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(54) Assembly for a device of a fiber web production line

(57) The invention relates an assembly comprising a rod or a blade (21) for a device of a fiber web production line, especially a rod-bed or a blade holder or holder assembly for a rod or a blade (21) of a device for coating or sizing a fiber web, particularly a paper or a board web, which assembly comprises a holder (25), in which the rod or the blade (21) is supported on the front side of the holder (25), and which assembly has loading means (24). The assembly further comprises sensors, in particular piezo sensors (10) located between the rod or the blade (21) and the loading means (24) for measuring the loading pressure of the rod or the blade (21) locally.

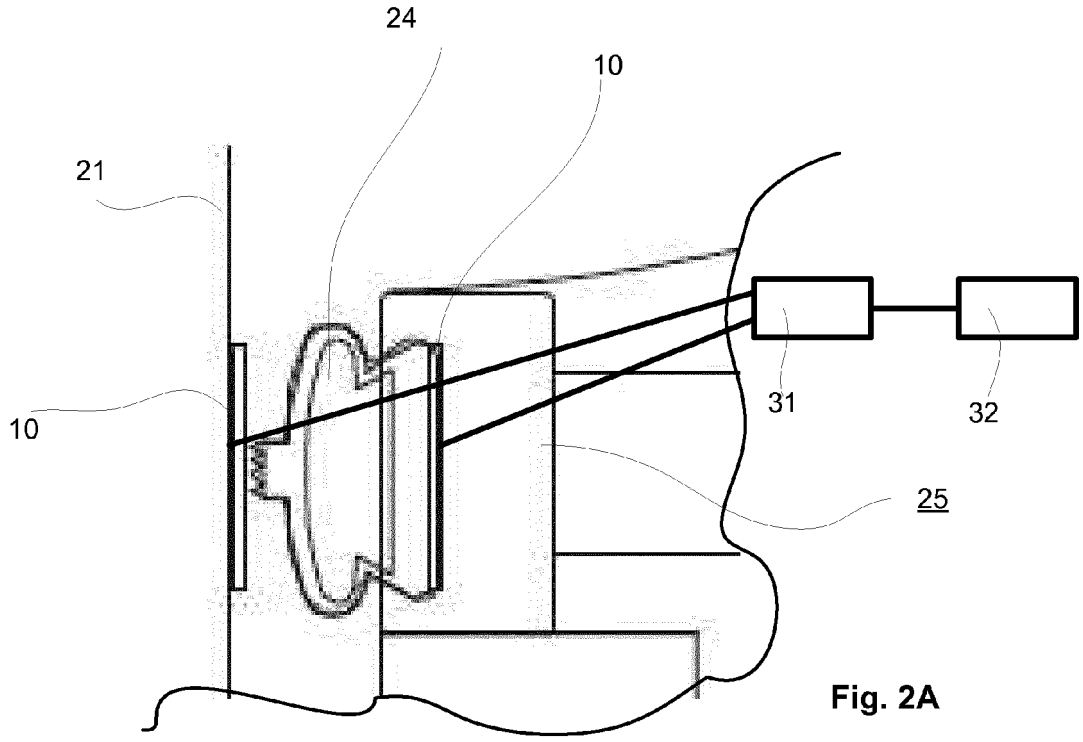

Fig. 2A

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Description

[0001] The present invention relates to an assembly comprising a rod or a blade for a device of a fiber web production line, especially to a rod-bed or a blade holder assembly for a rod or a blade of a device for coating or sizing a fiber web, particularly a paper or a board web, according to the preamble of claim 1.

[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 the process 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 devices and sections for finishing the fiber web, for example, a sizer, a calender, a coating section. The production and treatment line also comprises at least one winder for forming customer rolls as well as a roll packaging apparatus. In this description and the following claims by fiber webs are meant for example paper and board webs.

[0003] In production of fiber webs, for example of paper or board webs, sizing is used to alter the properties of a fiber web by adding sizing agents (sizing medium), for example glue chemicals. Sizing can be divided to internal sizing and surface sizing. In internal sizing the sizing agent is added to pulp in the wet end of the fiber web machine before forming. In surface sizing the sizing agent is added onto the surface of the fiber web at the fiber web machine.

[0004] In production of fiber webs, for example of paper or board webs, coating, especially the surface of a fiber web is formed with a layer of coating paste (coating medium) at a coating station followed by drying. The coating process can be divided in supplying the coating paste onto the web surface, which is called the application of the coating paste, as well as in the adjustment of final amount of coating paste.

[0005] The coating or the sizing of a fiber web typically utilizes a coating device - a coater - or a sizing device - a sizer. In connection with the coaters and sizers different kinds of application technology for application of the coating medium or the sizing medium on the fiber web are employed, for example curtain technology or blade coating technology or film transfer technology or rod coating technology or air brush coating technology or spray coating technology.

[0006] In the coating or sizing based on rod technology rod-bed assemblies are used for the rod functioning as dosing element of the coating or sizing medium for scraping off the excessive medium quantity of the sizing or coating medium. In the sizing the rod functions against a roll and in the coating the rod functions against the fiber web. The rod coating or sizing assembly is composed of a rod and of a rod-bed comprising a holder to which the rod is attached directly or by means of an insert that is fitted into the holder for the rod. The rod-bed is in turn attached to a beam or corresponding support structure arranged on the frame of the machine.

[0007] A web of paper or paperboard can be coated or surface sized using film-transfer or blade technology, wherein the web being treated is passed through a nip between two opposed rolls. The coating or sizing medium is applied with the help of a suitable applicators to the surface of one or both of the nip-forming rolls, wherefrom the substance is transferred to the surface of the web being treated in the nip between the rolls. The thickness and cross-machine profile of the coating or sizing medium layer applied to the roll surface are controlled by a blade or rotatable rod.

[0008] In the coating or sizing based on blade or film transfer technology the blade or rod is attached to a holder. The holder with accompanying support and fastening means is in turn attached to a beam or corresponding support structure arranged on the frame of the machine.

[0009] Typically the beam or corresponding support structure of a coating / sizing rod/blade is arranged movable by loading means arranged at each end of the beam or corresponding support structure by which the main loading of the blade or rod is provided. In cross direction of the web to be coated or sized the loading of the blade or rod is typically arranged by profiling loading means for example by spindles that load cross-directional means for example a loading hose (a hose-loaded blade) and/or by a rigid loading plate, which spindles are spaced apart at certain intervals at the cross direction of the fiber web to be coated or sized.

[0010] In a hose-loaded blade or rod in a fiber web machine in coating or sizing devices, the contact force of the blade or rod on the opposing surface is increased by means of loading hoses acting on the blade or rod holder. Loading hoses normally have an oval cross-section. The loading hose is set between the holder and its support.

[0011] In coating and sizing utilizing the dosing of the coating or sizing medium, especially the quality and profile of the medium is controlled by automatically or manually controlling the surface pressure created by the rod or the blade by means of the loading means and the profiling loading means. The surface pressure between the rod or the blade and the counter roll is not directly measured but instead the adjustments needed are done based on measurements of the fiber web and its coating/sizing layer.

[0012] The rod or the blade are loaded by adjusting pressure of a loading tube that is supported on a frame of the holder or by adjusting the rigid loading plate supported on a frame of the holder. The loading presses the back of the holder and the rod or the blade towards the web to be coated or towards the corresponding coating or sizing roll, in order to build up the contact pressure of the rod or the blade against the web or against the roll. In many loading tube arrangements there is also a loading plate or corresponding support plate on the back side (on the opposite side in respect of the holder) of the load-

ing tube that is locally loaded by loading elements, for example by spindles that are spaced apart at certain intervals at the cross direction of the fiber web to be coated or sized. There are also loading constructions in which no loading hose is used and instead the loading is arranged by means of the loading plate and the spindles. The spindles are adjusted manually or automatically based on a scanning measurement device located after the coater or the sizer. Thus there is no knowledge of the actual value of the loading pressure of the rod or the blade locally.

[0013] The lack of knowledge of the actual values makes the automatic control difficult and unreliable to use as typically the profile information received from the measurement device, for example from a scanning measurement frame is unreliable and not exact enough for profile adjustment of coating or sizing in desired accuracy.

[0014] By using manual control a required quality level of coating or sizing is typically achieved but locally the pressure may vary considerably, which might locally cause wear in rod and other surfaces.

[0015] As a summary one of the main problems is that the actual and real knowledge of the local loading information of the rod or the blade is not available and thus the adjustments and control of coating or sizing must be done based on indirect information.

[0016] Many of the above problems and disadvantages occur in coating and sizing irrelevant of the technology type used even though they have been in some cases described in reference to one example only.

[0017] In WO 2010099830 is disclosed a blade for doctoring a moving surface or for sizing or creping a fiber web produced or finished in a web machine, especially in a paper, board or tissue machine, which comprises at least one fiber optical waveguide being arranged on a surface of the blade or embedded in the material of the blade. Disadvantageous of this arrangement is that during use the blade wears and thus at regular intervals a new blade must be changed. A blade with a fiber optical waveguide is expensive thus the changing costs increase. In cases where the fiber optical waveguide is arranged on the surface of the blade also the waveguide may wear and thus its signal level may change and on the surface the waveguide is susceptible to damage.

[0018] In US 2005223513 is disclosed a calibration device for the pressure of a scraping device blade, which abuts the periphery of a roll or a cylinder, in particular of a paper machine, a printing machine, a calender or the like, comprising a holding blade, a sensor holder mounted thereto, and a pressure sensor, for example a piezo element are positioned such that the position of the pressure sensor on the periphery of the roller or cylinder corresponds to the position of abutment of the blade. Disadvantageous of this arrangement is that it is suitable for calibrating and testing in service situations but it is not suitable to be used during process. Further the as in the above case the sensor mounted on the blade increases the changing cost of the blade, which as a wear part changed regularly should be cost effective.

[0019] An object of the present invention is to create an assembly comprising a rod or a blade for a device of a fiber web production line in which the disadvantages of devices known from prior art are eliminated or at least minimized.

[0020] Yet another object of the present invention is to provide a rod-bed or a blade holder for a rod or a blade of a device for coating or sizing a fiber web, particularly a paper or a board web, in which the actual value of the loading pressure of the rod locally is received.

[0021] In this description and the claims by front side of the holder is meant the side on which the rod or the blade is located i.e. the side that is facing the web to be treated or the roll onto which the coating or sizing medium is applied and corresponding by the back side the side on which the loading means are located and which is facing the beam or corresponding support structure on which the holder is attached.

[0022] In order to achieve the above objects and to solve the problems of prior art mentioned above and coming apparent later an assembly comprising a rod or a blade for a device of a fiber web production line, especially to a rod-bed or a blade holder assembly for a rod or a blade of a device for coating or sizing a fiber web, particularly a paper or a board web according to the invention is mainly characterized by the features of the claim 1.

[0023] According to the invention the assembly comprises a holder, in which a rod or a blade is supported on the front side of the holder, and loading means and sensors, in particular piezo sensors, located in the holder between the rod or the blade and the loading means for measuring the loading pressure of the rod or the blade locally. Advantageously the sensors are located spaced apart at certain intervals at the cross direction of the fiber web to be coated or sized.

[0024] According to an advantageous feature of the invention a cross-directional profile of the loading pressure is provided based on the measurement information and based on the profile information the loading means are adjusted manually or automatically to load such that desired profile is provided in coating or sizing.

[0025] According to an advantageous feature the loading means comprise main loading means and profiling loading means.

[0026] According to an advantageous feature the sensors; in particular piezo sensors are located in the holder between the rod or the blade and the profiling loading means for measuring the loading pressure of the rod or the blade locally.

[0027] According to an advantageous aspect of the invention the rod-bed assembly comprises a holder, an insert removably and insertably supported in a groove of the holder and in which rod-bed assembly a rod of a coating or sizing or device is rotatably supported in a recess on the front side of the insert, which rod-bed assembly

further comprises sensors, in particular piezo sensors, located in between the insert and the holder on the opposite side of the insert in respect of the rod located in the insert for measuring the loading pressure of the rod.

[0028] According to another advantageous aspect of the invention the rod-bed assembly comprises a holder, in which a rod of a coating or sizing or device is rotatably supported in a recess on the front side of the holder, which rod-bed assembly further comprises sensors, in particular piezo sensors located on the back side of the holder in respect of the rod for measuring the loading pressure of the rod.

[0029] According to another advantageous aspect of the invention the blade holder assembly comprises a holder and a blade supported in the holder, which assembly further comprises sensors, in particular piezo sensors, located between the blade and the loading means for measuring the loading pressure of the blade.

[0030] According to an advantageous feature in cases where the blade holder assembly comprises a loading hose and its loading means, the sensors, in particular the piezo sensors are located between the blade and the loading hose and/or between the loading hose and its loading means.

[0031] According to another advantageous feature in cases where the blade holder assembly or the rod-bed assembly comprises a rigid loading or support plate and its loading means, the sensors in particular the piezo sensors, are located between the blade or the rod and the rigid loading or support plate and/or between the loading or support plate and its loading means.

[0032] According to an advantageous feature of the invention the sensors, in particular piezo sensors are located spaced apart in cross direction of the web to be coated or sized desired intervals.

[0033] According to an advantageous feature of the invention the sensors, in particular piezo sensors, are located in a band comprising a number of spaced apart sensors.

[0034] According to an advantageous feature of the invention the sensors; in particular piezo sensors are located in loading direction of the rod or the blade in line with the rod or the blade.

[0035] The assembly comprises as loading means a loading tube and spindles loading the loading tube located on the opposite side in respect of the rod or the blade placed in the holder of the assembly i.e. on the back side of the holder.

[0036] According to an advantageous feature the assembly has means for transmitting the measurement results of the sensors, in particular piezo sensors, to control means for control the loading means, in particular the spindles for regulating the pressure of the loading tube. The sensors are located aligned with the spindles correspondingly spaced apart.

[0037] According to an advantageous feature the assembly according to the invention is used as an up-grade kit of the assembly, in which the up-grade kit comprises as an expert service arranged measurement with the assembly and adjustment of the loading means to load the rod or the blade to provide the desired profile.

[0038] The assembly according to the invention is applicable in connection with continuous measurements or as troubleshooting equipment or during a start-up of a new device.

[0039] By the invention many advantages are achieved the profiling of the dosing of the coating or sizing medium by the rod or the blade is improved. The locally existing peaks of loading can also be avoided and thus the wear of the rod or the blade, the rod-bed or the holder and the coating or sizing roll is decreased and thus the service time of the same increased.

[0040] In case the invention is used in connection with a start-up of a new device by utilizing the invention the required quality level is achieved fast and thus the production can begin in a shorter time.

[0041] In the following the invention is described in more detail with reference to the accompanying drawing in which

In figure 1A is schematically shown an example of the invention in connection with a rod-bed assembly comprising an insert,

In figure 1B is schematically shown an example of the invention in connection with a rod-bed assembly without an insert,

In figures 2A and 2B are schematically shown examples of the invention in connection with a blade holder assembly,

In figure 3 is schematically shown an example of loading and profiling arrangement in a coater or in a sizer

[0042] In the following the invention is described referring to the examples of the figures 1A - 3 to details of which to invention is not to be narrowly limited. In the figures and the description by same reference signs are indicated corresponding parts and part components unless otherwise mentioned.

[0043] In figure 1A is schematically shown an example of the invention in connection with a rod-bed assembly. The rod-bed assembly comprises a holder 13, an insert 12 removably and insertably supported in a groove of the holder 13 and in which rod-bed assembly a rod 11 of a coating or a sizing device is rotatably supported in a recess on the front side of the insert 12, which rod-bed assembly further comprises sensors, in particular piezo sensors 10, located in between the insert 12 and the holder 13 on the opposite side of the insert 12 in respect of the rod 11 located in the insert 12 for measuring the loading pressure of the rod 11. The sensors, in particular piezo sensors 10 transmit measurement information to a receiver 31, which transmits the measurement informa-

tion to a control system 32, which can directly or indirectly control the loading means (fig. 3) of the rod-bed assembly.

[0044] In figure 1B is schematically shown an example of the invention in connection with a rod-bed assembly. The rod-bed assembly comprises a holder 13 and in which a rod 11 of a coating or a sizing device is rotatably supported in a recess on the front side of the holder 13, which rod-bed assembly further comprises sensors, in particular piezo sensors 10 located on the back side of the holder 13 on the opposite side in respect to the rod 11 for measuring the loading pressure of the rod 11. The sensors, in particular piezo sensors 10 transmit measurement information to a receiver 31, which transmits the measurement information to a control system 32, which can directly or indirectly control the loading means (fig. 3) of the rod-bed assembly.

[0045] In figures 2A and 2B are schematically shown examples of the invention in connection with a blade holder assembly and the blade holder assembly comprises a holder 25 and a blade 21. The assembly further comprises sensors, in particular piezo sensors 10 located between the blade 21 and the loading means for measuring the loading pressure of the blade 21. The sensors, in particular piezo sensors 10 transmit measurement information to a receiver 31, which transmits the measurement information to a control system 32, which can directly or indirectly control the loading means (24 and fig. 3) of the rod-bed assembly.

[0046] In the example of figure 2A the blade holder assembly comprises a loading hose 24 and the sensors, in particular piezo sensors. The sensors 10 are located between the blade 21 and the loading hose 24 and/or between the blade 24 and the loading means behind the loading hose 24 in the holder 25. The sensors, in particular piezo sensors 10, transmit measurement information to a receiver 31, which transmits the measurement information to a control system 32, which can directly or indirectly control the loading means of the blade holder assembly.

[0047] In figure 2B the sensors 10 are located between the blade 21 and the holder 25. The sensors, in particular piezo sensors 10, transmit measurement information to a receiver 31, which transmits the measurement information to a control system 32, which can directly or indirectly control the loading means of the blade holder assembly.

[0048] In figure 3 is schematically shown an example of the loading arrangement in a coater or a sizer. By reference number 30 is indicated a roll of the coater or of the sizer. Main loading means 26 are located at each end of the frame structure 29. The assembly with the rod or the blade is attached to the frame structure by its rod-bed assembly or blade holder assembly and is located in view of the figure 3 behind the frame structure 29 opposing the roll 20 such that when loaded the rod or the blade are in loading pressure contact with the roll 10 i.e. the dosing the coating or sizing medium on the roll 10. To the frame structure 20 is attached a loading or support plate 28 extending in cross direction i.e. horizontally in the view of figure 3. The profiling loading means 27, for example spindles 27 are located to load the loading or support plate 28 in cross direction. The profiling loading means 27 are thus located spaced apart in the cross direction. The sensors, in particular piezo sensors transmit measurement information to a receiver 31, which transmits the measurement information to a control system 32, which can directly or indirectly control the loading means 26, 27 of the rod-bed assembly.

[0049] Above the invention has been explained in view of some advantageous examples only and many modifications in the examples and in the details of the examples are possible.

Reference signs used

10	sensors
11	rod
12	insert
13	holder
21	blade
24	loading hose
25	holder
26	main loading means
27	profiling loading means
28	loading or support plate
30	roll
31	receiver
32	control system

Claims

1. Assembly comprising a rod (11) or a blade (21) for a device of a fiber web production line, especially a rod-bed or a blade holder or holder assembly for a rod (11) or a blade (21) of a device for coating or sizing a fiber web, particularly a paper or a board web, which assembly comprises a holder (13; 25), in which the rod (11) or the blade (21) is supported on the front side of the holder (13; 25), and which assembly has loading means (24; 26; 27), **characterized in that** the assembly further comprises sensors, in particular piezo sensors (10) located between the rod (11) or the blade (21) and the loading means (24; 26; 27) for measuring the loading pressure of the rod (11) or the blade (21) locally.

2. Assembly according to claim 1, **characterized in that** by the sensors, in particular piezo sensors (10), a cross-directional profile of the loading pressure is provided based on the measurement information and based on the profile information the loading means (24; 26) are adjusted manually or automatically to load such that desired profile is provided in

coating or sizing.

3. Assembly according to claim 1, **characterized in that** the assembly is a rod-bed assembly, which comprises a holder (13), an insert (12) removably and insertably supported in a groove of the holder (13) and in which rod-bed assembly a rod (11) of a coating or sizing device is rotatably supported in a recess on the front side of the insert (12), which rod-bed assembly further comprises sensors, in particular piezo sensors (10) located in between the insert (12) and the holder (13) on the opposite side of the insert (12) in respect of the rod (11) located in the insert (12) for measuring the loading pressure of the rod (11).

4. Assembly according to claim 1, **characterized in that** the assembly is a rod-bed assembly, which comprises a holder (13), in which holder a rod (11) of a coating or sizing device is rotatably supported in a recess on the front side of the holder (13), which rod-bed assembly further comprises sensors, in particular piezo sensors (10) located on the back side of the holder (13) on the opposite side in respect of the rod (11) for measuring the loading pressure of the rod (11).

5. Assembly according to claim 1, **characterized in that** the assembly is a blade holder assembly, which comprises a holder (25) and a blade (21) supported in the holder (25) , which assembly further comprises sensors, in particular piezo sensors (10) located between the blade (21) and the holder (25) for measuring the loading pressure of the blade (21).

6. Assembly according to claim 5, **characterized in that** the blade holder assembly further comprises a loading hose (24) and that the sensors, in particular piezo sensors (10) are located between the blade (21) and the loading hose (24) for measuring the loading pressure of the blade.

7. Assembly according to claim 1, **characterized in that** the loading means comprise main loading means (26) and profiling loading means (24; 27) and that the sensors (10), in particular piezo sensors, are located in the holder between the rod (11) or the blade (21) and the profiling loading means (24; 27) for measuring the loading pressure of the rod or the blade locally.

8. Assembly according to any of claims 1 - 6, **characterized in that** the sensors, in particular piezo sensors (11; 21) are located spaced apart in cross direction of the web to be coated or sized.

9. Assembly according to any of claims 1, **characterized in that**, the sensors (10) are located in a band comprising a number of spaced apart sensors.

10. Assembly according to claim 1, **characterized in that** the sensors (10) are located in loading direction of the rod (11) or the blade (21) in line with the rod (11) or the blade (21).

11. Assembly according to claim 1, **characterized in that** the assembly comprises as loading means a loading tube (24) and/or spindles (27) located on the opposite side in respect of the rod (11) or the blade (21) of the holder (13; 25) of the assembly i.e. behind the holder (13; 25).

12. Assembly according to claim 1, **characterized in that** the assembly has means for transmitting the measurement results of the sensors, in particular piezo sensors (10) to control means (32) for control the loading means (24; 26; 27).

13. Assembly according to claim 1, **characterized in that** the assembly is used as an up-grade kit of the assembly, in which the up-grade kit comprises as an expert service arranged measurement with the assembly and adjustment of the loading means to load the rod (11) or the blade (21) to provide the desired profile.

14. Assembly according to claim 1, **characterized in that** the assembly is used in connection with continuous measurements or as troubleshooting equipment or during a start-up.

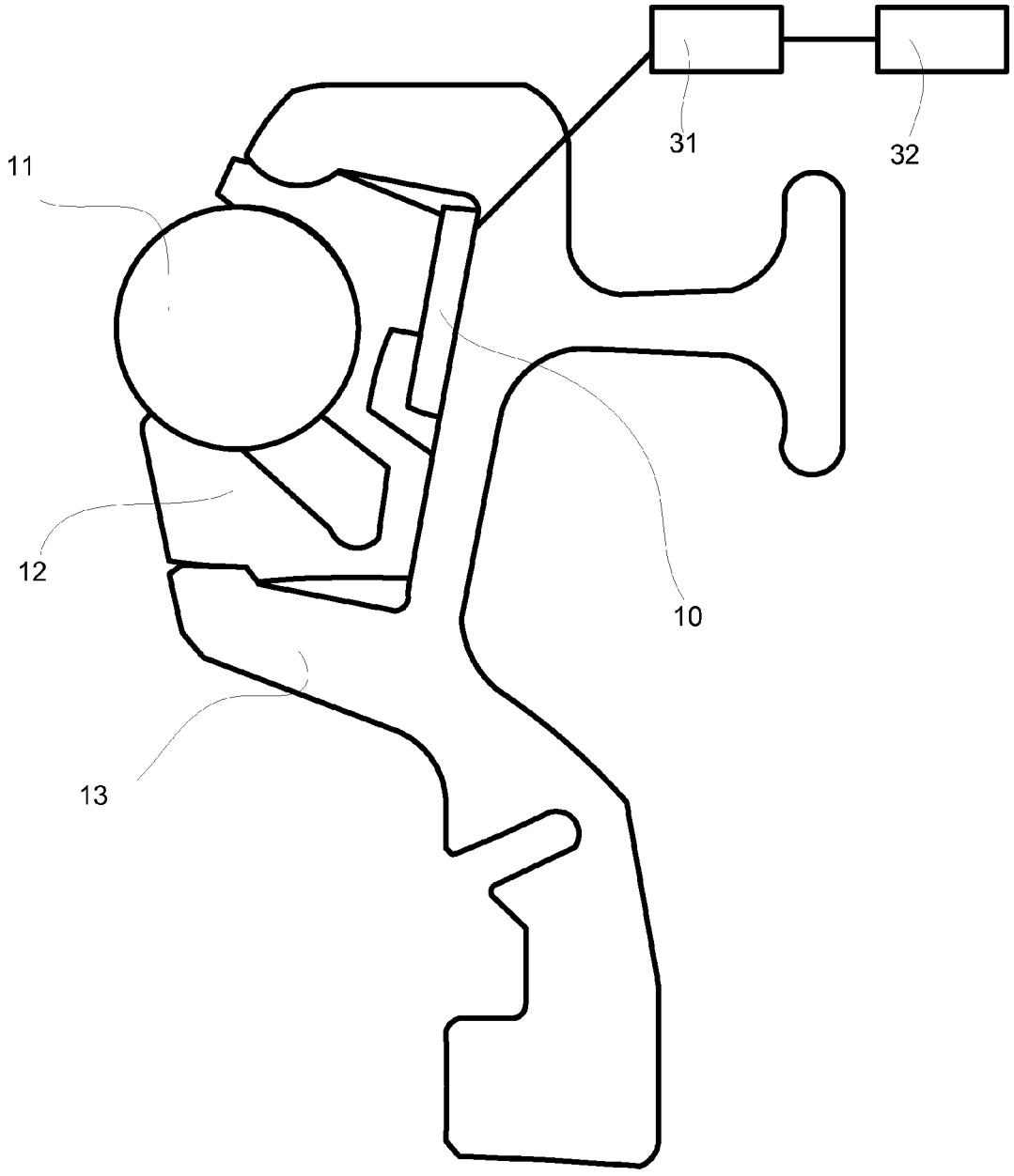

Fig. 1A

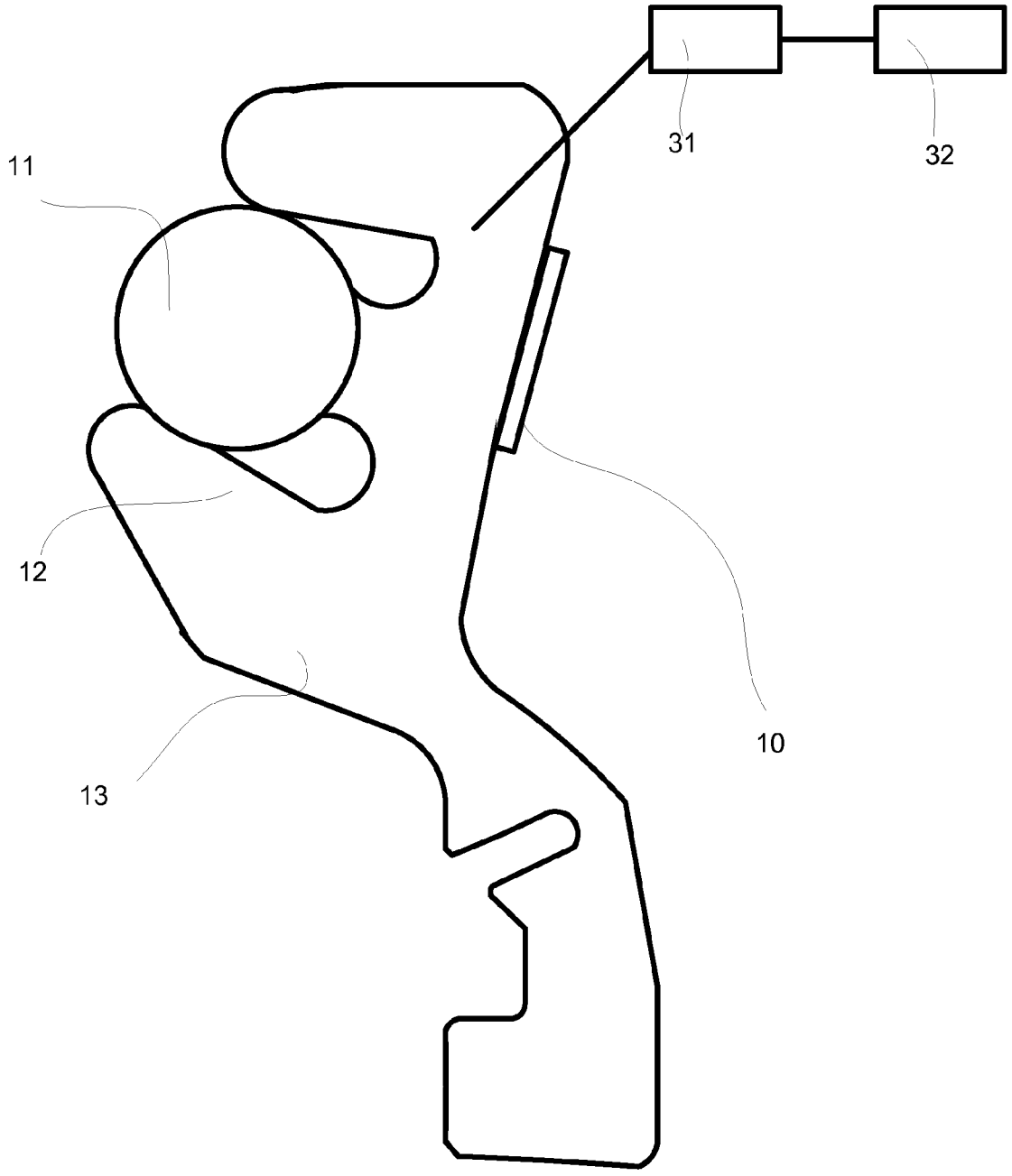

Fig. 1B

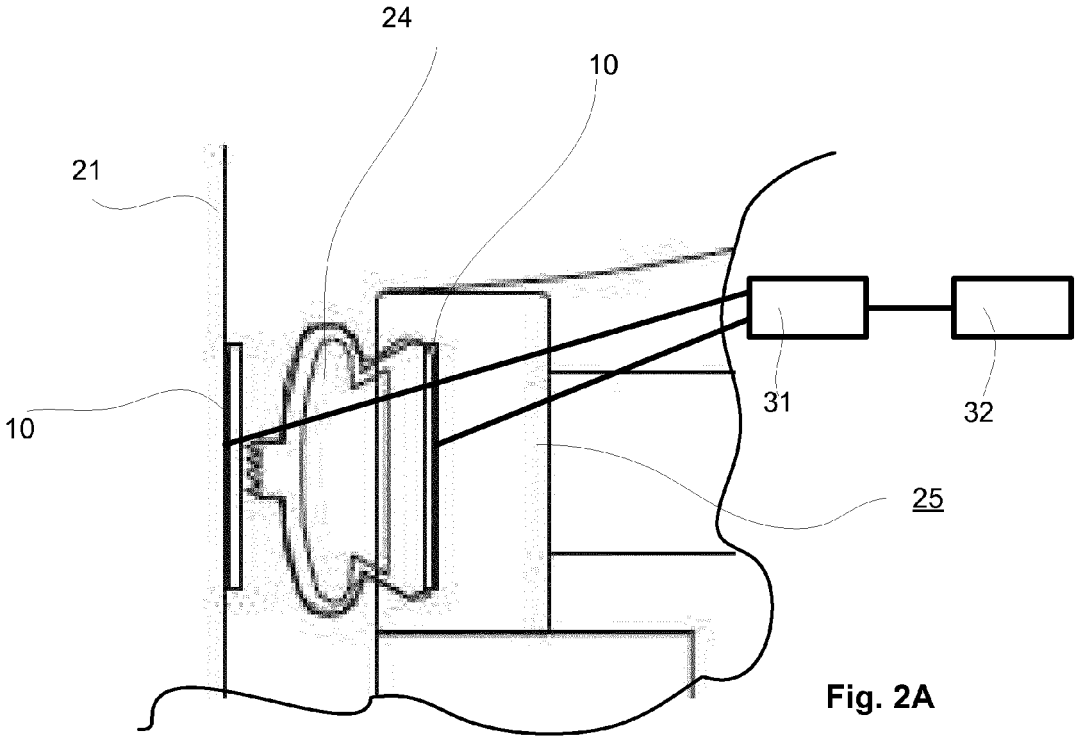

Fig. 2A

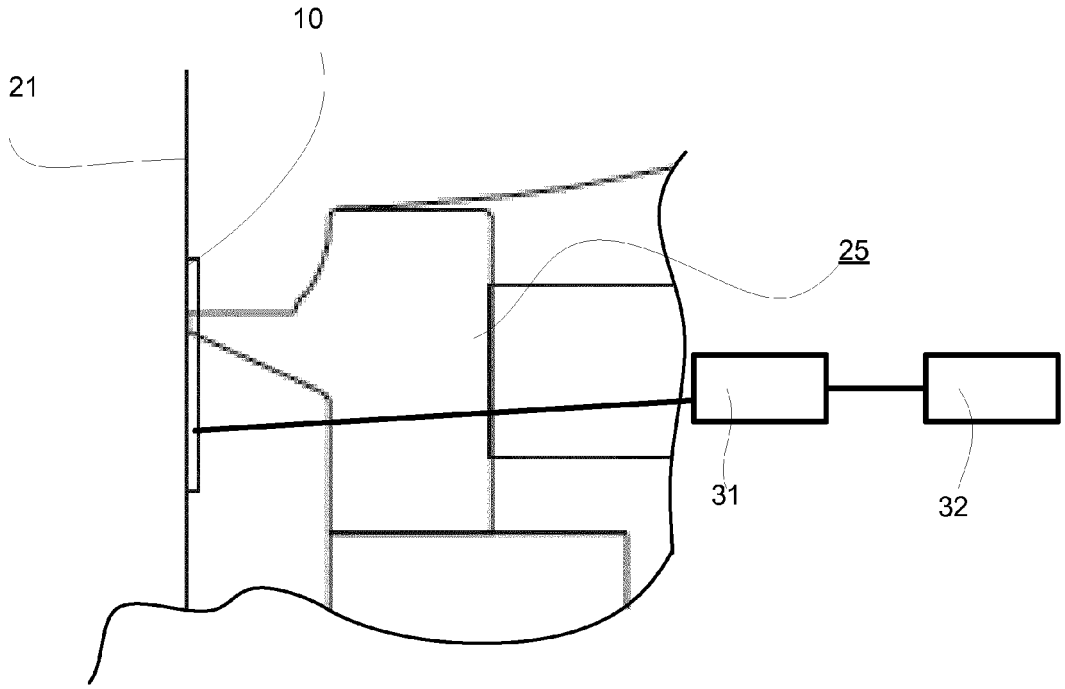

Fig. 2B

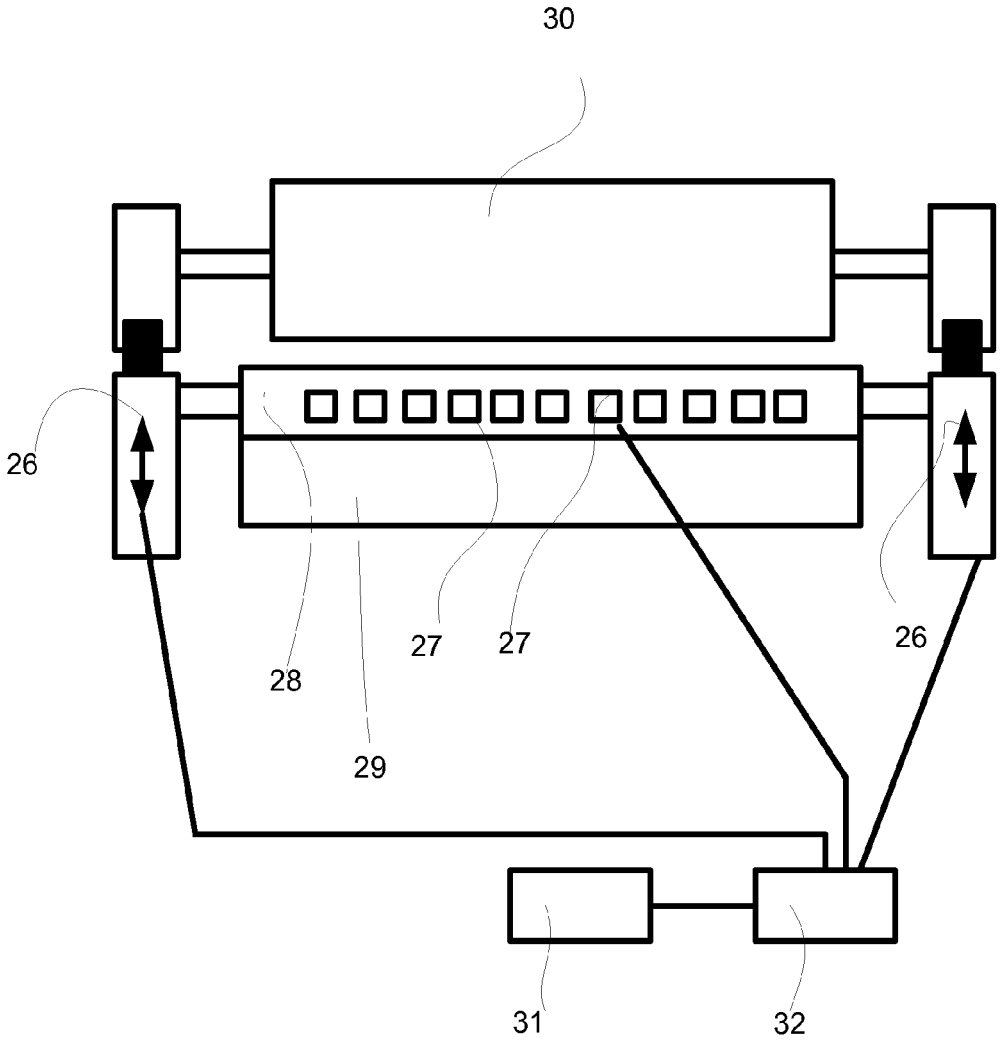

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 2894

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 August 2013	Karlsson, Lennart

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 16 2894

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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