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(54) **Compacting device of a fibre web in a spinning frame**

(57) A compacting device (2) of a fibre web comprises an intermediate body (100,102) slidably couplable to a support body (80) and a suction mouth (30) couplable, preferably slidably, to the intermediate body (100,102). In addition, the devices preferably envisages that upon

transit between an intermediate duct (104) of the intermediate body (102) and a side branch (89) of the support body (82) and/or upon transit between the inner chamber (121) of the mouth (30) and the intermediate duct (104) a widening of the through section of the air in the air suction direction is made.

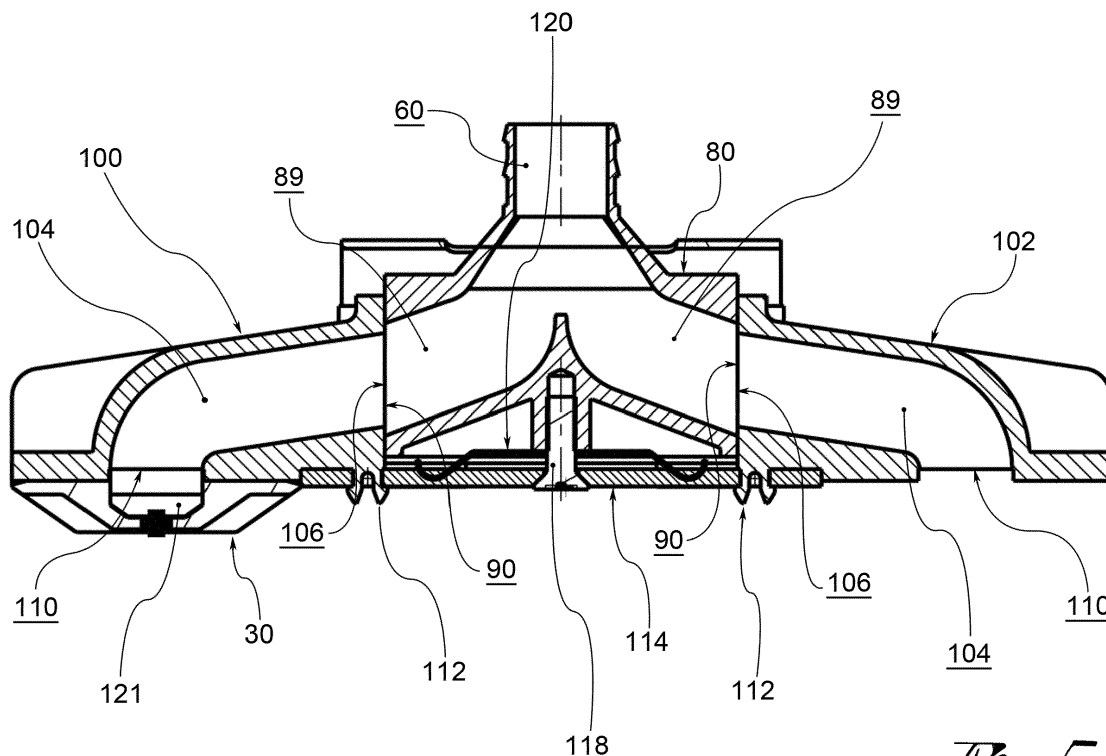


Fig. 5

Description

[0001] The present invention relates to a compacting device of a fibre web in a spinning frame.

[0002] Numerous embodiments of compacting devices for spinning frames exist.

[0003] The embodiments exploiting a current of aspirated air which acts on the fibres bringing them closer together, thereby compacting the web, are particularly widespread.

[0004] Such solutions are particularly appreciated, in that they permit the contemporary compacting of the web and the removal of dust from it, with a significant improvement in the quality of the yarn obtained in the spinning frame.

[0005] One example of an embodiment of a compacting device is described in the Italian patent application for an invention BS2010A000181, in the name of the Applicant.

[0006] The need is widely felt in the sector to avail of compacting devices which it is particularly simple to operate on for maintenance or adjustment purposes.

[0007] The purpose of the present invention is to make a compacting device of a fibre web in a spinning frame which satisfies such need.

[0008] Such purpose is achieved by a compacting device made according to claim 1 below.

[0009] The characteristics and advantages of the compacting device according to the present invention will be evident from the description below, made by way of a non-limiting example, according to the attached figures, wherein:

[0010] - figure 1 shows a view of the drawing zone of a spinning frame, fitted with a compacting device according to the present invention;

[0011] - figure 2 shows an embodiment of the compacting device according to a rear view, that is observing the compacting device from the side of the drawing cylinder to which it is applied;

[0012] - figure 3 shows a cross-section diagram of a suction unit,

[0013] - figure 4 shows a suction unit in separate parts; and

[0014] - figure 5 shows a cross-section view of the suction unit in figure 4.

[0015] A spinning frame on a spinning line comprises a plurality of spinning points, each spinning point comprises a spindle for the formation of a reel of yarn.

[0016] Each spinning point further comprises a drawing device, which a roving W1 goes into and a drawn web comes out of, and a compacting device 2, from which a compacted web W3 emerges, generally destined to be twisted and wound to form the reel.

[0017] According to a preferred embodiment, the drawing device comprises, in an opposite direction to that of advancement of the web, a first pair of cylinders, formed of the first drawing cylinder 4a and the first pressure cylinder 4b, which surmounts the first drawing cylinder and

is in pressurised contact with it, to draw the web passing through it.

[0018] The drawing device 1 comprises, in addition, a second pair of cylinders, upstream of the first pair of cylinders, formed of the second drawing cylinder 6a and the second pressure cylinder 6b, and a third pair of cylinders, upstream of the second pair of cylinders, formed of the third drawing cylinder and the third pressure cylinder.

[0019] The pairs of cylinders have different rotation speeds, so as to achieve drawing of the web moving forward; in general, the rotation speed of the second pair of cylinders is greater than that of the third pair and the rotation speed of the first pair is greater than that of the second pair.

[0020] The ratios of the rotation speeds define the drawing ratios; in general, the drawing ratio between the second and third pair is much less than the drawing ratio between the first and second pair: this means that the web is drawn lightly between the third and second pair and drawn more forcefully between the second and the first pair of cylinders.

[0021] Preferably, the drawing device comprises a drawing cage 10 between the third pair of cylinders and the first pair of cylinders, which the second pair of cylinders is part of.

[0022] The cage 10 comprises an inversion abutment 12, downstream of the second pressure cylinder 6b, distanced from it, and an upper belt 14, wound around the second cylinder 6b, by which it is dragged in movement, and wound around the inversion abutment 12, so as to form a closed circuit.

[0023] The cage 10 further comprises a fixed lower guide 16, positioned downstream of the second drawing cylinder 6a, distanced from it, having a main portion 18 which extends mainly in the direction of advancement of the web, terminating next to the abutment 12, and a lower belt 20, wound around the second drawing cylinder 6a, by which it is dragged in movement, and around the main portion 18, so as to form a closed circuit.

[0024] The two belts 14, 20 are in contact with each other along a section aligned with the gap between the second pair of cylinders and the first pair of cylinders, and the web is dragged between them.

[0025] At the exit of the cage 10, the web enters the compacting device 2, which it comes out of as a compacted web W3.

[0026] The compacting device 2 comprises the first drawing cylinder 4a and the first pressure cylinder 4b, a suction mouth 30 facing the first drawing cylinder 4a, and an output cylinder 4c, downstream of the first pressure cylinder 4b, in pressurised contact with the first drawing cylinder 4a.

[0027] Generally, the suction mouth 30 can be fitted to a general main cylinder; in other words, the suction mouth does not necessarily have to be fitted to a drawing device. For example, in one embodiment variation, the spinning frame comprises a drawing device and, downstream of this, a main cylinder, coupled to the pressure cylinder

and to the output cylinder, which the suction mouth co-operates with.

[0028] The first pressure cylinder 4b co-operates peripherally with the first drawing cylinder 4a in an input contact zone and the output cylinder 4c co-operates peripherally with the first drawing cylinder 4a in an output contact zone, so that the web passes along the contact zones between these, travelling along a contact section on the outer surface of the first drawing cylinder 4a.

[0029] The suction mouth 30 is connected, by means of a suction duct 60, to suction means suitable to form a current of aspirated air.

[0030] According to a preferred embodiment, the mouth 30 comprises a main body 32 provided with a main surface 34, facing the outer surface of the first drawing cylinder 4a, on which a suction zone extends provided with at least one suction aperture 36, in the form of a slit or hole, from which the air is aspirated by the suction means.

[0031] Preferably, the main surface 34 is arched, for example with a curvature such as to substantially trace the curvature of the outer surface of the first drawing cylinder, with which said mouth 30 co-operates. Preferably, said main surface 34 has a greater or equal curvature radius to the curvature radius of the outer surface of the first drawing cylinder 4a.

[0032] Preferably, two adjacent spinning points have a single suction unit 70, connected to at least one suction duct 60, preferably to a single suction duct 60, fitted with two separate suction mouths 30, each operating on a respective contact section of the first drawing cylinder 4a of the spinning point.

[0033] Preferably, the suction mouths of the suction unit are identical.

[0034] According to a preferred embodiment, the suction unit 70 comprises a support body 80, fitted with at least one coupling arm 82 for engagement with a pressure axis 84 between two consecutive pressure cylinders 4b and at least one housing seat 86 to house the support body 80 against a pressure axis 88 between two consecutive output cylinders 4c.

[0035] The support body 80 is internally hollow so that the suction duct 60 communicates with two side branches 89 which preferably open in a Y, and come out in side apertures 90 opening at the sides of the support body.

[0036] At each side aperture 90, the support body 80 envisages a pair of sliding guides 92, 94 which extend along the side aperture 90, for example radially in relation to the first drawing cylinder 4a.

[0037] The suction unit 70 comprises at least one intermediate body 100, 102, couplable in a detachable manner to the support body 80.

[0038] In particular the intermediate body 100 is axially elongated (with reference to the direction of the rotation axis of the drawing cylinders) and fitted internally with an intermediate duct 104, which at the engagement end with the support body 80 is accessible from an intermediate aperture 106.

[0039] At the intermediate aperture 106, the intermediate body 100, 102 is fitted with a pair of prominences 108, slidably couplable to the respective sliding guides 92, 94 provided on the support body 80.

[0040] Once the prominences 108 have been inserted in the sliding guides 92, 94 and the intermediate bodies have been made to slide into position, the intermediate apertures 106 are aligned with the side apertures 90 of the support body, forming a fluidic continuity between the suction duct 60 of the support body 80 and the intermediate ducts 104.

[0041] Each intermediate duct 104 comes out in an end aperture 110, facing the lateral surface of the first drawing cylinder 4a.

[0042] The suction unit 70 further comprises attachment means for the permanent attachment of the intermediate bodies 100, 102 to the support body 80.

[0043] Preferably, the means of attachment comprise at least one pliable pin 112 projecting from the intermediate body 100, 102, and a plate 114 fitted with respective holes 116 for the snap insertion of the pins 112.

[0044] The plate 114 is attachable to the support body 80 for example by means of a screw 118.

[0045] According to a preferred embodiment, the attachment means comprise a leaf spring 120 positioned between the plate 114 and the support body 80, also traversed by the screw 118.

[0046] The suction unit 70 further comprises said suction mouths 30, slidably engageable with the respective intermediate body.

[0047] In particular the mouth 30 is provided with an inner chamber 121 in fluidic communication with the holes positioned on the arched surface 34.

[0048] In addition, the intermediate body 100, 102 is fitted with guide elements 122 alongside the end aperture 110, while the mouth 30 is fitted with a pair of rails 124, which together with the guide elements 122, form a dovetailed guide system.

[0049] A snap system is envisaged for positioning the mouth, for example, made by means of a prominence 126 projecting from the guide element 122 and suitable for snapping into a respective seat made on the surface of the mouth 30 facing said guide element.

[0050] After inserting the mouth 30 on the intermediate body, this is made to slide until it snap-engages with the prominence 126, which ensures its positioning. In such configuration, the end aperture 110 of the intermediate body is aligned with the inner chamber 121 of the mouth 30, ensuring suction by the suction holes.

[0051] Generally, the inner chamber 121, the intermediate duct 104 and the side branch 89 form an overall duct which is mainly divergent (in a widespread manner along the duct or in a concentrated manner in some sections) in the suction direction of the air from the suction apertures of the mouth 30 as far as the suction duct 60 of the support body, so as to facilitate suction and limit or eliminate the accumulation of dust, fibres and the like.

[0052] In particular in the embodiment shown, the in-

intermediate aperture 106 has a lesser extension than the extension of the side aperture 90, so that upon transit from the intermediate duct 104 to the side branch 89 a sudden widening of the through section of the air occurs.

[0053] According to a further embodiment variation (not shown), the inner chamber 121 has a lesser extension than the extension of the end aperture 110, so that upon transit from the inner chamber 121 to the intermediate branch 104 a sudden widening of the through section of the air occurs.

[0054] The compacting device according to the present invention satisfies the need for fast dismantling, so as to facilitate maintenance and adjustment operations.

[0055] Advantageously, in addition, the device according to the present invention makes it possible to optimise the flow of suction air, avoiding or limiting the accumulation of dirt, fibres and the like.

Claims

1. Compacting device (2) of a spinning frame for compacting a fibre web, comprising:

- a main cylinder (4a), a pressure cylinder (4b), in pressurised contact with the main cylinder, in an entry contact zone, and an output cylinder (4c), in pressurised contact with the main cylinder, downstream of the pressure cylinder, in an exit contact zone, so that the web travels over a contact section on the outer surface of the main cylinder, between said contact zones;
- a suction unit (70) comprising:

a) a support body (80) comprising at least one suction duct (60);
b) an intermediate body (100,102) slidably couplable to the support body (80), fitted with an intermediate duct (104) in communication with the suction duct; and
c) a suction mouth (30) couplable to the intermediate body (100, 102), provided with a suction zone with at least one suction aperture (36) in fluidic communication with the intermediate duct (104), positioned between the entry contact zone and the exit contact zone, facing the outer surface of the main cylinder (4a), for compacting the web by means of air suction.

2. Device according to claim 1, wherein the suction mouth (30) is slidably couplable to the intermediate body (100,102).

3. Compacting device (2) of a spinning frame for compacting a fibre web, comprising:

- a main cylinder (4a), a pressure cylinder (4b), in pressurised contact with the main cylinder, in an entry contact zone, and an output cylinder (4c), in pressurised contact with the main cylinder, downstream of the pressure cylinder, in an exit contact zone, so that the web travels over a contact section on the outer surface of the main cylinder, between said contact zones;
- a suction unit (70) comprising:

a) a support body (80) comprising at least one suction duct (60);
b) an intermediate body (100,102) couplable to the support body (80), fitted with an intermediate duct (104) in communication with the suction duct; and
c) a suction mouth (30) slidably couplable to the intermediate body (100,102), provided with a suction zone with at least one suction aperture (36) in fluidic communication with the intermediate duct (104), positioned between the entry contact zone and the exit contact zone, facing the outer surface of the main cylinder (4a), for compacting the web by means of air suction.

4. Device according to claim 3, wherein the intermediate body (100,102) is slidably couplable to the support body (80).

5. Device according to any of the previous claims, wherein the support body (80) is fitted with at least one coupling arm (82) for engagement with a pressure axis (84) between two consecutive pressure cylinders (4b).

6. Device according to claim 5, wherein the support body (80) is fitted with at least one housing seat (86) to house the support body (80) against a pressure axis (88) between two consecutive output cylinders (4c).

7. Device according to any of the previous claims, wherein the suction unit (70) comprises attachment means for the permanent attachment of the intermediate bodies (100, 102) to the support body (80).

8. Device according to claim 7, wherein the means of attachment comprise at least one pliable pin (112) projecting from the intermediate body (100, 102), and a plate (114) fitted with respective holes (116) for the snap insertion of the pins (112).

9. Device according to claim 8, wherein the plate (114) is attachable to the support body (80) by means of at least one screw (118).

10. Device according to claim 8 or 9, wherein the attach-

ment means comprise a leaf spring (120) positioned between the plate (114) and the support body (80).

11. Device according to any of the previous claims, wherein the suction unit (70) has a snap system for positioning the mouth. 5
12. Device according to any of the previous claims, wherein upon transit between the intermediate duct (104) and the side branch (89) inside the support body (82) a widening of the through section of the air in the air suction direction is made. 10
13. Device according to any of the previous claims, wherein upon transit between the inner chamber (121) of the mouth (30) and the intermediate duct (104) a widening of the through section of the air in the air suction direction is made. 15
14. Compacting device (2) of a spinning frame for compacting a fibre web, comprising: 20
- a main cylinder (4a), a pressure cylinder (4b), in pressurised contact with the main cylinder, in an entry contact zone, and an output cylinder (4c), in pressurised contact with the main cylinder, downstream of the pressure cylinder, in an exit contact zone, so that the web travels over a contact section on the outer surface of the main cylinder, between said contact zones; 25 30
 - a suction unit (70) comprising:
 - a) a support body (80) comprising at least one suction duct (60);
 - b) an intermediate body (100, 102) coupled to the support body (80), fitted with an intermediate duct (104) in communication with the suction duct; and 35
 - c) a suction mouth (30) coupled to the intermediate body (100, 102), provided with a suction zone with at least one suction aperture (36) in fluidic communication with the intermediate duct (104), positioned between the entry contact zone and the exit contact zone, facing the outer surface of the main cylinder (4a), for compacting the web by means of air suction. 40 45
 - wherein upon transit between the intermediate duct (104) and the side branch (89) inside the support body (82) a widening of the through section of the air in the air suction direction is made, and/or 50
 - upon transit between the inner chamber (121) of the mouth (30) and the intermediate duct (104) a widening of the through section of the air in the air suction direction is made. 55

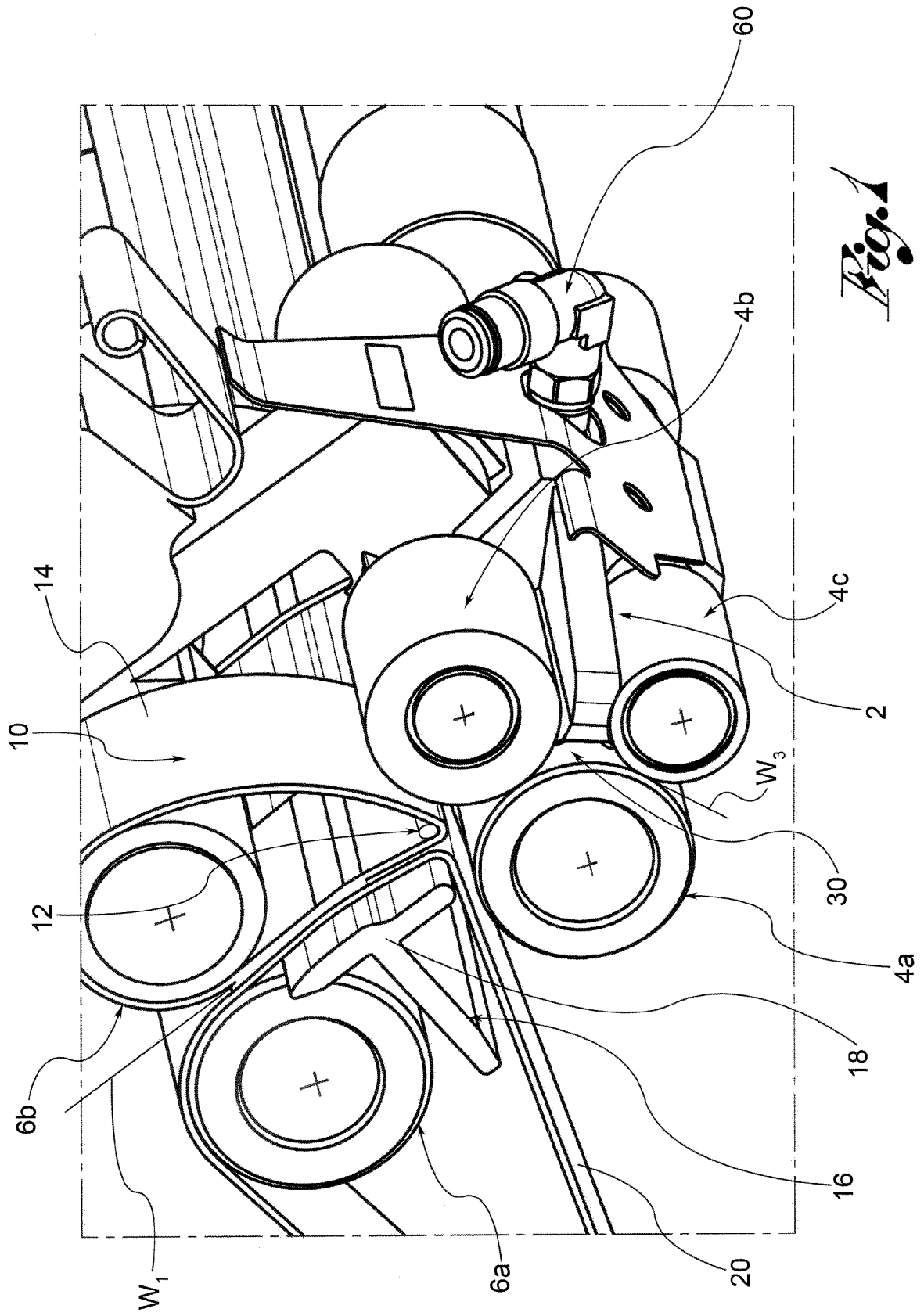
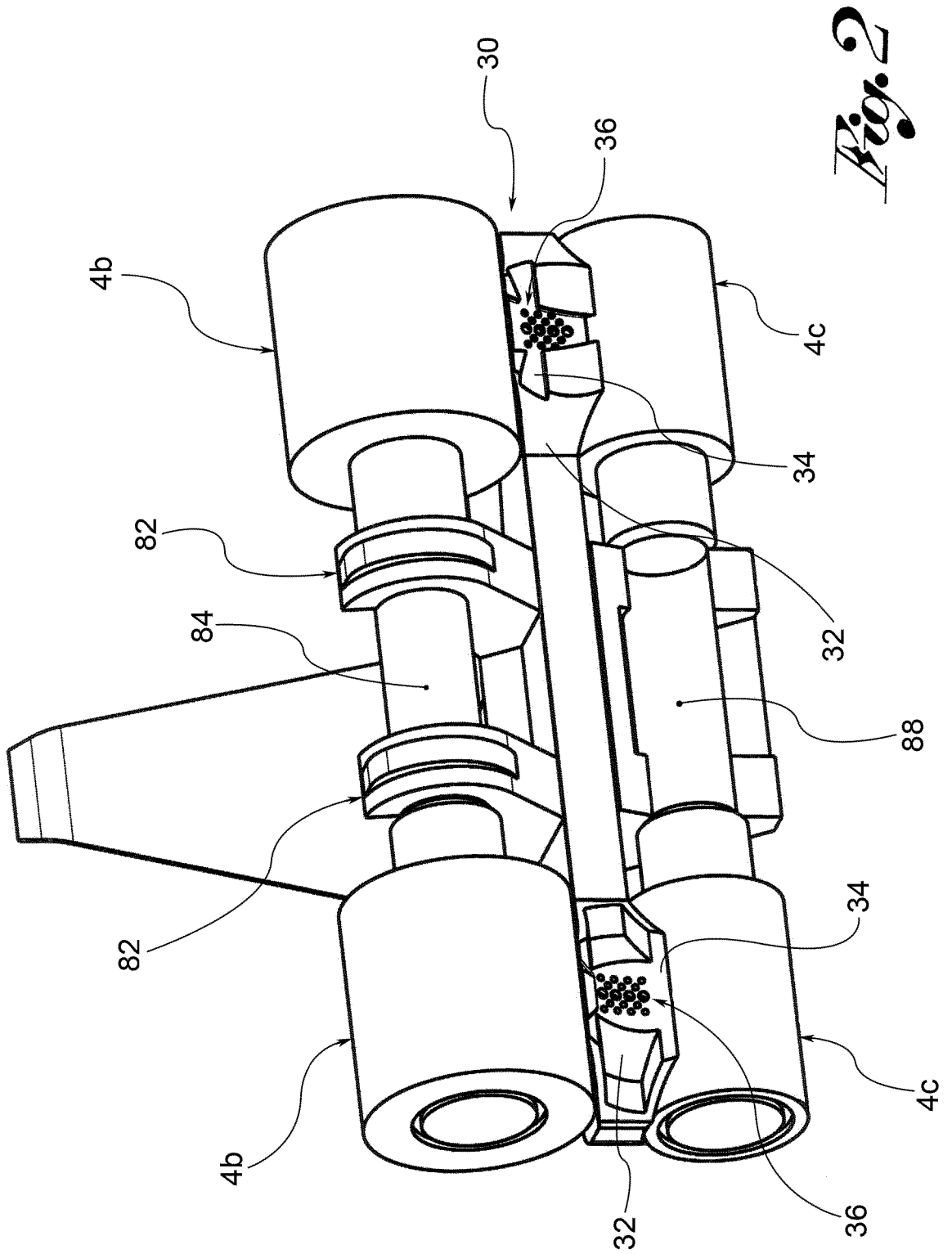


Fig. 1



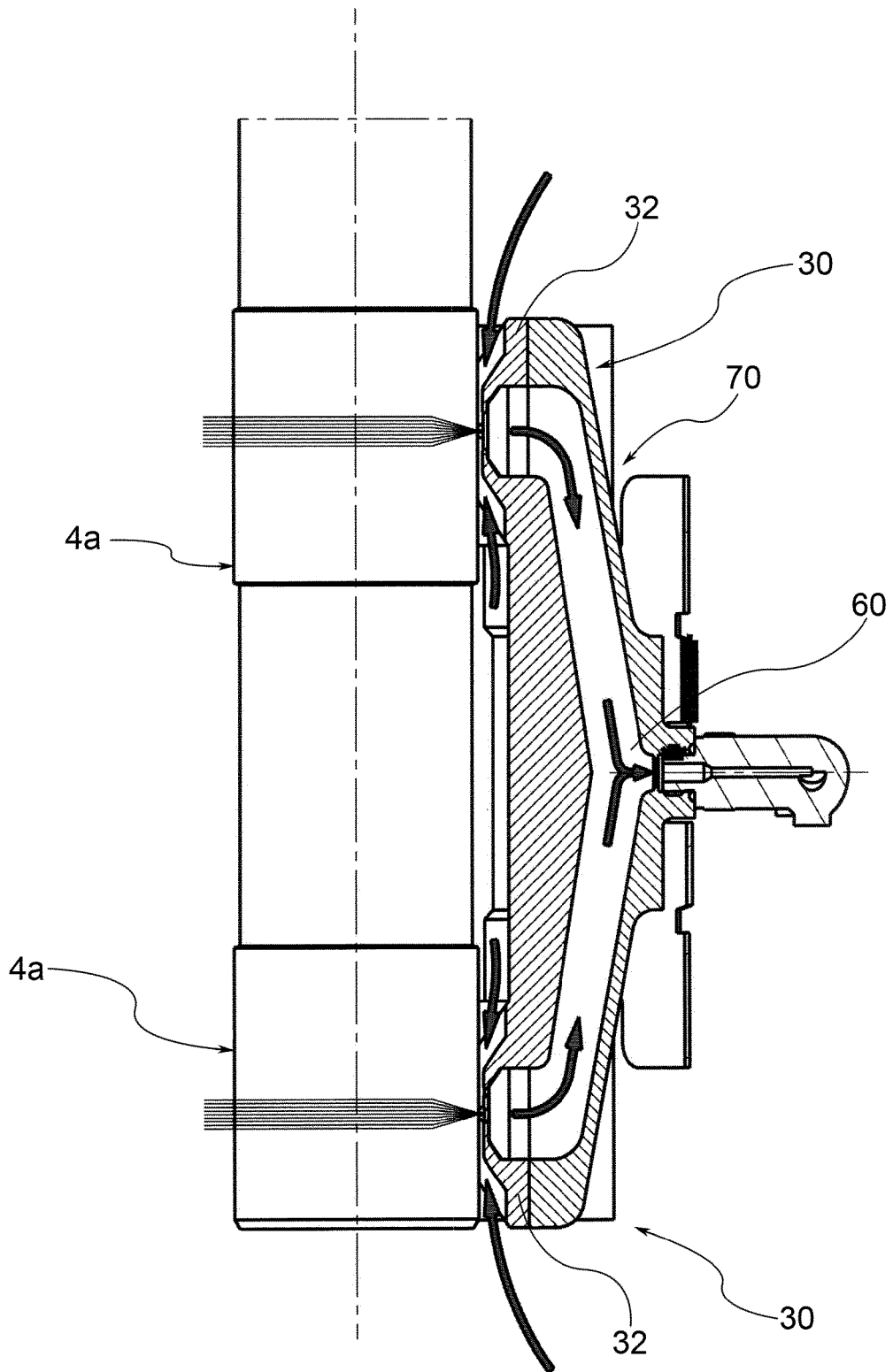


Fig. 3

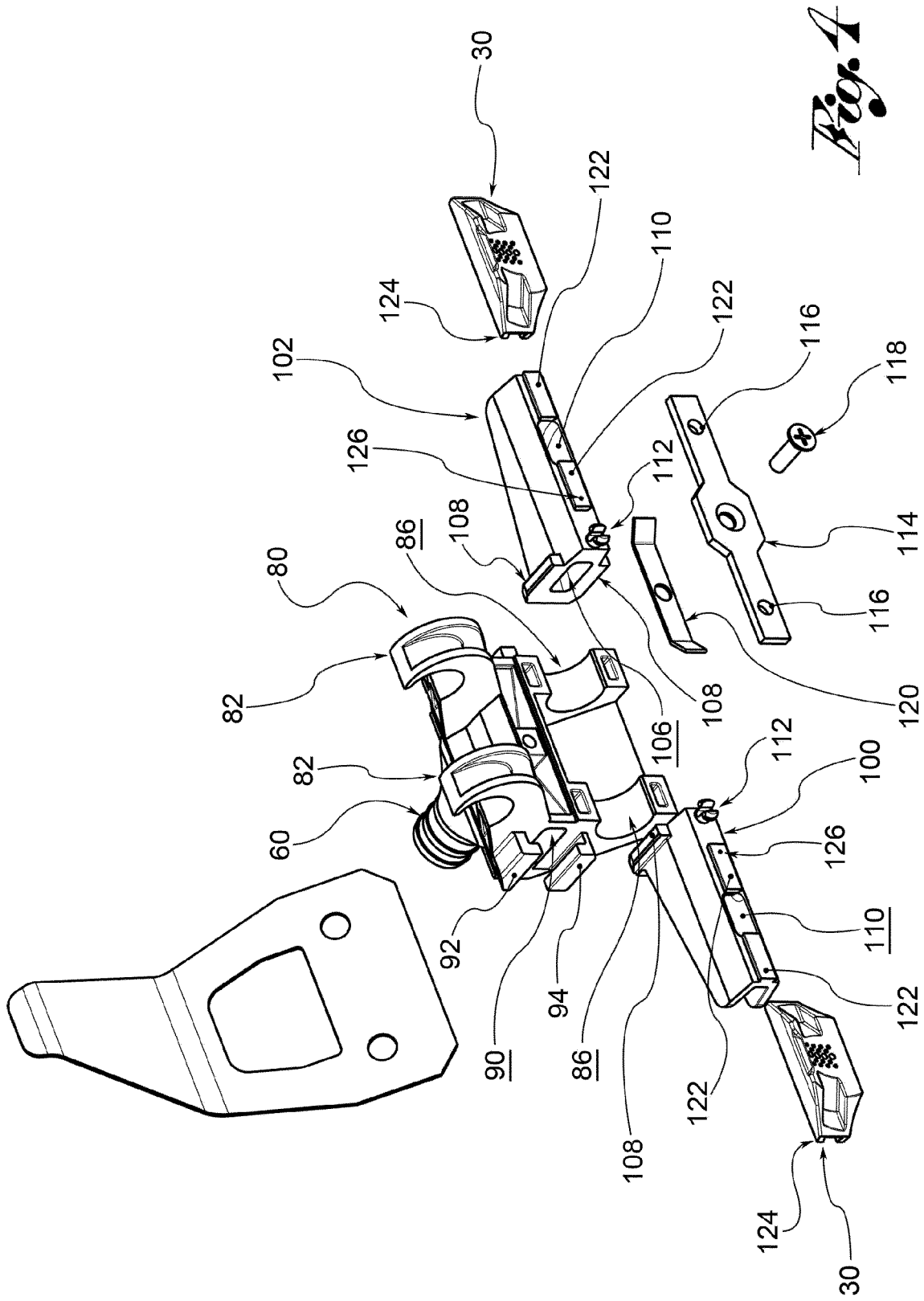


Fig. 4

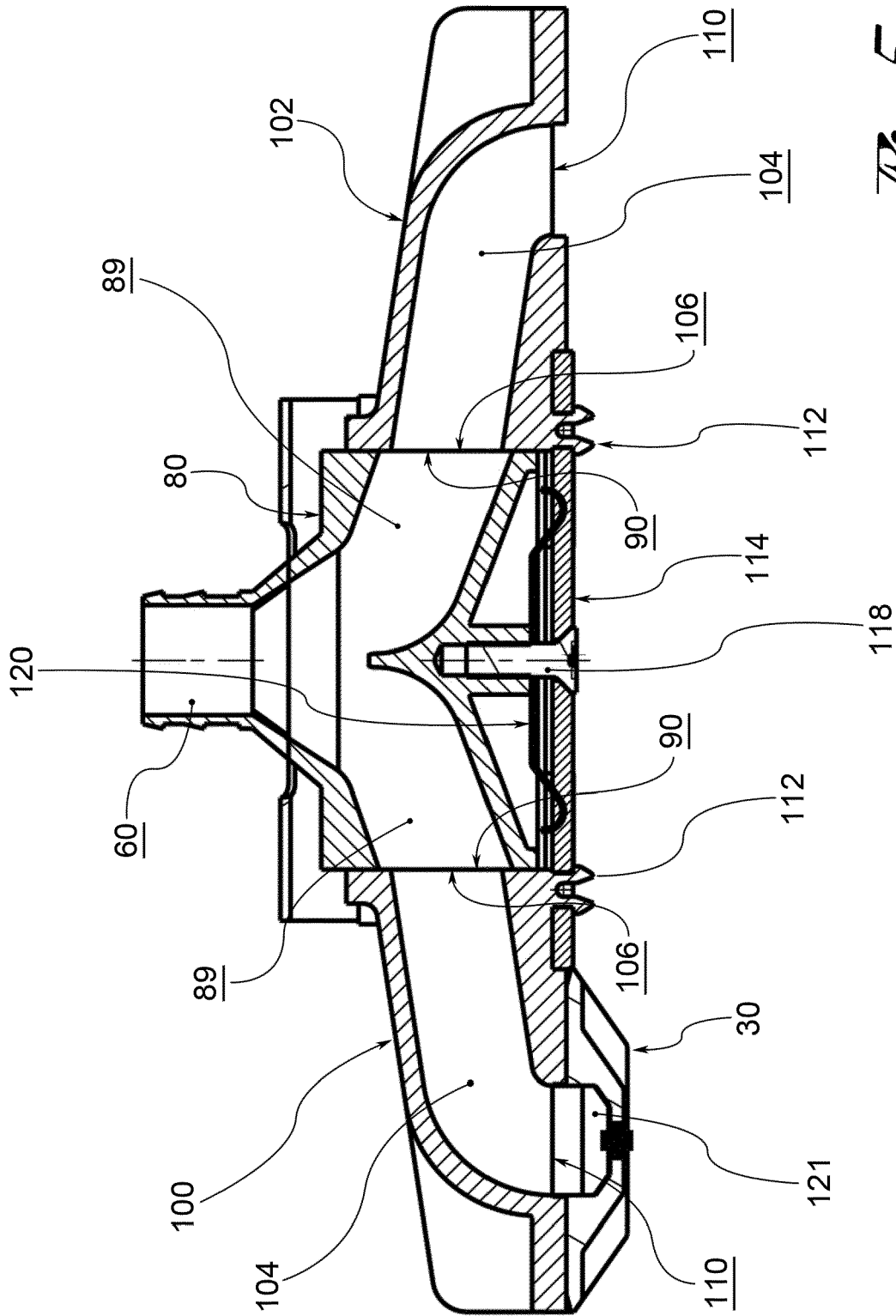


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 12 18 2999

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D01H
Place of search		Date of completion of the search	Examiner
Munich		4 October 2012	Dupuis, Jean-Luc
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04001)

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04-10-2012

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REFERENCES CITED IN THE DESCRIPTION

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