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European Patent Office
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(11)

EP 1 666 650 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.06.2006 Bulletin 2006/23

(51) Int Cl.:
D01H 9/04 (2006.01) D01H 13/14 (2006.01)

(21) Application number: **04380244.6**

(22) Date of filing: **01.12.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

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(54) Roving frame for formation and delivery of roving bobbins

(57) This roving frame comprises: a movable bedplate (1) made up of several bedplate sections (3) aligned horizontally and provided with means (10, 11) for controlling their horizontal position, means (29) for the suspended support of the overhead conveyor (19) responsible for carrying out the collection of the roving bobbins (17) and the delivery of the empty tubes (18), sensors

(30) for the detection of possible upward movements of the overhead conveyor (19) during the change of roving bobbins (17) for empty tubes (18), sensors (21) for automatically verifying the correct position of the roving bobbins (17) and of the empty tubes (18) during doffing change, and a cooling circuit (35, 36) projecting the air coming from the pneumatic cleaning circuit (31) toward the members to be cooled.

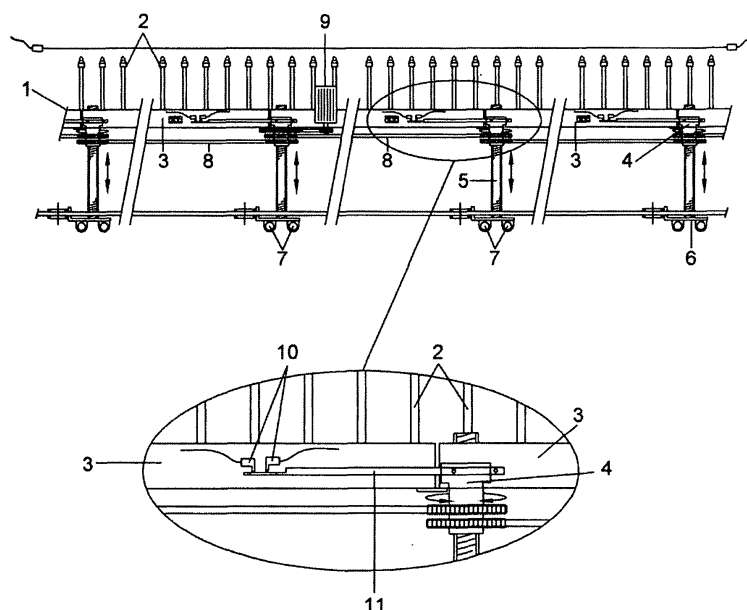


Fig. 1

Description

Object of the invention

[0001] The present invention refers to a roving frame for the formation and delivery of roving bobbins, of the type comprising a plurality of roving supply devices which, with the aid of rotating fins and a pressure finger for the guiding of the rovings, form roving bobbins on tubes coupled on rotating barbs associated to a shiftable bedplate; the bedplate being able to shift from a first end position in the roving bobbin formation area and a second end position, shifted toward the rear area of the machine in which the doffing change or automatic replacement of bobbin-bearing tubes with empty tubes is carried out.

Background of the invention

[0002] There are currently different roving frames on the market enabling the formation of roving bobbins on empty tubes, the automatic replacement of the roving bobbins with empty tubes and, subsequently, the shifting of the formed bobbins toward an extraction area.

[0003] The known roving frames use different devices for carrying out the replacement of the roving bobbins with empty tubes on which new bobbins will be formed.

[0004] Thus, for example, in German patent DE 3,936,518 and in US patent 5,222,350, which are the patent documents most closely related to the device for replacing bobbins for empty tubes used in the roving frame of the present invention, the support or bedplate on which the formation of the bobbins is carried out describes a vertical movement in the bobbin formation area, a horizontal movement for shifting the formed roving bobbins toward a rear area of the machine, and vertical movements for carrying out the replacement of full bobbins with empty bobbins in said rear area with the aid of an overhead conveyor.

[0005] In said US patent 5,222,350, the vertical shifting of the bedplate is carried out by means of end rotating spindles vertically arranged and linked to one another by gears associated to a common drive shaft. The horizontal movement of the bedplate is likewise carried out by means of rotating spindles horizontally arranged and linked to one another by means of gears associated to a common drive shaft.

[0006] In this case, the transmission of movements, both horizontal and vertical, has a certain rigidity and constructive complexity.

[0007] In other roving frames, such as those disclosed in European patents EP 0 906 548 and EP 0 912 781, the replacement of bobbins with empty tubes is carried out in an area very close to the bobbin formation area, a problem of interference in the movements of the bobbins and of the empty tubes being able to arise during the replacement thereof.

[0008] One of the drawbacks of these roving frames, in reference to the replacement of bobbins with empty

tubes, is the risk that some of them may be arranged in an incorrect position, which could cause damages in the machine as the latter lacks suitable safety members for detecting this type of events.

[0009] On the other hand, these roving frames have an aspiration circuit which is responsible for removing those fibers or particles which have become detached from the rovings from the feed area.

[0010] The air used in this operation is unavoidably heated due to the pressure to which it is subjected, and it is passed through a filter which retains the lint or detached fibers of the rovings.

[0011] Currently, once the air is filtered, it is not reused but rather released to the exterior.

[0012] One of the objectives of the present invention is to use this already filtered air to carry out the cooling of certain members or components of the roving frame, which usually reach a temperature exceeding that of the air used in the particle or fiber aspiration and removal circuit.

[0013] For the formation of bobbins, the roving frames have rotating fins and a pressure finger responsible for guiding the roving on the bobbin being formed.

[0014] This pressure finger usually has a hole for the passage of the roving, as can be observed in European patent EP 0 533 601, for example.

[0015] The use of a closed hole for the passage of the roving in the pressure finger implies a drawback when correctly situating the thread with regard to said pressure finger, since each of the rovings must be introduced through said hole, which implies an excessively slow operation, especially considering the large number of pressure fingers existing in each one of the roving frames.

Description of the invention

[0016] The roving frame object of the present invention has constructive particularities aimed at achieving greater constructive simplicity, using to that end a modular bedplate and flexible transmission members for its shifting.

[0017] Another object of the invention is to cool different parts or members of the machine, using to that end the filtered hot air coming from the aspiration cleaning circuit.

[0018] Another object is to obtain greater simplicity in the positioning of the rovings in the respective pressure fingers.

[0019] Another of the objects of the invention is to obtain greater safety in the doffing change, using to that end sensors, which cause the shutdown of the machine in the event that any of the bobbins or any of the empty tubes are in an incorrect position, and an overhead conveyor also, assembled in a floating manner and causing the shutdown of the machine by means of specific sensors before the break of any of the parts of the roving frame can occur precisely due to the connection between a bobbin and an empty tube due to its incorrect position-

ing.

[0020] Another of the objects of the present invention is the use of an overhead conveyor, occupying a small space inside the machine, maintaining its horizontal position, for changing full bobbins and empty tubes.

[0021] To that end and according to the invention, the movable bedplate holding the barbs on which the empty tubes are assembled for the formation of bobbins is made up of several bedplate sections horizontally aligned and provided on their ends with means for controlling the horizontal alignment of said successive bedplate sections.

[0022] Said means for controlling the horizontal alignment are made up of fixed sensors and a fixed bar associated to consecutive bedplate sections such that when consecutive bedplate sections become misaligned, the bar of one of the sections acts on one of the sensors of the other section, said sensor causing the shutdown of the roving frame.

[0023] The bedplate sections are assembled on rotating nuts, linked to one another by a series of flexible gear tooth belt or chain type transmission members.

[0024] Said rotating nuts are assembled on vertical spindles unable to rotate and fixed to lower carriages assembled with the possibility of longitudinal shifting on sets of transverse rails.

[0025] Said lower carriages are shifted by flexible dragging means comprising transverse chain sections or the like fixed to the opposite ends of the carriages and linked with respective main branches which are notably parallel and vertically arranged in the front and rear areas of the roving frame.

[0026] These main branches are linked, at least at one of their ends, by means of a chain section which is actuated by a drive member responsible for causing the shifting of the main branches in opposite directions, achieving the transverse and simultaneous shifting of the lower carriages toward the front area or toward the rear area of the roving frame.

[0027] The cooling circuit used for preventing the excessive heating of certain components or members of the roving frame, such as motors or electrical control panels, comprises a main duct connected to the pneumatic cleaning circuit belonging to the roving frame.

[0028] This main duct of the cooling circuit branches off into a series of branches provided with outlets through which the air coming from the pneumatic cleaning circuit is projected towards those members or areas of the roving frame to be cooled.

[0029] Specifically, the main duct of the cooling circuit is connected to a filtered air outlet defined in the impurity collection tank of the pneumatic cleaning circuit.

[0030] This roving frame furthermore comprises means for the suspended support and with the possibility of vertical shifting of the overhead conveyor responsible for carrying out the collection of bobbins delivered by the movable bedplate and the delivery of empty tubes to said bedplate.

[0031] Said support means enable certain vertical

shifting of the overhead conveyor such that in the event that said overhead conveyor is pushed vertically (due to the interference between bobbins and/or empty tubes incorrectly positioned during the upward movement of the bedplate), the actuation of sensors detecting the lifting of said overhead conveyor occurs, and they cause the shutdown of the roving frame, preventing the breaking of the overhead conveyor or of any other member of the roving frame.

[0032] Said overhead conveyor has rails defining a closed path for the shifting of a bobbin holder chain, said rails defining two intermediate, notably parallel sections linked at their ends by means of a divergent oblique section and two curved and symmetrical sections, in the manner of a circular segment.

[0033] In turn, the bobbin holder chain is formed of a series of hinge bars the length of which is greater than the separation existing between the intermediate and parallel sections of the rails of the overhead conveyor, and notably equal to the radius of curvature of the symmetrical sections, in the manner of circular segment, defined in the opposite ends of the rails of said overhead conveyor.

[0034] In addition to reducing the width occupied by the rails, this particularity enables the branches of the chain which shift on the two sides or intermediate sections of the rails to be able to describe intermittent and alternating movements since when one of the branches moves forward, one of the end bars pivots on one of its ends, whereas the other end of said bar runs along the curved section defined in the corresponding end of the rails of the overhead conveyor.

[0035] The roving frame of the invention furthermore incorporates sensors which enable automatically verifying the correct position of the bobbins and of the empty tubes during the doffing change. These sensors are made up of photoelectric cells arranged at the opposite ends of the machine and slightly deviated with regard to the alignments formed by the empty tubes and the bobbins in the collection and delivery positions.

[0036] During the doffing change, the bedplate describes a series of upward or downward vertical movements and forward and backward horizontal movements in the rear area of the machine and in an alternating manner, such that in the event that any of the bobbins or empty tubes are in an incorrect position, the contact thereof and their deviation or tilt toward a position in which they are detected by the sensors responsible for automatically verifying the correct position of the bobbins and of the empty tubes will occur.

[0037] These sensors are connected to an emergency shutdown circuit which causes the shutdown of the roving frame in the event that this anomaly occurs so that an operator can place those bobbins or tubes not occupying a correct position in a suitable position.

[0038] According to the invention and as previously discussed, the pressure fingers used in this roving frame for guiding the rovings during the formation of the bobbin

have features aimed at facilitating the placement of the thread in the hole defined in the baffle of the pressure finger and assuring that the roving is maintained inside the hole when its breaking is carried out, once the bobbin is finished.

[0039] To that end, said pressure finger has a rear opening or cut which tangentially accesses the upper area of said hole, demarcating together with said opening a roving retention fin having a lateral tilt on its front-upper area, which prevents the roving from being able to be involuntarily released from said pressure finger.

Description of the Figures

[0040] To complement the description being made and for the purpose of facilitating the understanding of the features of the invention, a set of drawings is attached to the present specification in which, with an illustrative and non-limiting character, the following has been shown:

Figure 1 shows a schematic front elevational view of a portion of the bedplate and of the means used for its vertical shifting, with an enlarged detail of the means used for controlling the horizontal position of the successive bedplate sections.

Figures 2 and 3 show respective schematic upper plan views of the means for the horizontal shifting of the bedplate, the lower carriages being able to be observed in the two end positions.

Figures 4, 5 and 6 show schematic profile views of the roving frame, sectioned by a vertical plane and in which the downward vertical and shifting movements of the bedplate, with the bobbins already formed, toward the rear area of the machine to carry out the change of doffing, can be observed.

Figures 7a and 7b show respective schematic profile and rear elevational views of the bedplate holding the bobbins, vertically aligned with the overhead conveyor, the tubes and bobbins being correctly positioned.

Figures 8a and 8b show respective views similar to the previous ones, in which the detection by the sensors of one of the empty tubes positioned on the overhead conveyor in an incorrect position can be observed.

Figures 9a and 9b show respective views similar to the previous ones, in which the detection by the sensors of the incorrect position of a bobbin which has been incorrectly positioned on the bedplate after the bobbins have been delivered to the overhead conveyor can be observed.

Figures 10a and 10b show respective views similar to the previous ones, in which the detection of an empty tube which has been incorrectly positioned on the overhead conveyor once the empty tubes have been delivered to the bedplate can be observed.

Figures 11, 12 and 13 show respective profile views

of the machine in which the return of the bedplate by means of a horizontal shifting and a vertical shifting toward the front area, positioning the empty tubes in the bobbin formation area, can be observed.

Figure 14 shows a plan view of the overhead conveyor in which the rails of said conveyor and the bobbin holder chain represented with a simple tracing line can be observed.

Figures 15 and 16 show respective plan views of the overhead conveyor during the alternating forward movement of each one of the branches of the bobbin holder chain.

Figure 17 shows an elevational view of a detail of the overhead conveyor suspended from the bedplate, being able to observe one of the sensors responsible for detecting the vertical movement of said overhead conveyor in the event that any bobbins or empty tubes are incorrectly positioned during the doffing change.

Figure 18 shows a view similar to the previous one in which the actuation of one of said sensors during the doffing change due to the incorrect position of one of the empty tubes can be observed.

Figure 19 shows a schematic profile view of the machine with an enlarged detail of the conveyor vertically shifted and actuating one of the sensors responsible for detecting said vertical shifting of the overhead conveyor.

Figure 20 shows a schematic rear elevational view of the cooling device connected to the pneumatic cleaning circuit of the machine.

Figure 21 shows a schematic elevational view of the pressure finger acting on a bobbin, once the bobbin is finished and immediately after the breaking of the roving has occurred.

Figure 22 shows an enlarged detail of the baffle of the pressure finger.

Figure 23 shows a profile view of the baffle sectioned by a vertical plane.

Preferred Embodiment of the Invention

[0041] As can be seen in Figure 1, the bedplate (1) holding the rotating barbs (2) is made up of several bedplate sections (3), horizontally aligned and assembled by means of rotating nuts (4) on vertical spindles (5). Said vertical spindles (5) are unable to spin and are fixed to lower carriages (6) assembled with the possibility of longitudinal shifting of a set of transverse rails (7).

[0042] The rotating nuts (4) are linked to one another by a series of flexible gear tooth belt or chain-type members (8), actuated by a drive member (9).

[0043] Each one of the transmission belts or chains (8) links a pair of successive nuts (4).

[0044] The rotation of the motor in either direction causes the upward or downward vertical shifting of the bedplate (1).

[0045] As can be observed in the enlarged detail of

Figure 1, the successive sections (3) of the bedplate (1) respectively have a pair of sensors (10) connected to an emergency shutdown system and a cantilever bar (11), which selectively acts on one of the sensors (10) in the event that the successive bedplate sections (3) lose their horizontal position and define between one another a certain positive or negative angle. Thus, if a misalignment of any one of the transmission members (8) occurs, the automatic shutdown of the roving frame will occur.

[0046] The horizontal shifting of the bedplate (1) is generated by flexible dragging means of the lower carriages (6), said dragging means being observable in Figures 2 and 3.

[0047] These dragging means comprise transverse band or strip sections (12) fixed to the opposite ends of the carriages (6) and linked to respective main branches (13) which are notably parallel and longitudinally arranged in the front and rear areas of the roving frame.

[0048] Said main branches (13) are linked at one of their ends by means of a chain section (14) on which a drive member (15) acts by means of the corresponding pinion, which drive member, when rotating in either direction, causes the horizontal shifting of the carriages (6) toward the front area or toward the rear area of the roving frame, and which is adjusted to a torque limiter.

[0049] As can be observed in the enlarged detail of Figure 3, the end positions of the carriages (6) are detected by proximity sensors (16) and mechanical stop to assure the position.

[0050] As can be observed in Figure 4, once the roving bobbins (17) are formed on tubes (18) assembled on the barbs (2) of the bedplate (1), said bedplate (1) vertically shifts toward a lower position (Figure 5) and subsequently shifts horizontally over the transverse rails (7) to be arranged in the rear area of the machine and vertically facing an overhead conveyor (19) responsible for collecting the bobbins (17) already formed and for delivering empty tubes (18) for the formation of new bobbins, this operation being referred to as doffing change.

[0051] In a normal functioning of the machine shown in Figures 7a and 7b, the empty tubes (18) will be assembled in alternating positions on a bobbin holder chain (20) assembled with the possibility of shifting with regard to the overhead conveyor (19).

[0052] To detect possible positioning errors of the empty tubes (18) and/or of the roving bobbins (17) during the doffing change, the roving frame incorporates sensors (21) which can be photoelectric cells arranged parallelly to the alignments of empty tubes and bobbins.

[0053] In order for said sensors (21) to be able to detect the incorrect position of any of the empty tubes (18) or the bobbins (17) during the doffing change, the bedplate (1) describes alternating vertical movements and horizontal movements, such that the empty tubes (18) or the bobbins (17) which are in an incorrect position are laterally shifted or tilted, enabling their detection by the sensors (21).

[0054] Specifically, in Figures 8a and 8b, one of the

empty tubes (18) placed incorrectly on the chain (20) of the overhead conveyor can be observed.

[0055] By means of a first upward movement of the bedplate (1) and a subsequently transverse shifting, the empty tube (18), assembled in an incorrect position in Figures 8a and 8b, is detected by one of the sensors (21), as shown in the enlarged detail of Figure 8a, said sensor (21) causing the shutdown of the roving frame.

[0056] In Figures 9a and 9b, a bobbin (17) which has not been correctly delivered to the overhead conveyor and remains assembled on the bedplate (1) can be observed. By means of the vertical and transverse shiftings of the bedplate (1), said bobbin (17) is arranged in a position in which it is detected by one of the sensors (21) which causes the shutdown of the roving frame.

[0057] In Figures 10a and 10b, an error in transferring one of the empty tubes (18) to the bedplate (1) is represented, said empty tube (18) remaining assembled on the conveyor (19). As in the previous cases, the horizontal and vertical shiftings of the bedplate cause the arrangement of said empty tube (18) in a tilted position, in which it is detected by the sensor (21), said sensor causing the shutdown of the machine so that the operator can position the empty tube (18) in the correct position.

[0058] Once the full bobbins are transferred to the overhead conveyor (19) and the empty tubes (18) are positioned on the barbs (2) of the bedplate, as represented in Figure 11, said bedplate (1) is transversally shifted toward the front area of the machine and is subsequently shifted vertically (Figure 13) to be arranged in the suitable position for the formation of new roving bobbins on the empty tubes (18).

[0059] As can be observed in Figures 14, 15 and 16, the overhead conveyor (19) defines a closed path for the shifting of the bobbin holder chain (20), the rails of said overhead conveyor (19) having two notably parallel intermediate sections (22) linked at their ends by means of a diverging oblique section (23) and two sections (24, 25) which are symmetrical with regard to the vertex, in the manner of a circular segment.

[0060] This conveyor (19) has two motors (26, 27) for the alternate dragging of the branches of the bobbin holder chain (20) which respectively circulate on the branches (22) of the overhead conveyor (19).

[0061] Said bobbin holder chain (20) is formed by a series of hinge bars (21) whose length is greater than the separation existing between the intermediate sections (22) of the rails of the conveyor and notably equal to the radius of curvature of the curved sections (24, 25) of the rails of said conveyor, such that during the actuation of the motor (27), only one of the branches of the bobbin holder chain moves forward, specifically the one represented in the lower position in Figure 15, whereas the upper branch remains static and two of the hinge bars (21) pivot on one of their ends, the opposite end of said bars (21) shifting over the curved section (24 and 25), respectively, of the opposite ends of the conveyor.

[0062] As can be observed in Figure 16, when motor

(26) acts, only the shifting of the upper branch of the bobbin holder chain occurs, two end links (21) pivoting on one of their ends and being shifted with the opposite end over the curved sections (25 and 24) of the opposite ends of the conveyor (19).

[0063] As can be observed in Figures 17 and 18, the overhead conveyor (19) is suspended from the bedplate (28) by means of several screw-nut assemblies (29) enabling the vertical shifting of said conveyor (19) in the event that the latter receives an upward push due, for example, to the incorrect positioning of one of the empty tubes (18) during the doffing change. In the event that this vertical shifting of the conveyor (19) occurs, as shown in Figure 18, the overhead conveyor will act on a sensor (30) positioned over the bedplate and causing the automatic shutdown of the roving frame, preventing the breaking of any of the members thereof.

[0064] The sensor (30) can optionally be assembled on the overhead conveyor (19), as shown in Figure 19.

[0065] As previously discussed, this roving frame incorporates a cooling circuit, schematically shown in Figure 20. Said cooling circuit uses the air coming from the pneumatic cleaning circuit (31) belonging to the roving frame, using it to cool those parts of the roving frame normally reaching a temperature exceeding that of the air coming from the pneumatic cleaning circuit (31).

[0066] These pneumatic cleaning circuits (31) usually have an impurity collection tank (32), the filtered air passing through a filter (33) due to the action of an exhaust ventilator (34).

[0067] In the example shown in Figure 20, the cooling circuit object of the invention has a main duct (35) connected to a filtered air outlet defined in the collection tank (32). Said main duct (35) branches off, forming branches (36) provided with outlets (37) projecting the air over those areas or parts of the machine to be cooled which, specifically in said Figure 20, are represented by the motors (9, 15) and by the electrical control panel (38) of the roving frame.

[0068] In Figures 21, 22 and 23, the pressure finger (39) used in this roving frame for carrying out the guiding of the roving (40) during the formation of the bobbins, is shown. The pressure finger (39) has a baffle (41) on its free end provided with a hole (42) for the passage of the roving and with a rear opening (43) tangentially accessing the upper area of said hole (42) from the rear area of the baffle. The hole (42) and the rear opening (43) demarcate a fin (44) whose upper-front area is laterally tilted, as can be observed in Figure 23, preventing the roving (40) from being able to be involuntarily released from the hole (42) when the breaking of the roving occurs once the bobbin is formed, as shown in Figure 21.

[0069] Having sufficiently described the nature of the invention, as well as a preferred embodiment example, it is hereby stated for all pertinent intents and purposes that the materials, shape, size and arrangement of the members described can be modified, as long as this does not imply an alteration of the essential features of the

invention which are claimed below.

Claims

1. A roving frame for the formation and delivery of roving bobbins; of the type comprising a plurality of roving supply devices for the formation of bobbins on tubes coupled on barbs associated to a shiftable bedplate with the aid of rotating spider assemblies and a pressure finger for the guiding of the rovings, said bedplate being shiftable between a first end position in the roving bobbin formation area and a second end position in which the doffing change or automatic replacement of tubes holding bobbins with empty tubes is carried out; **characterized in that** it comprises:

- a movable bedplate (1) made up of several bedplate sections (3) aligned horizontally and provided on their ends with means (10, 11) for controlling the horizontal position of the successive bedplate sections (3) during the lifting and downward movements of said bedplate,
- means (29) for the suspended support and with the possibility of vertical shifting of the overhead conveyor (19) responsible for carrying out the collection of the roving bobbins (17) delivered by the movable bedplate (1) and the delivery of the empty tubes (18) to said bedplate,
- sensors (30) for the detection of possible upward movements of the overhead conveyor (19) during the upward movement of the bedplate (1) in the rear area of the roving frame during the change of roving bobbins (17) and empty tubes (18),
- sensors (21) for automatically verifying the correct position of the roving bobbins (17) and of the empty tubes (18) during the passage thereof from the bedplate (1) to the overhead conveyor (19) and from the overhead conveyor (19) to the bedplate (1), respectively.

2. A roving frame according to claim 1, **characterized in that** the means for controlling the horizontal alignment of the successive bedplate sections (3) comprise fixed sensors (10) in one of said bedplate sections (3) and a fixed bar (11) in the following bedplate section which selectively acts on one of the sensors (10) when said successive bedplate sections (3) become misaligned and form a positive or negative angle between one another.

3. A roving frame according to claim 2, **characterized in that** the sensors (10) associated to the different bedplate sections (3) are connected to an emergency shutdown circuit incorporated in the electrical control panel (38) of the roving frame.

4. A roving frame according to claims 1 and 2, **characterized in that** successive bedplate sections (3) are assembled on respective rotating nuts (4), linked to one another by a series of flexible transmission members (8) driven by at least one drive member (9). 5
5. A roving frame according to claim 4, **characterized in that** the flexible transmission members (8) are made up of belts and/or of chains linking pairs of consecutive rotating nuts (4). 10
6. A roving frame according to claim 4, **characterized in that** the rotating nuts (4) are assembled on respective vertical spindles (5), unable to rotate, fixed to lower carriages (6) assembled with the possibility of longitudinal shifting on respective sets of transverse rails (7), and fixed to flexible dragging means (12) causing the transverse shifting of the lower carriages (6). 15
7. A roving frame according to claim 6, **characterized in that** the flexible dragging means of the lower carriages comprise transverse chain sections (12) fixed to opposite ends of the lower carriages (6) and linked with respective main branches (13) which are notably parallel and longitudinally arranged in the front and rear areas of the roving frame. 20 25
8. A roving frame according to claim 7, **characterized in that** the main branches (13) are linked, at least at one of their ends, by a chain section (14) which is actuated by a drive member (15) and which causes, when rotating in either direction, the shifting of the main branches (13) in opposite directions and the transverse and simultaneous shifting of the lower carriages (6) toward the front area or toward the rear area of the roving frame. 30 35
9. A roving frame according to claim 1, **characterized in that** it comprises a cooling circuit provided with a main air circulation duct (35) connected to the pneumatic cleaning circuit (31) belonging to the roving frame, said main duct (35) branching off into a series of branches (36) provided with outlets (37) projecting the air coming from the pneumatic cleaning circuit (31) toward the members (9, 15, 38) or areas of the roving frame to be cooled. 40 45
10. A roving frame according to claim 9, **characterized in that** the main duct (35) of the cooling circuit is connected to a filtered air outlet defined in the impurity collection tank (32) of the pneumatic cleaning circuit (31). 50
11. A roving frame according to claim 1, **characterized in that** the means for the suspended support of the overhead conveyor (19) comprise a series of screw-nut assemblies (29) fixed to the bedplate (28) of the roving frame and which pass through holes defined in the rails of the overhead conveyor (19), said rails being supported on said screw-nut assemblies (29) and having the possibility of vertical shifting with regard to said screw-nut assemblies (29). 55
12. A roving frame according to claim 11, **characterized in that** the rails of the overhead conveyor (19) define a closed path for the shifting of a bobbin holder chain (20), said rails having two notably parallel intermediate sections (22), linked at their ends by means of a divergent oblique section (23) and two sections (24, 25) which are symmetrical with regard to the vertex, in the manner of a circular segment.
13. A roving frame according to claim 12, **characterized in that** the bobbin holder chain (20) is formed by a series of hinge bars, the length of each bar being greater than the separation existing between the intermediate and parallel sections (22) of the rails of the overhead conveyor (19), and notably equal to the radius of curvature of the symmetrical sections (24, 25), in the manner of circular segment, defined at the opposite ends of the rails of said overhead conveyor.
14. A roving frame according to claim 1, **characterized in that** the sensors (30) for the detection of possible upward movements of the overhead conveyor (19) are arranged between the rails of the overhead conveyor (19) and the area of the bedplate (28) carrying out the upper securing of said rails by means of the nut-screw assemblies (29).
15. A roving frame according to claim 14, **characterized in that** the sensors (30) are connected to an emergency shutdown circuit incorporated in the electrical control panel (38) of the roving frame.
16. A roving frame according to claim 1, **characterized in that** the sensors (21) responsible for automatically verifying the correct position of the roving bobbins (17) and of the empty tubes (18) during the passage thereof from the bedplate (1) to the overhead conveyor (19) and from the overhead conveyor (19) to the bedplate (1), respectively, are made up of photoelectric cells arranged at the opposite ends of the machine and slightly deviated with regard to the alignments formed by the empty tubes (18) and the bobbins (17) in the collection and delivery positions, to detect possible lateral deviations or tilting of those rovings or bobbins (17) or empty tubes (18) incorrectly positioned on the overhead conveyor (19) or on the bedplate (1) during the doffing change.
17. A roving frame according to claim 16, **characterized in that** the sensors (21) are connected to an emergency shutdown circuit incorporated in the electrical

control panel (38) of the roving frame.

18. A roving frame according to claims 1, 16 or 17, **characterized in that** in the doffing change end position, the bedplate (1) alternately defines upward or downward vertical movements and forward and backward horizontal movements, those bobbins (17) and/or empty tubes (18) which are in an incorrect position deviating or tilting in the horizontal movements toward a position in which they are detected by the sensors (21) responsible for verifying the correct position of the bobbins (17) and of the empty tubes (18). 5 10
19. A roving frame according to claim 1, **characterized in that** the guiding of each one of the rovings (40) during the formation of bobbins (17) is carried out by means of a pressure finger (39) having a baffle (41) in the area resting on the bobbin (17) which is provided with a hole (42) for the passage of the roving and with a rear opening (43) tangentially accessing the upper area of said hole (42); said rear opening (43), together with the hole (42), demarcating a retention fin (44) for retaining the roving (40) inside said hole (42). 15 20 25
20. A roving frame according to claim 19, **characterized in that** the retention fin (44) has a lateral tilt in its front-upper area, slightly projecting toward the outer side of the baffle (41). 30

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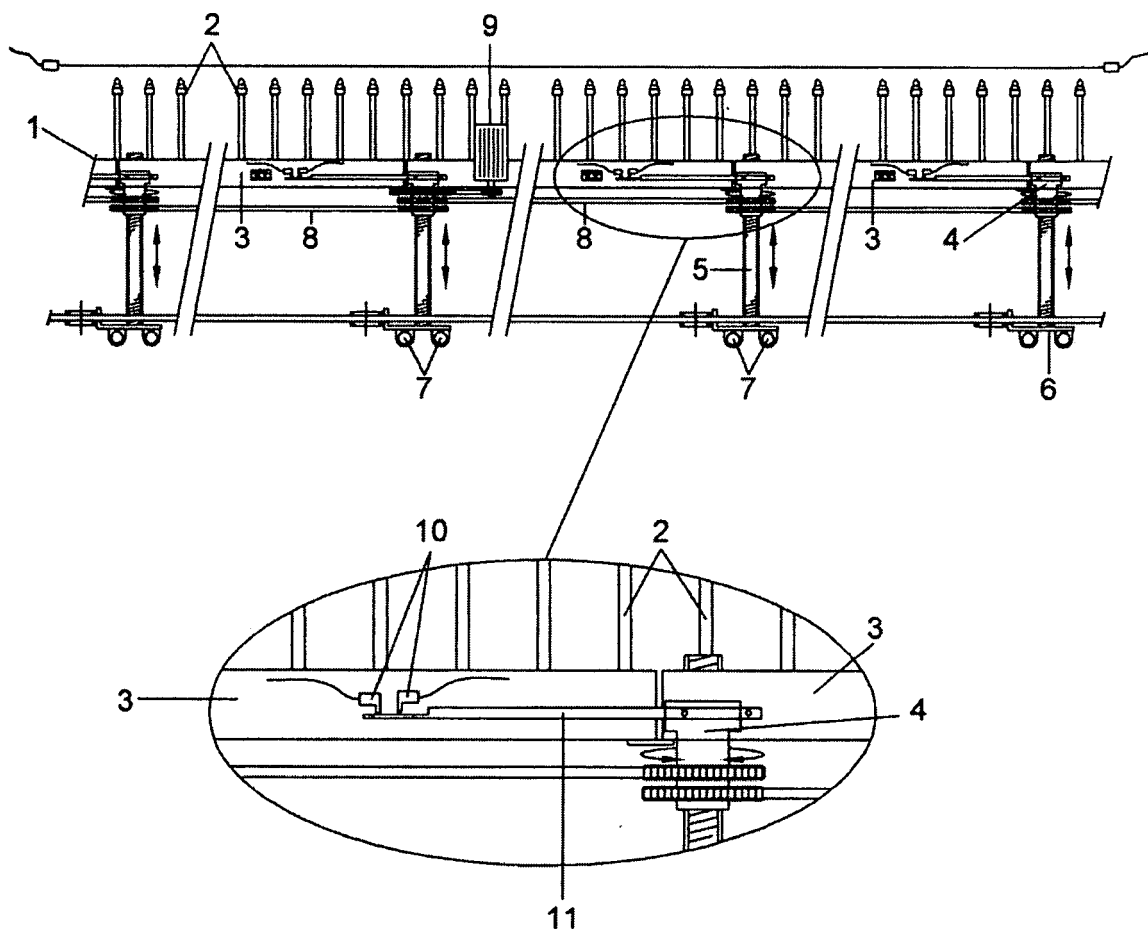


Fig. 1

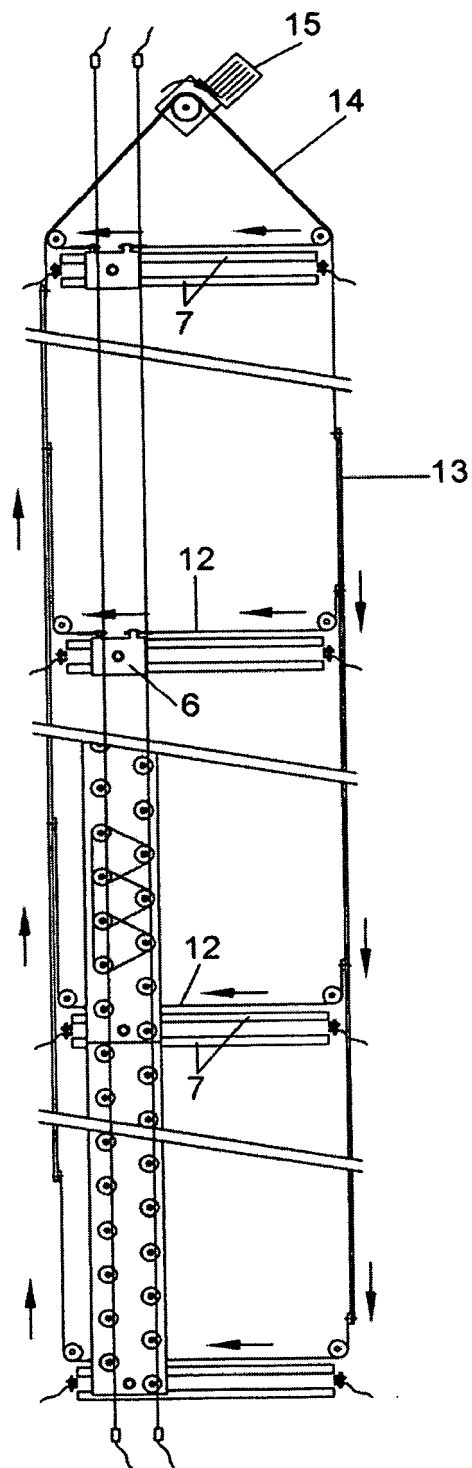


Fig. 2

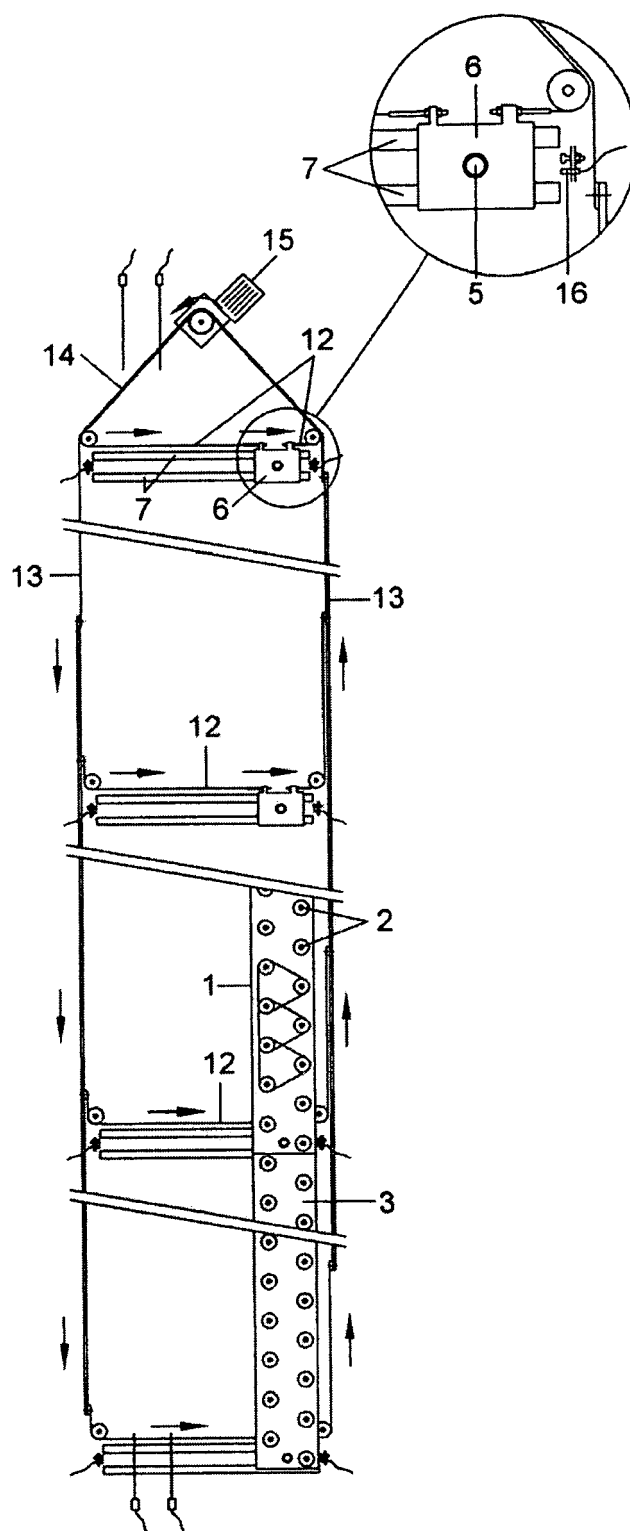


Fig. 3

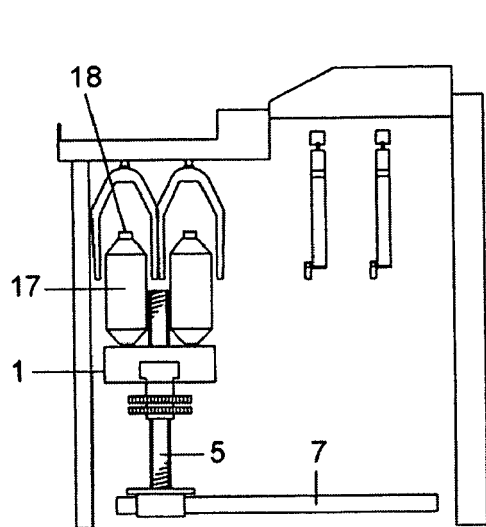


Fig. 4

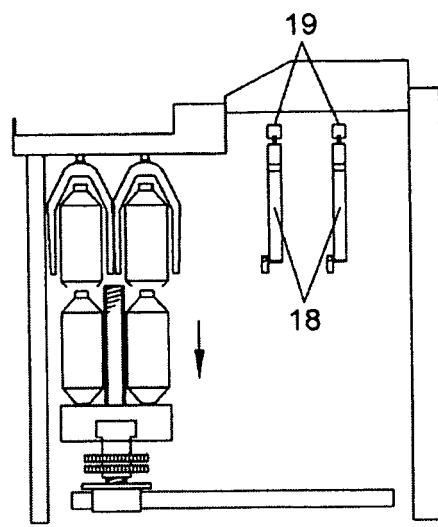


Fig. 5

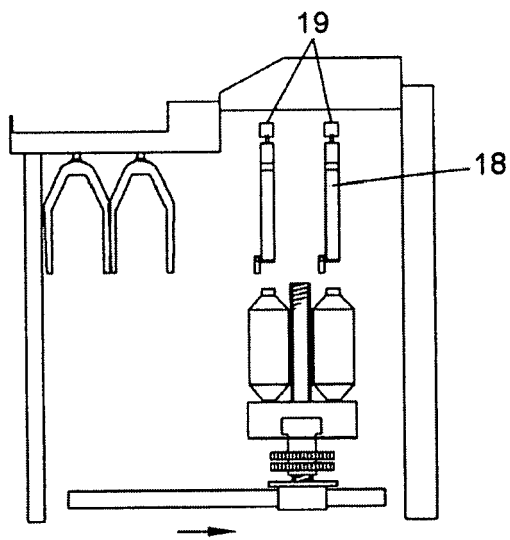


Fig. 6

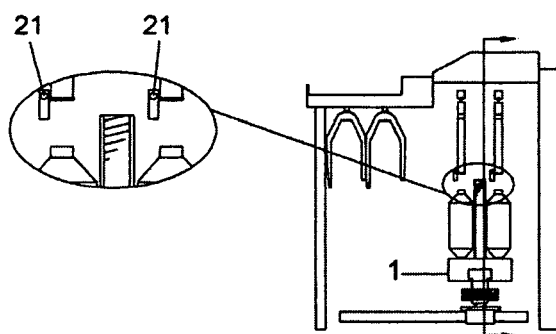


Fig. 7a

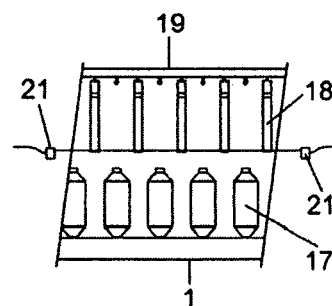


Fig. 7b

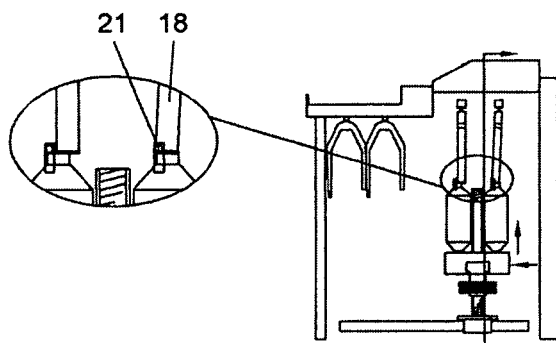


Fig. 8a

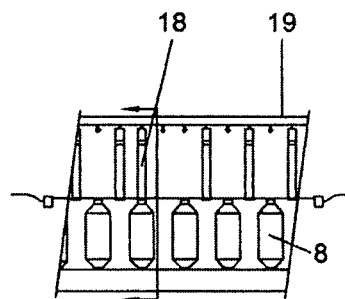


Fig. 8b

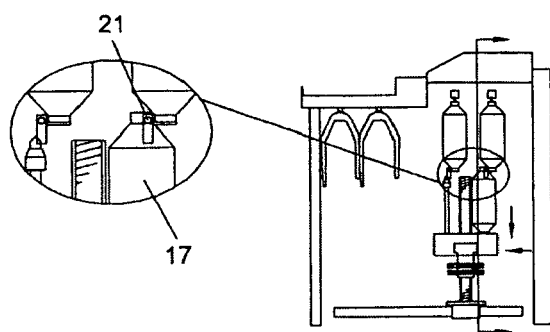


Fig. 9a

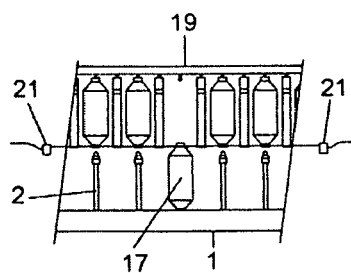


Fig. 9b

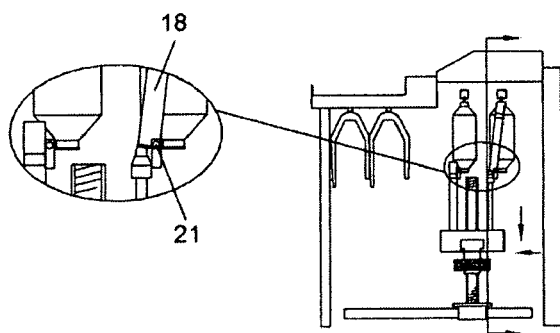


Fig. 10a

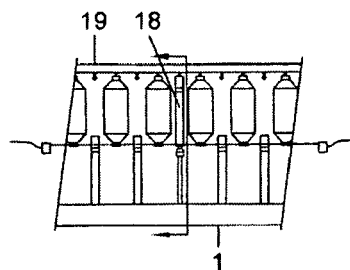


Fig. 10b

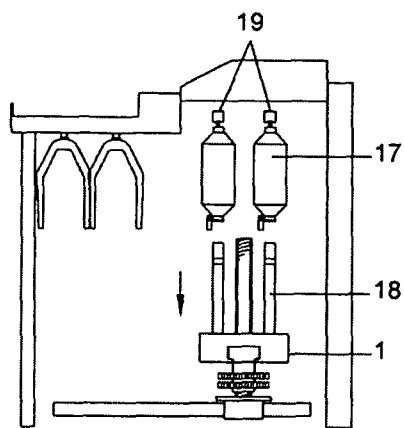


Fig. 11

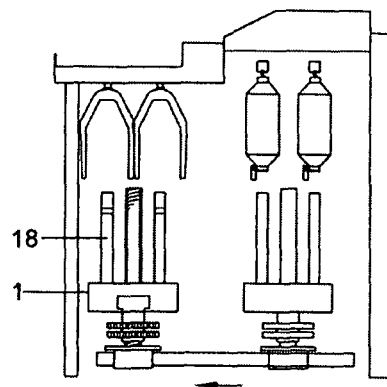


Fig. 12

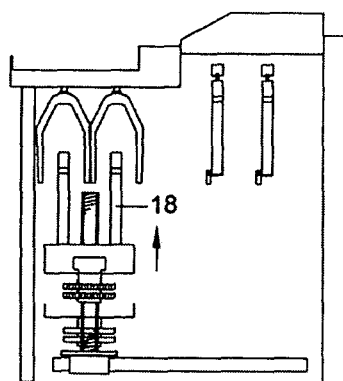
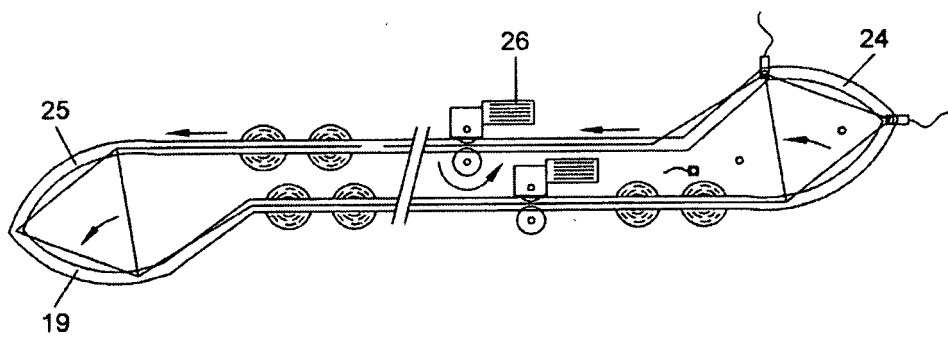
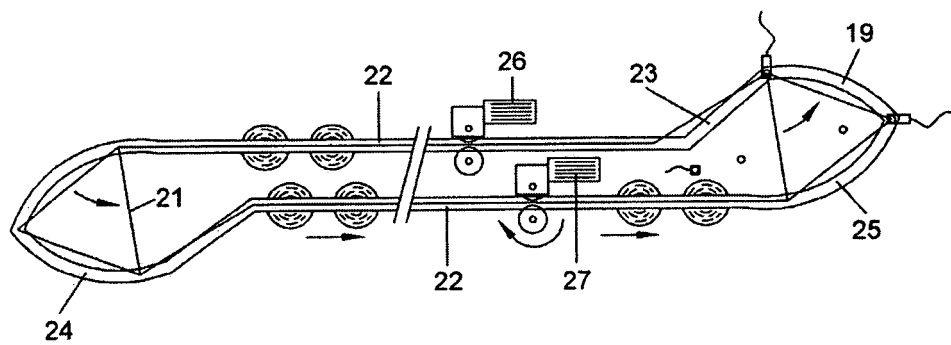
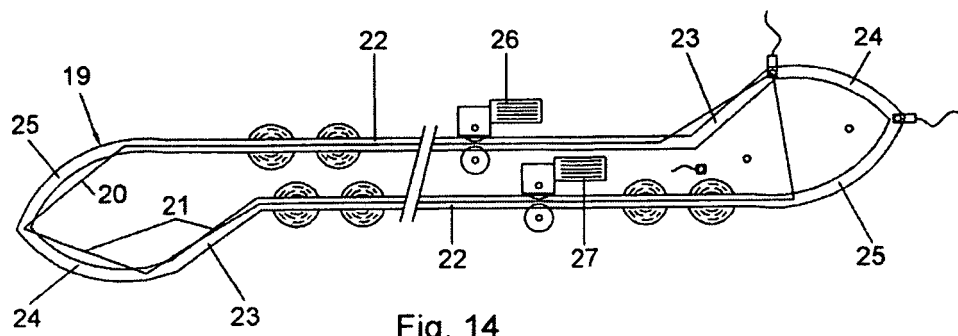


Fig. 13



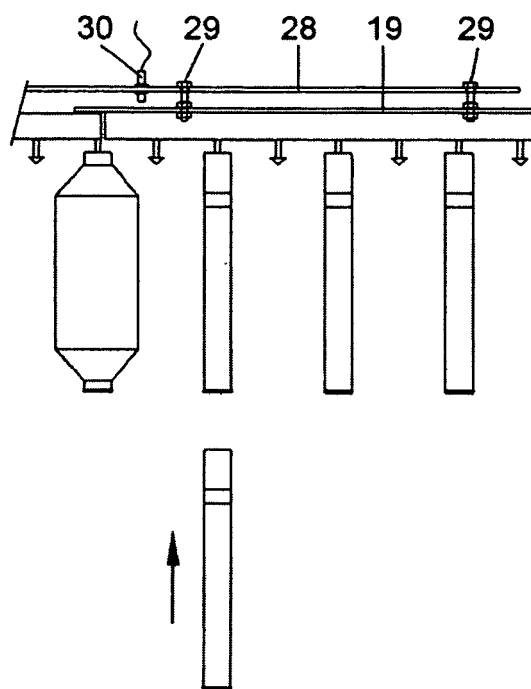


Fig. 17

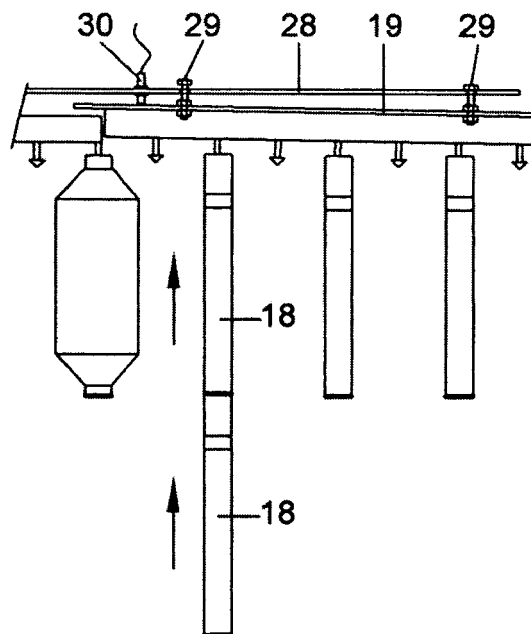


Fig. 18

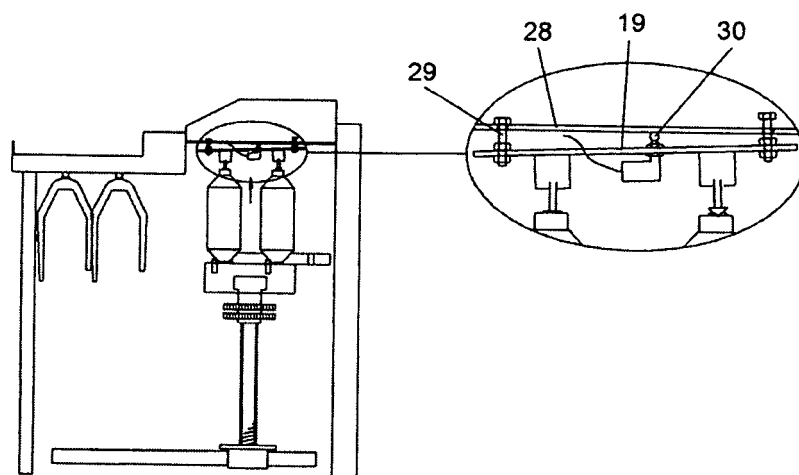


Fig. 19

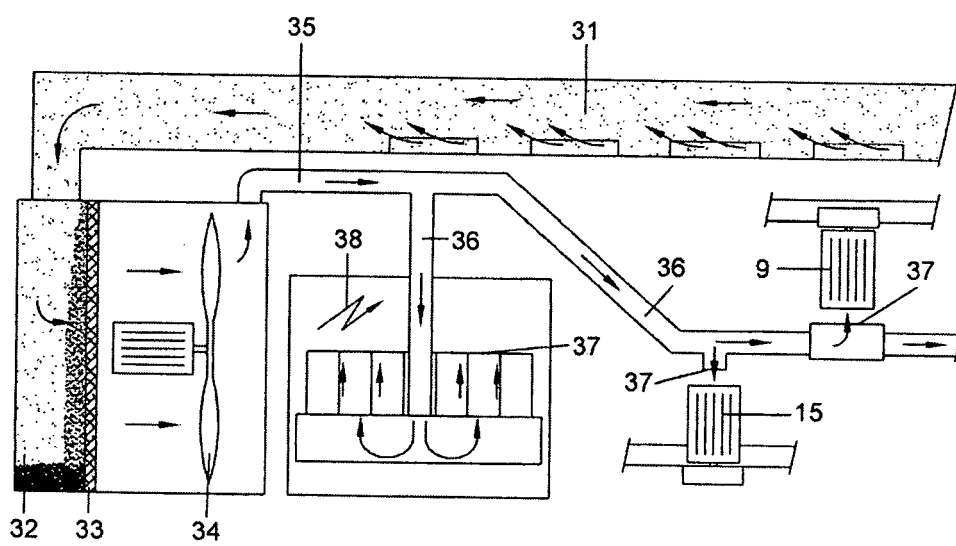


Fig. 20

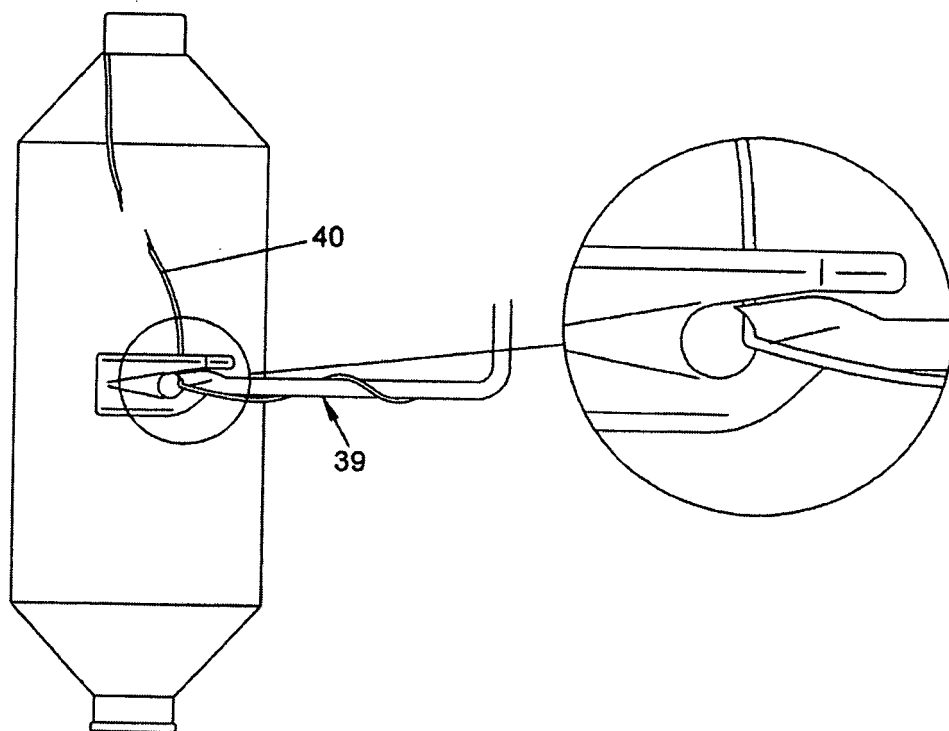


Fig. 21

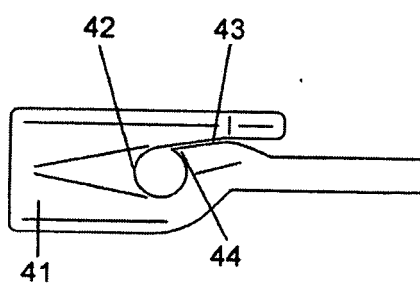


Fig. 22

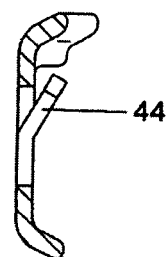


Fig. 23



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 38 0244

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	US 5 222 350 A (BOWMAN ET AL) 29 June 1993 (1993-06-29) * column 5, line 43 - column 7, line 39; figures 1-28 *	1-20	D01H9/04 D01H13/14
A	EP 0 214 837 A (HOWA MACHINERY LIMITED) 18 March 1987 (1987-03-18) * column 13, line 16 - column 18, line 2; figures 1-19 *	1-20	
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D,A	DE 39 36 518 A1 (MASCHINENFABRIK RIETER AG, WINTERTHUR, CH; MASCHINENFABRIK RIETER AG,) 8 May 1991 (1991-05-08) * the whole document *	1-20	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D01H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 May 2005	Examiner Henningsen, O
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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