



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.05.2008 Bulletin 2008/21

(51) Int Cl.:
B65H 19/22 (2006.01)

(21) Application number: **07120594.2**

(22) Date of filing: **13.11.2007**

(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 LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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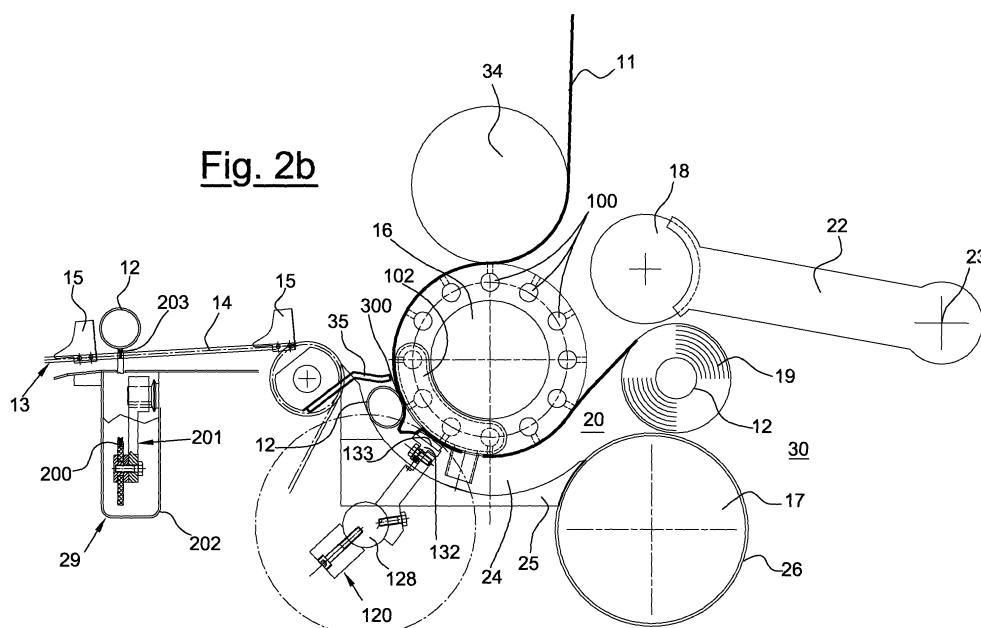
(30) Priority: **15.11.2006 IT MI20060395 U**

(54) **Rereeling machine for rereeling and forming a roll of paper**

(57) An improved rereeling machine (10) for rereeling and forming a roll of paper comprising three rollers (16, 17, 18) with axes parallel to one another and perpendicular to the direction of movement of the paper (11), wherein two upper and lower winding rollers (16, 17) collaborate with a third roller (18), connected by a pair of arms (22) that are able to oscillate, suitable for keeping a certain pressure on a roll, or log, to form a finished roll (19), which comes out from said machine (10) through an outlet port (30) defined between said lower winding rollers (17) and said third roller (18), through winding of said paper (11), which passes onto said upper winding

roller (16), about a core (12), said machine (10) also comprising a conveyor with thrusters (15) upstream of said three rollers (16, 17, 18) for the introduction of said cores (12) one after the other into a channel (24) formed below said upper roller (16), a rotary thruster (35) suitable for making said cores (12) proceed in said channel (24), a glue dispensing group (29) upstream of said channel (24), and a stop element (120) for at least partially stopping the paper (11), defined in an area inside said channel (24), which collaborates with said upper roller (16), on which it acts rotating about a pin (128) thereof, wherein said upper roller (16) is of the suction type.

Fig. 2b



Description

[0001] The present invention refers to an improved set up for rereeling and forming a roll of paper in a rereeling machine.

[0002] In treatment machines or groups for winding paper for use in the home, in particular paper used as toilet paper, kitchen paper and similar, it is well known to use elements that guide the arriving paper and control its correct winding on a core in order to make a finished roll known as a "log".

[0003] These are machines, known as rereelers, in which there are two winding rollers and a third pressure roller. The first two rollers wind the paper into a roll of gradually increasing diameter, whereas the third roller, as well as collaborating with such a winding, keeps a certain pressure on the roll or log taking care of winding it correctly and well compacted.

[0004] The two rollers have a fixed position with respect to the frame and support the log, pulling the paper. The third roller, acting as a pressure roller, presses on the log in formation and thus determines the diameter of the end product.

[0005] The third roller, known as "presser", is supported on opposite ends by at least one pair of arms hinged to the frame and is able to oscillate according to a direction curving around the hinging of the arms. This roller can alternatively also be subjected to a test of the pressure that acts on it through a sensor.

[0006] Gradually various groups and devices have been developed that carry out the feeding of the inner core to the roll and the separation of the finished roll with simultaneous arrangement of a new core of the head or initial portion of the arriving paper.

[0007] For example, for this purpose Italian patent no. 1.262.046 shows a means for interrupting the band-shaped material that cooperates with feeding means along a channel, between a point of insertion of a new core and an outlet throat or port for the core between the three rollers to be able to then wind the roll.

[0008] The provision of the interruption means in an inner area of the channel requires complicated synchronisation between the parts and does not allow the rereeling operation to be made faster. This has problems of arrangement of the ends of the head paper in relation to the fed core since it is not possible to determine a certain position for it.

[0009] However, the provision of the interruption means in an area upstream of the channel in which the new cores are inserted has drawbacks in terms of the arrangement on the new fed core of the head or initial portion of paper arriving that formed after the separation of a finished roll.

[0010] Indeed, the separation of the paper takes place in a portion located between the finished roll and the separation means, generally close to such a separation means. In the case in which tearing occurs close to the separation means and therefore in a portion upstream

and distant from the point of insertion of the cores in the throat, there may be difficulties in getting the head of the paper to stick onto the core itself to start off the winding of a new roll.

[0011] Therefore, a main purpose of the present invention is to make an improved set up for rereeling and forming a roll of paper in a rereeling machine that solves all of the problems and drawbacks indicated above, operating correctly at a high speed.

[0012] Another purpose of the present invention is to make an improved set up that overcomes the problems of correct synchronisation between the quoted interruption means, the acceleration of the presser and the insertion of the new core, not causing slopes of the paper or slowing down the process.

[0013] A further purpose of the present invention is to make a set up that improves efficiency at high speed ensuring the winding of the head portion of the paper onto the new cores fed.

[0014] Yet another purpose of the present invention is to make a set up that, whilst solving the problems quoted previously, is particularly simple and effective.

[0015] A further purpose of the present invention is to make a set up that allows the length of the initial portion of the paper that forms the so-called "fold" on the core in the first winding step to be precisely controlled and reduced to the minimum.

[0016] These and other purposes according to the present invention are accomplished by making an improved set up for rereeling and forming a roll of paper in a rereeling machine as outlined in the attached claim 1.

[0017] Further more detailed characteristics are indicated in the subsequent claims.

[0018] The structural and functional characteristics and the advantages of a set up for rereeling and forming a roll of paper in a rereeling machine shall become clearer from the following description, given as a non-limiting example, referring to the attached schematic drawings, in which:

Figure 1 illustrates a schematic top side view of an improved set up for rereeling and forming a roll of paper in a rereeling machine made according to this invention;

Figures 2a-2b illustrate what is shown in figure 1 in two operative steps one following shortly after the other;

Figure 3 shows an enlarged detail of the perforated top roller shown in the previous figures.

[0019] Firstly with reference to figure 1, a central part of a machine for winding paper, in particular paper 11 to be used as toilet paper, kitchen paper and similar, is shown, in which the set up for rereeling and forming a roll of paper according to the invention is arranged. The paper 11 being fed is paper consisting of one or more bands combined together, once unrolled from respective rolls, not shown.

[0020] This paper 11 comes from a large roll (not shown) and is wound on a tubular central core 12.

[0021] Said cores 12 are fed one after the other by means of a conveyor 13 provided with thrusters 15. The conveyor 13 comprises e.g., bands 14 parallel to each other, of which only one is shown, upon said bands being displaced spaced thrusters 15, said thrusters feeding the cores 12 to the inner portion of the machine from a stock (not shown).

[0022] The conveyor 13 carries the tubular cores 12 towards the inlet of a channel 24 arranged upstream of an arrangement of three rollers 16, 17 and 18 that guide the continuous paper 11 arriving and control its correct winding on each core 12 to make a finished roll, of predetermined size, usually known as a log, and indicated with 19.

[0023] Whereas the cores 12 are directed by the thrusters 15 of the conveyor 13 towards the channel 24, they interact with a glue dispensing group 29, schematically shown below the conveyor 13.

[0024] Such a glue dispensing group 29 comprises a recipient 202 containing glue and a rod element 200, at least the longitudinal length of the core 12, which is able to be cyclically provided with glue on an upper pointed end 203 thereof.

[0025] The aforementioned upper end 203, at or slightly before the moment when the core 12, as it advances, is located in the position where the glue dispensing group 29 is arranged, thanks to a mechanism schematically indicated with 201, carries out a lifting movement, for example vertical, and goes into contact with the outer surface of the core 12.

[0026] In the example shown, since the glue dispensing group 29 is on the other side of the conveyor 13 with respect to the passing of the core 12 during its movement the upper end 203 passes it by.

[0027] In this configuration the core 12 thrust by the thrusters 15 passes over the upper end 203.

[0028] Indeed, during the succession of feeding of the cores 12 through the band 14, at each passage of the band 14 the thrusters 15 position one of them at the glue dispensing group 29 and another, already glued, in a nearby position upstream of the channel 24, as can be seen in figure 1.

[0029] At this point the rod element 200 immersed in the glue lifts up and making contact with the core releases a line of glue on the cylindrical generatrix 300 of the core 12 that is positioned by the relative thruster 15 at the glue dispensing group 29.

[0030] Practically, since the thrusters 15 advance in steps, each gluing takes place with the core 12 stopped and not during its passage.

[0031] Then a part of the aforementioned glue is released by contact onto the generatrix 300 of the cylindrical outer surface of the core 12.

[0032] When the core 12 has passed by, the upper end 203, again thanks to the mechanism schematically indicated with 201, moves from the raised position in contact

with the core 12 to another lowered position inside the glue dispensing group 29 in which it is once again covered with glue for the subsequent release thereof.

[0033] In general, therefore, the rod element 200 and therefore the upper end 203 cyclically perform a movement between a position in which they are inside the glue dispensing group 29 and in which the upper end 203 comes into contact with the glue, and a second position in which the upper end 203 is outside of the glue dispensing group 29 and in which it comes into contact with the cylindrical generatrix 300 of the core 12 on which it releases the glue held previously.

[0034] The three rollers 16, 17 and 18 have axes parallel to one another and perpendicular to the direction of movement of the paper 11. There are two winding rollers 16 and 17 supported by the frame that collaborate with a third roller 18.

[0035] The third roller 18 keeps a certain pressure on the roll or log being formed, taking care of its correct winding. This roller 18, known as "presser", is supported on opposite ends by at least one pair of arms, one of which is schematised at 22 and hinged at 23 to the frame. The roller 18 is subjected to a pressure check through a sensor or similar element (not shown).

[0036] The rollers 16 and 17 make an entry port 20 between them into the group of the three rollers 16, 17 and 18.

[0037] In the central part of the rereeler shown in figures 1 and 2a-2b, a diverging roller (34), or upper winding presser, is provided, in the example arranged above the upper roller 16, onto which the paper 11 is sent, so that it is wound on a large surface of the roller 16.

[0038] Moreover, according to the invention, the channel 24 is defined by curved elements 25, side-by-side, only one of which is shown, suitable for at least partially inserting through their end in the grooves 26 formed on the outer surface of the lower roller 17. The lower roller 17 can in any case be smooth and such curved elements in this case rest on its surface.

[0039] The channel 24 ends at the entry port 20, defined between the upper roller 16 and lower roller 17, where the channel 24 is of a size totally similar to the outer diameter of the core 12.

[0040] For the sake of being thorough, it should be noted that an outlet port 30 for the finished roll is defined between the lower roller 17 and the third roller 18 of the presser.

[0041] At the channel 24, or rather at the inlet, a thruster 35 is foreseen, shown schematically in figures 1 and 2a-2b in three working positions. The thruster 35, rotating around a pin, inserts the cores 12, equipped with glue along a generatrix 300 thereof, in the channel 24 when the finished roll is discharge and a new roll is to be formed.

[0042] Of course, other types of oscillating or rotary thrusters, different to what has been shown as a non-limiting example, could be arranged at the inlet of the channel 24.

[0043] A stop element 120 for at least partially stopping

the paper intervenes on the paper 11 wound and advanced onto the roller 16, locking the paper on the upper roller 16 in rotation, i.e. on a moving element, inside the channel 24.

[0044] In order to tear the paper 11 the stop element 120 collaborates with the presser 18, the acceleration of which tears the tail of the finished roll 19 and causes the direct winding of the head of the paper 11 that follows onto the new core 12. This core 12 indeed inserts into the channel 24 as soon as the acceleration of the roller of the presser 18 has torn the tail of the finished roll 19.

[0045] In the example shown, the stop element 120 consists of an arm 132 rotating around a pin 128, with adjustable position, respectively shown in figure 1 in release position, in figure 2a in a position close to the stop position and in figure 2b in stop position. The outer end of the arm 132 can also be equipped with friction material 133 to interfere on the paper 11 and make a better engagement.

[0046] The arm 132 rotating around a pin 128 intervenes directly on the paper 11 resting on the upper roller 16. It intervenes a moment before or at the same times as when the core 12 is introduced by the thruster 35. There is thus immediate coordination between the breaking of the continuous paper and the winding of the head of the paper on the new core 12.

[0047] Tearing occurs by the stop element 120 locking the paper near to the perforation and with the cooperation of the winding presser 18 and of the lower roller 17.

[0048] The presser 18 undergoes a slight acceleration by the roller 17; this slight acceleration places the paper under tension under the upper winding roller 16 and makes the paper taut and thus easier to tear.

[0049] The upper roller 16 is of the suction type, equipped with a plurality of longitudinal channels 100 arranged radially equally spaced apart in a circular crown close to the cylindrical surface, as shown schematically in the enlarged detail of figure 3. Each channel 100 is placed in communication with the outside through a plurality of holes 101 that cross the shell of the roller 16.

[0050] A pair of suction pads 102 is arranged aligned with the upper roller 16 and in a fixed position with respect to the machine, on the opposite heads of the upper roller 16. The suction pads 102, for example connected through a suction duct to a vacuum pump, not shown, face a circular sector of the roller 16, which in the example shown is about 180°, but which could also have different higher or lower angle values, respectively, to favour the suction surface or reduce the load losses and have a more efficient suction.

[0051] The suction through the pads 102, which can be continuous or suitably synchronised with the operation of the rereeler, thus only engages a portion of the rotating upper roller 16 at least comprising the stop element 120 and the inlet of the channel 24 for the new cores 12. Since the upper roller 16 rotates during operation, the suction is carried out progressively through the successive channels.

[0052] Thanks to the intervention of the sucked roller 16 it is ensured that the head of the paper 11 adhering to the shell of the roller is transported in the fraction that runs between the tearing of the paper through the stop element 120, which acts close to the perforation of the paper 11, and the insertion thanks to the thruster 35 of the new core into the channel 24.

[0053] Figures 1 and 2a-2b schematically show possible operation in which the acceleration of the roller 18 tears the tail of the finished roll 19 upstream of the channel 24 near to the stop element 120. As schematised in figure 2b, at the moment of tearing the new core is inserted upstream of the channel 24.

[0054] The core 12, inserted by the thruster 35 into the channel 24 in which it is supported by the curved elements 25, receives the head of the paper 11 and keeps it along its generatrix 300 provided with glue, said head of paper 11, remaining stuck to the surface of the sucked roller 16 during its rotation, makes this coupling optimal.

[0055] Indeed, the sucked surface of the upper roller 16 prevents the paper 11, torn from the roller 18 of the presser, from going backwards, with a winding that is always constant.

[0056] In the improved set up for rereeling and forming a roll of paper in a rereeling machine according to the present invention, the stop element 120 for at least partially stopping the paper advantageously locks the paper on the upper roller 16 in rotation, i.e. on a moving element, in an area corresponding to the channel 24.

[0057] Moreover, the improved set according to the present invention has the advantage of accepting a higher tolerance on the moment of introduction of the core with respect to the breaking point ensuring that winding is always constant.

[0058] The special structure of the improved set up according to the present invention inserted in a machine suitable for making rolls of paper, as stated previously, therefore allows maximum efficacy with a minimum presence of operative elements.

[0059] Such a set up according to the invention allows the operation of the entire machine to be substantially accelerated with an increase in the logs produced.

[0060] The improved set up according to the present invention avoids the torn paper from going backwards ensuring that winding is always constant.

[0061] It is clear that the schematisation illustrated is just one of the possible ones; it should be understood that further example solutions can be identified that are all covered by the same inventive concept of the present invention.

Claims

1. Improved rereeling machine (10) for rereeling and forming a roll of paper comprising three rollers (16, 17, 18) with axes parallel to one another and perpendicular to the direction of movement of the paper

(11), wherein two upper and lower winding rollers (16, 17) collaborate with a third roller (18), connected by a pair of arms (22) that are able to oscillate, suitable for keeping a certain pressure on a roll, or log, to form a finished roll (19), which comes out from said machine (10) through an outlet port (30) defined between said lower winding roller (17) and said third roller (18), through winding of said paper (11), which passes onto said upper winding roller (16), about a core (12), said machine (10) also comprising a conveyor with thrusters (15) upstream of said three rollers (16, 17, 18) for the introduction of said cores (12) one after the other into a channel (24) formed below said upper roller (16), a rotary thruster (35) suitable for making said cores (12) proceed in said channel (24), a glue dispensing group (29) upstream of said channel (24), and a stop element (120) for at least partially stopping the paper (11), defined in an area inside said channel (24), which collaborates with said upper roller (16), on which it acts rotating about a pin (128) thereof, wherein said upper roller (16) is of the suction type.

2. Set up according to claim 1, **characterised in that** said upper suction roller (16) comprises a plurality of longitudinal channels (100) arranged according to a circular crown near to the cylindrical surface portion of said roller (16), each channel (100) being placed in communication with the outside through a plurality of holes (101) on the surface of the roller (16) .
3. Set up according to claim 2, **characterised in that** said suction roller (16) comprises a pair of suction pads (102) in the form of a circular sector arranged aligned with said roller (16), fixed, facing opposite heads, said pads (102) being suitable for causing the suction through the channels (100) located between them.
4. Set up according to claim 1, **characterised in that** said glue dispensing group (29) comprises a rod element (200) equipped with a pointed upper end (203) able to move cyclically, thanks to a mechanism (201), between a position in which said pointed upper end (203) is inside said glue dispensing group (29) and in which it comes into contact with the glue, and a second position in which said pointed upper end (203) is outside of said glue dispensing group (29) and in which it comes into contact with a cylindrical generatrix (300) of the outer surface of said core (12) moving on said conveyor (13).
5. Set up according to claim 4, **characterised in that** said pointed upper end (203) in said second position extends over said conveyor (13).
6. Set up according to claim 1, **characterised in that** said stop element (120) for at least partially stopping

the paper (11) consists of an arm (132) rotating around a pin (128), the position of which is adjustable.

7. Set up according to claim 1, **characterised in that** said stop element (120) for at least partially stopping the paper (11) foresees friction material (133) at a free end thereof.
8. Set up according to claim 1, **characterised in that** said stop element (120) for at least partially stopping the paper (11) acts upon a moving element.
9. Set up according to claim 1, **characterised in that** said channel (24) is defined by curved elements (25) arranged below said upper roller (16).
10. Set up according to claim 1, **characterised in that** said curved elements (25) are side-by-side and are suitable for inserting, at least partially through their ends, in grooves (26) formed in said lower roller (17).

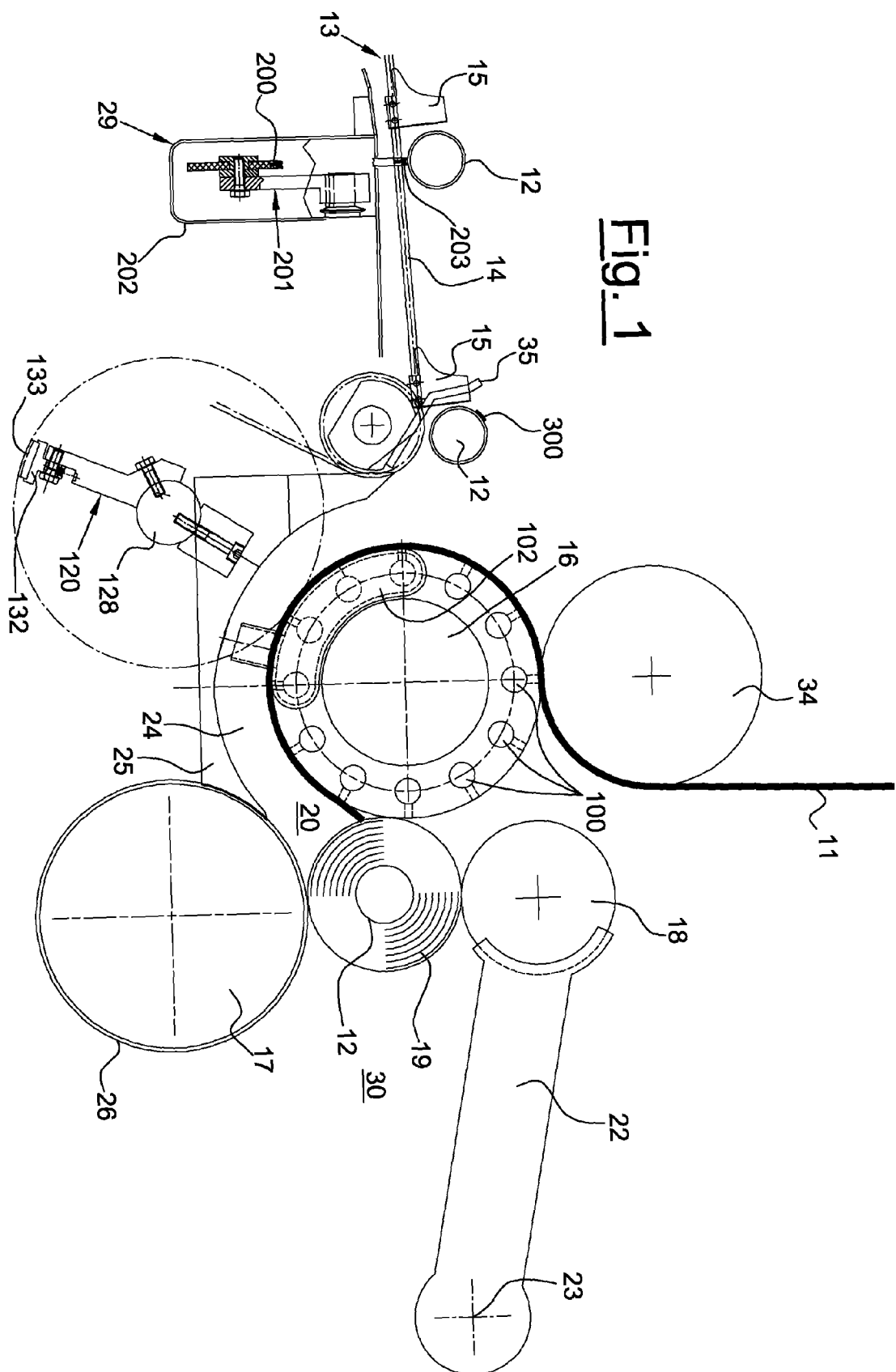
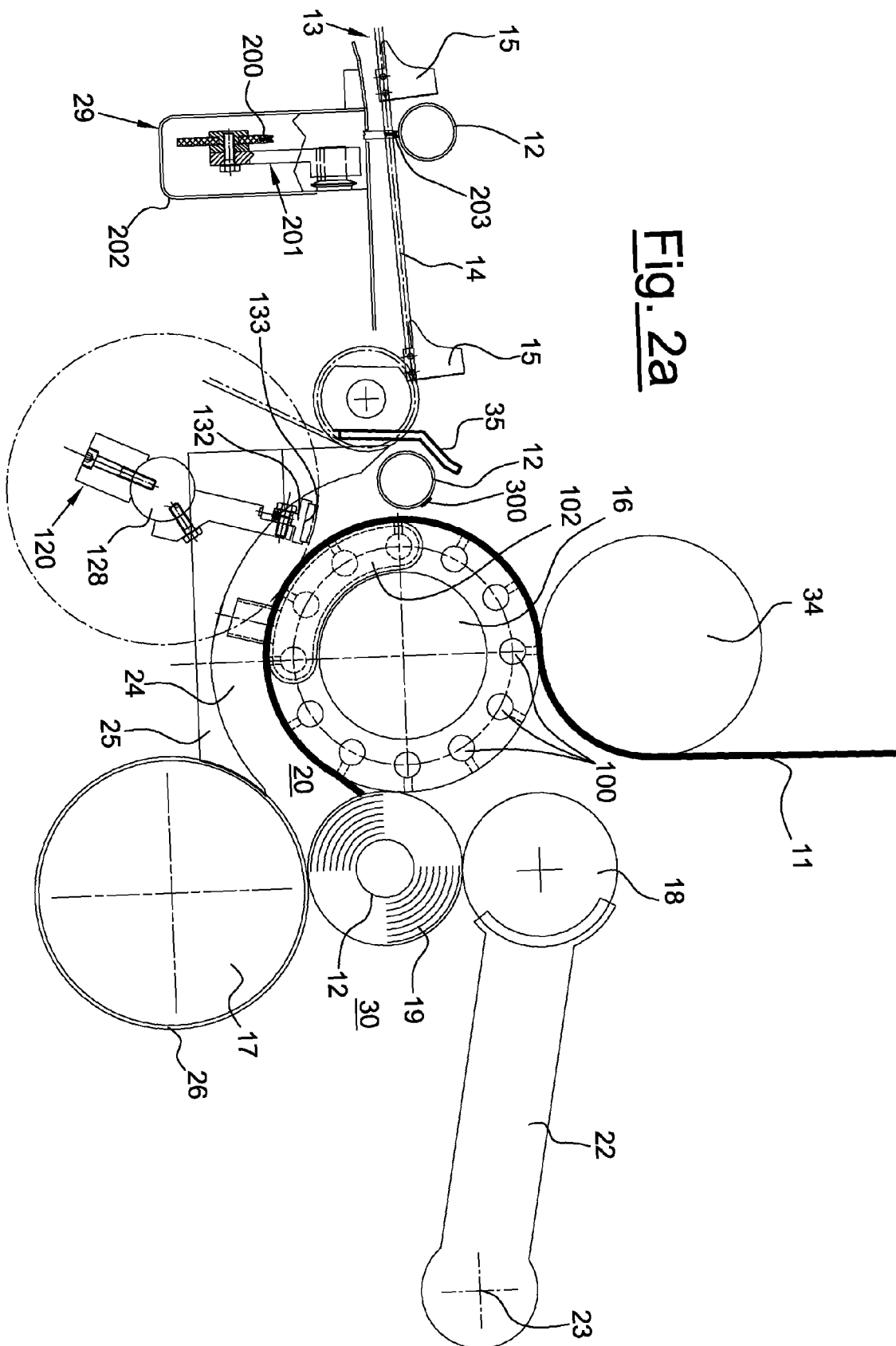


Fig. 2a



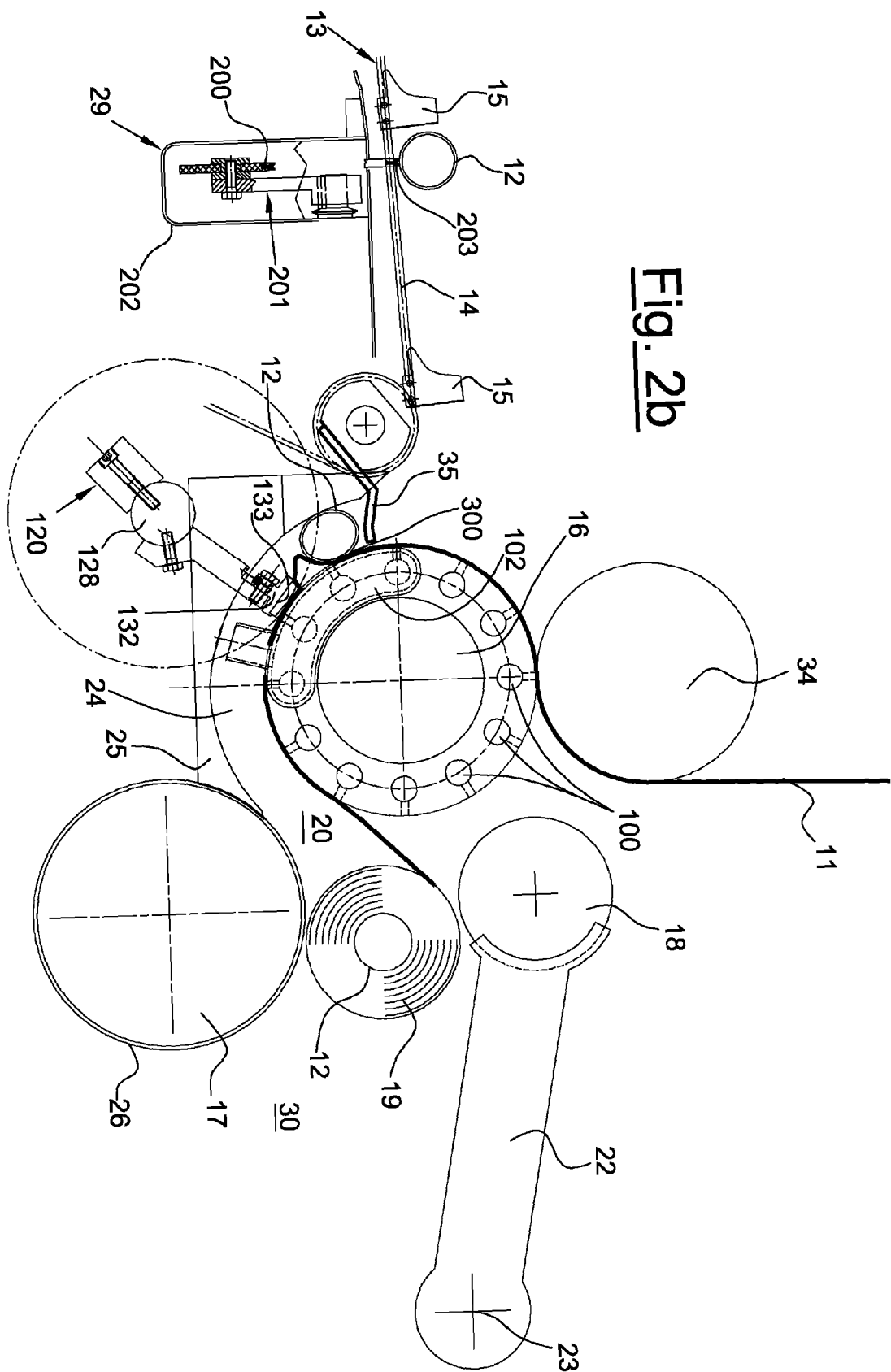
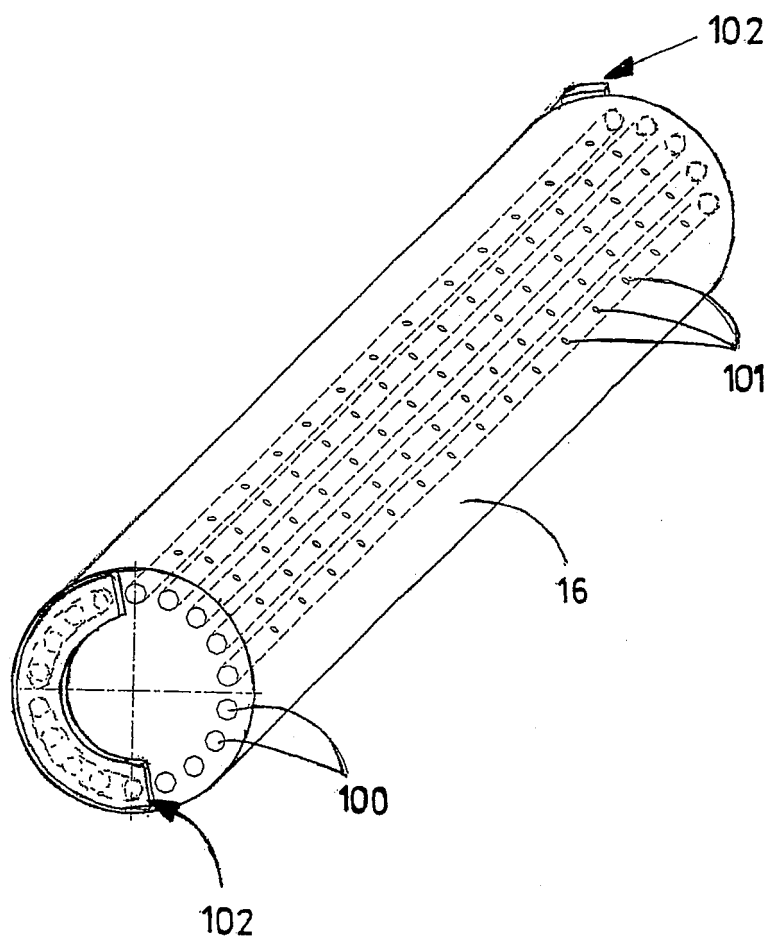


Fig. 2b

Fig. 3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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