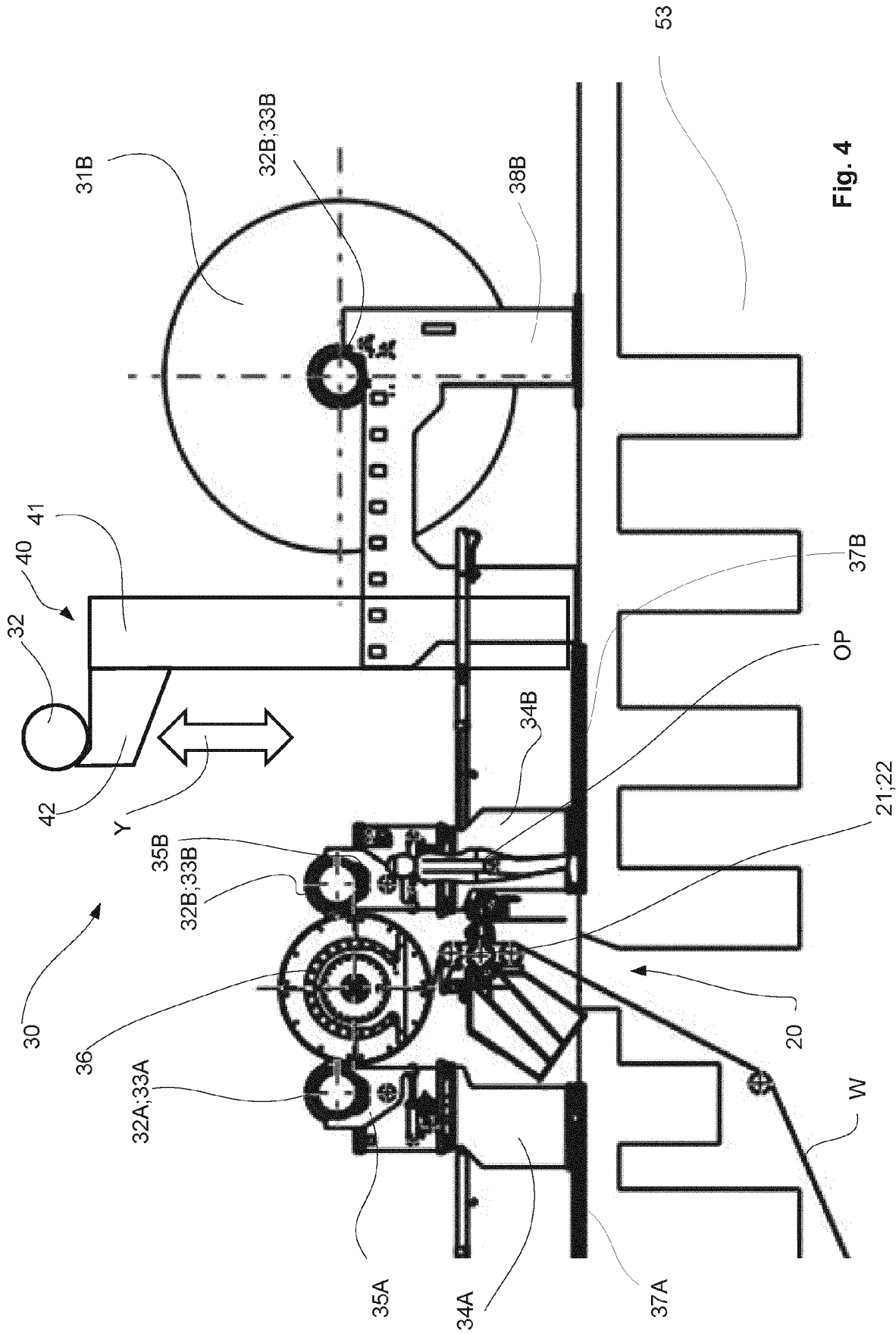


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
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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	EP 2 184 243 A2 (VOITH PATENT GMBH [DE]) 12 May 2010 (2010-05-12)	1-10, 12-15	INV. B65H18/14 B65H18/16
Y	* abstract; figures 1-4 * * paragraph [0027] * * paragraphs [0043] - [0045] * * the whole document *	11	
X	US 5 360 180 A (WELP EWALD G [DE] ET AL) 1 November 1994 (1994-11-01)	1-10, 12-15	
Y	* abstract; figures 1-3 * * column 3, line 1 - column 4, line 28 * * the whole document *	11	
X	US 3 383 064 A (DALY DAVID A ET AL) 14 May 1968 (1968-05-14)	1-7,10, 12-14	
Y	* figures 1-7 * * column 3, line 45 - column 4, line 31 * * the whole document *	11	
X	DE 44 24 848 A1 (JAGENBERG PAPIERTECH GMBH [DE]) 18 January 1996 (1996-01-18)	1-7,10, 12-14	TECHNICAL FIELDS SEARCHED (IPC)
Y	* abstract; figure 1 * * the whole document *	11	B65H
Y	EP 1 571 109 A1 (ANDRITZ TISSUE INC [US]) 7 September 2005 (2005-09-07)	11	
	* abstract; figures 1, 2 * * paragraph [0022] * * the whole document *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 April 2021	Examiner Piekarski, Adam
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			

EPO FORM 1503 03.82 (P04C01)

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

EP 20 20 3993

5 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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10-04-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2184243 A2	12-05-2010	DE 102008043507 A1 EP 2184243 A2	12-05-2010 12-05-2010
US 5360180 A	01-11-1994	DE 4219485 A1 FI 932675 A US 5360180 A	16-12-1993 14-12-1993 01-11-1994
US 3383064 A	14-05-1968	CH 466692 A DE 1574301 A1 ES 334673 A1 FR 1507808 A GB 1141598 A NL 6615677 A SE 321850 B US 3383064 A	15-12-1968 18-02-1971 01-11-1967 29-12-1967 29-01-1969 18-07-1967 16-03-1970 14-05-1968
DE 4424848 A1	18-01-1996	NONE	
EP 1571109 A1	07-09-2005	BR PI0500620 A CA 2497414 A1 CN 1663896 A EP 1571109 A1 MX PA05002357 A US 2005189448 A1	18-10-2005 01-09-2005 07-09-2005 07-09-2005 05-12-2005 01-09-2005