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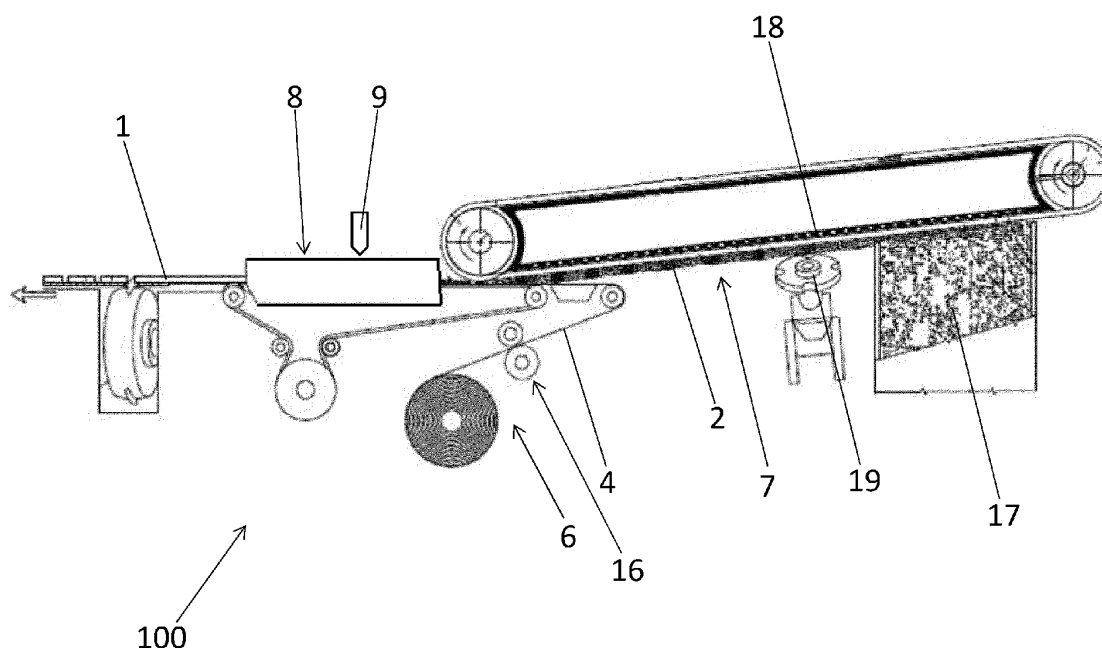
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(54) **METHOD FOR REALIZING A ROD OF THE TABACCO INDUSTRY AND RESPECTIVE MACHINE**

(57) A method for realizing a rod (1) of the tobacco industry, wherein the rod (1) comprises a rope (2) of material of the tobacco industry and a tubular wrapper (3) that wraps the rope (2). The method comprises the steps of: feeding a band (4) of a material intended to form the tubular wrapper (3) of the rod (1); forming a rope (2) of

a material of the tobacco industry; wrapping the band (4) around the rope (2) to form the rod (1); supplying a strip (5) of fluid on the band (4) of a wrapping material (3) and/or on the rope (2) of a material of the tobacco industry; and detecting the presence and/or size of bubbles inside the fluid before supplying said strip (5) of fluid.

Fig. 1



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 10202000009160 filed on 28/04/2020.

TECHNICAL FIELD

[0002] The present invention relates to a method for realizing a rod of the tobacco industry and the respective machine.

[0003] In particular, the rod of the tobacco industry to which the present invention refers comprises a rope of material of the tobacco industry and a tubular wrapper that wraps the rope.

PRIOR ART

[0004] In detail, the rope of material of the tobacco industry can be formed by tobacco, filtering material or a sequence of cylindrical pieces the materials of which can vary (for example, said cylindrical pieces can comprise tobacco, paper, PLA, acetate cellulose). The tubular wrapper that wraps the rope is preferably made of a paper material, which is unwound from a reel; alternatively, it could be obtained by means of a strip of tobacco or other material.

[0005] A machine is known for realizing a rod of the tobacco industry which comprises: means for feeding a band of paper-like wrapping material intended to form the tubular wrapper of the rod; a forming station of the rope of a material of the tobacco industry; a wrapping station in which the band of wrapping material is wrapped around the rope of material of the tobacco industry to form the rod.

[0006] In addition, said machine comprises a station for supplying a fluid in which a strip of fluid is supplied on the band of wrapping material and/or on the rope of a material of the tobacco industry.

[0007] In detail, said supplying station can comprise a nozzle for supplying a strip of glue at one end side of the paper band before or during the wrapping thereof around the rope of a material of the tobacco industry.

[0008] In addition or alternatively, the supplying station can comprise a nozzle for supplying a strip of flavour to the rope of a material of the tobacco industry, in particular during its formation.

[0009] It is common, during the supplying of a strip of fluid (be it glue or flavour or a fluid of another nature) that the latter is not supplied continuously. In other words, it is common for the strips of fluid supplied to have discontinuities.

[0010] Said discontinuities lead to the formation of defective products. Furthermore, in the worst cases, said discontinuities can cause the rod to break during its formation with a consequent sudden and unexpected stop

of the machine.

[0011] A method according to the preamble of the present invention is described in the document US4115085. In order to eliminate the bubbles inside the fluid, said document uses mechanical means for separating the bubbles from the flow of fluid directed to the supplying nozzle. Other mechanical means for separating the bubbles from the flow of fluid directed to the supplying nozzle are described in documents GB693523 and GB1524829.

DESCRIPTION OF THE INVENTION

[0012] Therefore, the aim of the present invention is to provide a method for realizing a rod of the tobacco industry and a respective machine that overcome at least one of the aforementioned drawbacks.

[0013] In particular, the aim of the present invention is to provide a method (and respective machine) for realizing a rod of the tobacco industry such as to identify any defective product without checking the product itself.

[0014] Furthermore, the subject of the present invention is to provide a method (and respective machine) for realizing a rod of the tobacco industry such as to decrease, substantially cancel, the probability of the rod breaking due to the presence of discontinuities in the fluids being part of the rod.

[0015] Said purpose is achieved with a method for realizing a rod of the tobacco industry and a respective machine according to the attached claims.

[0016] Advantageously, the proposed method and machine allow to detect the presence and/or size of bubbles inside the fluid before supplying the fluid so as to be able to intervene before any creation of the discontinuity and/or identify the part of the rod that will lead to the formation of defective products.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present invention will now be described with reference to the attached drawings, which illustrate a non-limiting embodiment example thereof, wherein:

- Figure 1 illustrates in a lateral and schematic view an embodiment of the machine subject of the present invention;
- Figure 2 illustrates a schematic front view of the supplying station of the machine of Figure 1;
- Figure 3 is a plan view of the band intended to form the tubular wrapper to which a strip of fluid has been applied;
- Figure 4 is a sectional view of the rod, in a forming step, produced by the machine of Figure 1;
- Figures 5 and 6 are schematic front views of the supplying station according to respective embodiments alternative to that of Figure 2.

PREFERRED EMBODIMENTS OF THE INVENTION

[0018] With reference to Figures 1, the numerical reference 100 denotes a machine for realizing a rod 1 of the tobacco industry subject of the present invention, wherein the rod 1 comprises a rope 2 of material of the tobacco industry and a tubular wrapper 3 that wraps the rope 2.

[0019] With reference to Figure 1, a machine 100 intended for forming tobacco pieces is illustrated. In detail, the rod 1 realized by said machine 100 has a rope 2 of tobacco and a wrapper 3 made starting from a paper band. Downstream from the formation of the rod 1, said machine 100 provides for the transversal cutting of the rod so as to form pieces of tobacco.

[0020] It is understood that the proposed solution also finds advantageous application in other types of machines in the tobacco field.

[0021] For example, the proposed solution finds advantageous application in machines for forming pieces of filters in which the rope 2 is of a filtering material (for example, cellulose acetate) and the wrapper 3 is made starting from a paper band.

[0022] According to a further embodiment, the proposed solution finds advantageous application in machines for forming bar-shaped articles of the tobacco field formed of several pieces. In said case, the rope 2 is made from a sequence of cylindrical pieces and the wrapper 3 is made starting from a paper band.

[0023] In other words, the rope 2 can be formed of tobacco (sliced, in powder, in a band, in a collected and possibly crimped sheet), of filtering material (for example, paper or cellulose acetate) or of sequences of tubular pieces of different nature. The tubular wrapper 3 is preferably obtained starting from a band (unwound from a reel) of paper material; alternatively, the wrapper 3 could be obtained from a strip of tobacco or other material.

[0024] The machine 100 comprises: means 6 for feeding a band 4 of wrapping material intended to form the tubular wrapper 3 of the rod 1; a forming station 7 of the rope 2 of a material of the tobacco industry; a wrapping station 8 in which the band 4 of wrapping material 3 is wrapped around the rope 2 of material of the tobacco industry to form the rod 1; a supplying station 9 of a fluid in which at least one strip 5 of fluid is supplied on the band 4 of wrapping material 3 and/or on the rope 2 of a material of the tobacco industry. It should be noted that the at least one strip 5 of fluid can be a single longitudinal line of fluid or can have several longitudinal, and preferably parallel, lines of fluid (they can be obtained, for example, by means of a suitable mask arranged at the outlet of the supply nozzle 11).

[0025] With further reference to Figure 1, the band 4 is unwound starting from a reel and, by means of suitable return and/or tensioning and/or dragging rollers 16, is fed into the wrapping station 8 in which said band 4 is wound around the rope 2.

[0026] The forming station 7 of the rope 2, according

to the machine 100 illustrated in Figure 1, comprises: an ascending chimney 17 from which the tobacco is fed; a suction conveyor belt 18 that receives the tobacco from the ascending chimney 17, which forms the rope 2 of tobacco and which feeds said rope 2 of tobacco to the wrapping station 8; a scraper 19 arranged downstream of the ascending chimney 17 and having the function of regulating the tobacco in the rope 2 being formed.

[0027] The supplying station 9 comprises: a tank 10 which contains the fluid; a fluid supply nozzle 11; a conduit 12 that connects the tank 10 and the nozzle 11.

[0028] The tank 10 can work either by gravity or by pressure, i.e., the fluid can flow out of the tank 10 towards the conduit 12 solely by virtue of the force of gravity or by a pressure applied thereto.

[0029] The fluid supply nozzle 11 is preferably a nozzle of the spreader type. Alternatively, the nozzle 11 could be of the spray type.

[0030] With further reference to Figure 1, the supplying station 9 is arranged at the wrapping station 8. In particular, the fluid is glue and the supplying station 9 is arranged at the wrapping station 8 so as to deliver a strip 5 of glue at the band 4 of wrapping material 3. With reference to Figure 4, the strip 5 of glue is applied at one end of the band 4 of wrapping material so as to glue the two ends of the band 4 of wrapping material together in order to form the tubular wrapper 3.

[0031] According to an alternative embodiment (not illustrated), the supplying station 9 could be arranged upstream of the wrapping station 8; in said case, the strip 5 of fluid (glue in this case) would be supplied at the band 4 of wrapping material moving towards the wrapping station 8.

[0032] Preferably, the fluid is glue (for example, of the Hot Melt type or of the PVA type). Alternatively, the fluid could be a flavouring fluid (for example, menthol) or a fluid to be added to tobacco to avoid accumulation thereof. In said case, the fluid would have to be added to the rope 2. In said case, the supplying station 9 would be arranged at the forming station 7 of the rope 2; for example, the supplying station 9 could be arranged downstream of the ascending chimney 17.

[0033] According to the present invention, the supplying station 9 comprises sensor means 13 arranged at the conduit 12 and adapted to detect the presence and/or size of bubbles inside the fluid. Said sensor means 13 are arranged upstream of the fluid supply nozzle 11.

[0034] Therefore, by detecting any bubbles inside the fluid before the creation of the discontinuity in the strip 5 of fluid, it is possible to intervene promptly thus avoiding either the production of products to be discarded or unexpected stops of the machine 100 or by identifying parts of the rod 1 that will form products to discard.

[0035] Preferably, the sensor means 13 comprise an ultrasonic sensor 13a which detects the presence and size of bubbles inside the fluid. Said ultrasonic sensor 13a is arranged around the conduit 12. Preferably, said sensor 13a is arranged as close as possible to the supply

nozzle 11.

[0036] Alternatively, the sensor means 13 can comprise a first sensor that detects the presence of bubbles inside the fluid and a second sensor that detects the size of the bubbles inside the fluid.

[0037] The machine 100 comprises, furthermore, a control unit 14 which is connected to the sensor means 13 and which receives the data detected by said sensor means 13.

[0038] The machine 100 also comprises alarm means 15 which are connected to the control unit 14 and which can emit an alarm signal (for example, an optical or sound signal) on the basis of the data detected by the sensor means 13. In particular, said alarm means 15 will be activated by the control unit 14 to emit an alarm signal if at least one bubble is detected inside the fluid and/or if the size of said bubble is greater than a predetermined threshold value.

[0039] Preferably, the sensor means 13 are adapted to detect the flow rate of the fluid inside the conduit 12. In other words, the sensor means 13 detect the quantity of fluid that passes through a section of the conduit 12 per time unit. In detail, according to the preferred embodiment, it is the ultrasound sensor 13a that also detects the flow rate of the fluid. Alternatively, the sensor means can comprise a specific sensor for measuring the flow rate of the fluid in the conduit 12.

[0040] According to Figure 2, the supplying station can comprise a pump 16 which is arranged at the conduit 12 (upstream with respect to the sensor means 13) and which is controlled by the control unit 14, on the basis of the data detected by the sensor means 13, so that the flow rate of the fluid is equal to a predetermined flow rate value or is kept within a range of predetermined flow rate values. Advantageously, an autocalibration of the pump 16 is performed.

[0041] According to the embodiments illustrated in Figures 5 and 6, the conduit 12 comprises a first section 12a that connects the tank 10 and the nozzle 11 and a second section 12b which departs from the first section 12a and is arranged downstream of the sensor means 13, in particular of the sensor 13a, and upstream of the nozzle 11.

[0042] In particular, the second section 12b departs from the first section 12a upwards so that any bubbles inside the fluid, which tend to move upwards, are brought to move towards the second section 12b.

[0043] The second section 12b has a first end which is connected to the first section 12a and a second end which is free (Figure 5); in said case, the second portion 12b of the conduit 12 acts as a vent. Alternatively, according to the embodiment of Figure 6, the second end of the second section 12b is connected to the tank 10; in this case, the second section 12b of the conduit 12 acts as a bypass.

[0044] Furthermore, the supplying station 9 can also comprise a valve (not illustrated) which is arranged along the second portion 12b of the conduit 12. Preferably, said valve is arranged near the first end of the second portion

12b of the conduit 12.

[0045] Preferably, said valve is controlled by the control unit 14 which controls the opening thereof in the case in which at least one bubble is detected inside the fluid and/or in the case in which the dimension of said bubble is greater than a predetermined threshold value. In other words, said valve is closed during the normal operation of the machine 100 and is opened if at least one bubble is detected inside the fluid and/or if the size of said bubble is greater than a predetermined threshold value.

[0046] It is understood that the machine 100 can comprise two or more supplying stations 9, which can supply fluids of different nature. For example, one of said supplying stations 9 could supply hot glue and another of said supplying stations 9 could supply PVA (vinyl) glue. In said case, the sensor means 13 may comprise two or more sensors, preferably ultrasonic ones, to detect the presence and/or the size of bubbles inside the respective fluids.

[0047] According to a further embodiment, the machine 100 can be a machine for realizing two rods 1 of the tobacco industry. In said case, the machine 100 comprises: means 6 for feeding two bands 4 of wrapping material intended to form the tubular wrapper 3 of the respective rods 1; a forming station 7 of the ropes 2 of a material of the tobacco industry; a wrapping station 8 in which the bands 4 of wrapping material 3 are wrapped around the respective ropes 2 to form the rods 1. In particular, in this embodiment the machine 100 comprises at least two supplying stations 9, one for each rod 1.

[0048] The method for realizing a rod 1 of the tobacco industry using the machine 100 described above, also part of the present invention, is described in the following.

[0049] The method subject of the present invention comprises the steps of:

- feeding a band 4 of wrapping material intended to form the tubular wrapper 3 of the rod 1;
- forming a rope 2 of a material of the tobacco industry;
- wrapping the band 4 of wrapping material around the rope 2 of material of the tobacco industry to form the rod 1 of the tobacco industry;
- supplying a strip 5 of fluid on the band 4 of wrapping material and/or on the rope 2 of a material of the tobacco industry.

[0050] Furthermore, the method comprises the step of detecting the presence and/or the size of bubbles inside the fluid before supplying said strip 5 of fluid on the band 4 of wrapping material and/or the rope 2 of a material from the tobacco industry.

[0051] Advantageously, by detecting any bubbles inside the fluid before the creation of the discontinuity in the strip 5 of fluid, it is possible to intervene promptly avoiding either the production of products to be discarded or unexpected stops of the machine 100 or identifying parts of the rod 1 that will form products to discard.

[0052] According to a first embodiment of the method,

if the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value, the method comprises the steps of:

- stopping the machine 100 for forming the rod 1 of the tobacco industry;
- cleaning the nozzle 11 with which the fluid is supplied;
- restarting the machine 100 for forming the rod 1 of the tobacco industry.

[0053] Therefore, according to this first embodiment, the machine 100 is stopped in a controlled manner, the supply nozzle 11 is cleaned and then the machine 100 is restarted (with manual or automatic restart). It is understood that, as known to one skilled in the art, restarting of a machine 100 following a controlled stop is less time consuming and simpler than a restart following an undesired stop of the machine 100.

[0054] In particular, said first embodiment of the method is particularly advantageous in the case in which the size of the bubble is greater than a threshold value (in other words, in the case in which the bubble is "large"): in fact, larger dimensions of the bubble with respect to said threshold value would cause the formation of a discontinuity such as to cause the undesired stop of the machine.

[0055] The step of cleaning the nozzle 11 involves discarding the fluid from the nozzle 11 in order to release the detected bubble.

[0056] According to a second embodiment of the method, the method comprises the step of decreasing the speed of the machine 100 for forming the rod 1 of the tobacco industry in the case the presence of at least one bubble is detected inside the fluid and the size of said bubble is smaller than a predetermined threshold value.

[0057] By speed of the machine 100 we mean the length of a rod 1 produced per time unit. In particular, the fact of decreasing the speed of the machine 100 is particularly advantageous in the case in which the size of the bubble is smaller than the threshold value (in other words, in the case in which the bubble is "small"): in fact, the bubble having smaller dimensions than said threshold value would cause the formation of a discontinuity in which there would be no undesired stop of the machine but only the production of articles to be discarded (which can possibly be subsequently checked).

[0058] Preferably, the method comprises the step of emitting an alarm signal (for example, an optical and/or sound signal) in the case the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value.

[0059] The method can comprise the step of detecting the flow rate of the fluid inside the conduit 12. Furthermore, the method comprises the step of controlling the pump 16, on the basis of the detected flow rate, so that the flow rate of the fluid is equal to a value of a predeter-

mined flow rate or is kept within a range of predetermined flow rate values.

[0060] With reference to the supplying station 9 of Figure 5 or 6, a further embodiment of the method comprises, if the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value, the step of allowing the bubble come out from the fluid through the second portion 12b of the conduit 12. This last step comprises the sub-step of opening the valve, allowing the bubble to come out from the fluid through the second portion 12b of the conduit 12 and reclosing the valve.

[0061] Advantageously, the proposed method and machine allow to avoid the unexpected stop of the machine 100 due to the presence of bubbles in the fluid (in particular glue or flavouring agent) or by means of a controlled stop of the machine 100 (which controlled stop allows a restart, automatic or manual, simpler than an unexpected stop due for example to the breaking of the rod) or by reducing the speed of the machine 100.

[0062] In particular, the controlled stop of the machine 100 is preferred in the case in which the detected bubble has a larger size than a predetermined threshold value and in the case in which it is not desired to produce products that may be discarded. Instead, the decrease in the speed of the machine 100 is preferred in the case in which the detected bubble has a smaller size than a predetermined threshold value (in this case there is no undesired stop of the machine but only products possibly to be discarded).

Claims

1. Method for realizing a rod (1) of the tobacco industry, by means of a machine (100) of the tobacco industry, wherein the rod (1) comprises a rope (2) of material of the tobacco industry and a tubular wrapper (3) that wraps the rope (2), the method comprising the steps of:

- feeding a band (4) of a wrapping material intended to form the tubular wrapper (3) of the rod (1);
- forming a rope (2) of a material of the tobacco industry;
- wrapping the band (4) of a wrapping material around the rope (2) of material of the tobacco industry to form the rod (1) of the tobacco industry; and
- supplying a strip (5) of fluid on the band (4) of a wrapping material (3) and/or on the rope (2) of material of the tobacco industry;

the method is characterized in that it comprises the step of detecting the presence and/or size of bubbles inside the fluid before supplying said strip (5) on the band (4) of a wrapping material and/or on the

rope (2) of a material of the tobacco industry.

2. The method according to claim 1, wherein if the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value, the method comprises the steps of:

- stopping the machine (100) for forming the rod (1) of the tobacco industry;
- cleaning the nozzle (11) with which the fluid is supplied; and
- restarting the machine (100) for forming the rod (1) of the tobacco industry.

3. The method according to claim 1, comprising the step of decreasing the speed of the machine (100) for forming the rod (1) of the tobacco industry in the case the presence of at least one bubble is detected inside the fluid and the size of said bubble is smaller than a predetermined threshold value.

4. The method according to any one of the preceding claims, wherein the machine (100) comprises a supplying station (9) of the fluid which comprises a tank (10) containing the fluid, a fluid supply nozzle (11); a conduit (12) that connects the tank (10) and the nozzle (11); the conduit (12) comprising a first section (12a) that connects the tank (10) and the nozzle (11) and a second section (12b) having a first end which is connected to the first section (12a) and a second end which is free or connected to the tank (10); if the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value, the method comprises the steps of:

- opening a valve arranged in the second section (12b) of the conduit (12);
- allowing the bubble to come out from the second section (12b) of the conduit (12); and
- closing the valve.

5. The method according to any one of the preceding claims, comprising the step of emitting an alarm signal in the case of the presence of at least one bubble is detected inside the fluid and/or the size of said bubble is greater than a predetermined threshold value.

6. The method according to any one of the preceding claims, comprising the steps of:

detecting the flow rate of the fluid inside a conduit (12), which conduit (12) connects a tank (10) that contains the fluid and a fluid supply nozzle (11);

controlling a pump (16) arranged along the conduit (12), based on the detected flow rate, so that the flow rate of the fluid is equal to a predetermined flow rate value or is kept within a range of predetermined flow rate values.

7. The method according to any one of the preceding claims, wherein the step of detecting the presence and/or the size of bubbles inside the fluid is performed by means of an ultrasonic sensor.

8. A machine (100) to realize a rod (1) of the tobacco industry, wherein the rod (1) comprises a rope (2) of material of the tobacco industry and a tubular wrapper (3) which wraps the rope (2), comprising:

feeding means (6) of a band (4) of wrapping material intended to form the tubular wrapper (3) of the rod (1);

a forming station (7) of the rope (2) of a material of the tobacco industry;

a wrapping station (8) wherein the band (4) of wrapping material (3) is wrapped around the rope (2) of material of the tobacco industry to form the rod (1);

a supplying station (9) of a fluid wherein a strip (5) of fluid is supplied on the band (4) of a wrapping material (3) and/or on the rope (2) of a material of the tobacco industry, which supplying station (9) comprises: a tank (10) that contains the fluid; a fluid supply nozzle (11); a conduit (12) connecting the tank (10) and the nozzle (11);

the machine (100) **is characterized in that** the supplying station (9) comprises sensor means (13) arranged at the conduit (12) and able to detect the presence and/or the size of bubbles inside the fluid.

9. The machine (100) according to claim 8, wherein the fluid is glue and wherein the supplying station (9) is arranged upstream or at the wrapping station (8) so as to supply a strip (5) of glue on the band (4) of wrapping material (3).

10. The machine (100) according to claim 8 or 9, wherein the sensor means (13) comprise an ultrasonic sensor (13a) that detects the presence and/or the size of bubbles inside the fluid.

11. The machine (100) according to any one of the claims from 8 to 10, wherein the conduit (12) comprises a first section (12a) that connects the tank (10) and the nozzle (11) and a second section (12b) having a first end which is connected to the first section (12a) and a second end which is free or which is connected to the tank (10).

12. The machine (100) according to claim 11, comprising a control unit (14) that is connected to the sensor means (13) and which receives the data detected by said sensor means (13) and wherein the supplying station (9) comprises a valve which is arranged along the second section (12b) of the conduit (12) and which is controlled by the control unit (14), in particular said valve is opened in the case in which at least one bubble is detected inside the fluid and/or in the case in which the size of said bubble is greater than a predetermined threshold value.

13. The machine (100) according to any one of the claims from 8 to 12, comprising:

a control unit (14) which is connected to the sensor means (13) and which receives the data detected by said sensor means (13);
alarm means (15) which are controlled by the control unit (14) and which emit an alarm signal on the basis of the data detected by the sensor means (13), in particular they emit an alarm signal in the case in which at least a bubble is detected inside the fluid and/or in the case in which the size of said bubble is greater than a predetermined threshold value.

14. The machine (100) according to any one of the claims from 8 to 13, wherein the sensor means (13) are adapted to detect the flow rate of the fluid inside the conduit (12) and wherein:

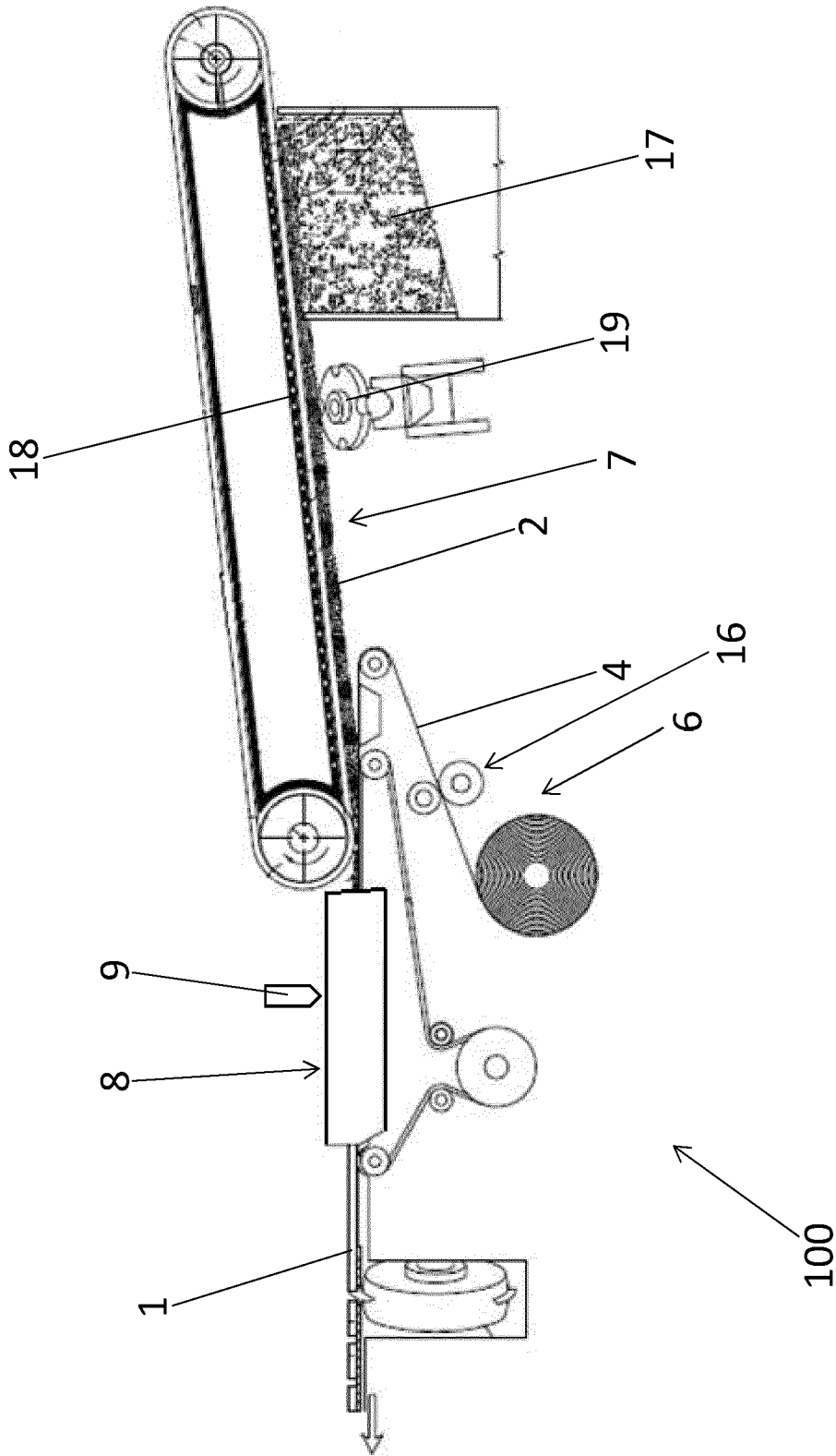
the machine (100) comprises a control unit (14) that is connected to the sensor means (13) and which receives the data detected by said sensor means (13); and
the supplying station (9) comprises a pump (16) which is arranged at the conduit (12) and which is controlled by the control unit (14), on the basis of the data detected by the sensor means (13), so that the flow rate of the fluid is equal to a predetermined flow rate value or is maintained within a range of predetermined flow rate values.

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Fig. 1



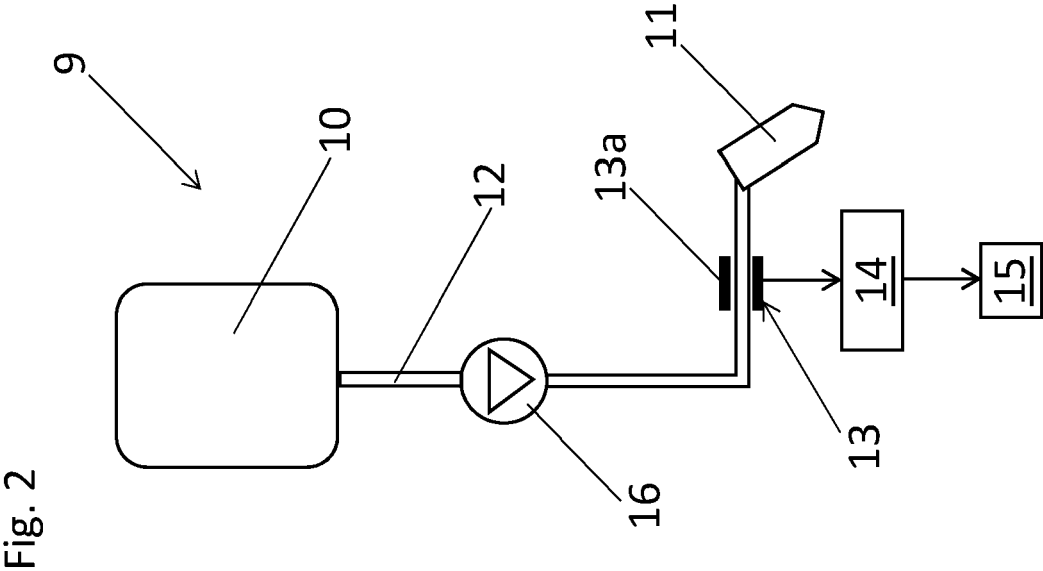
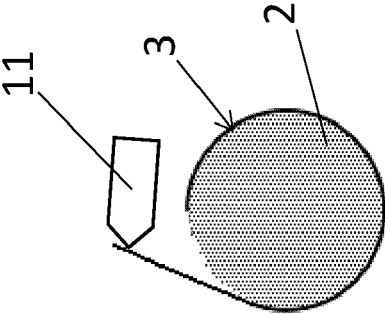
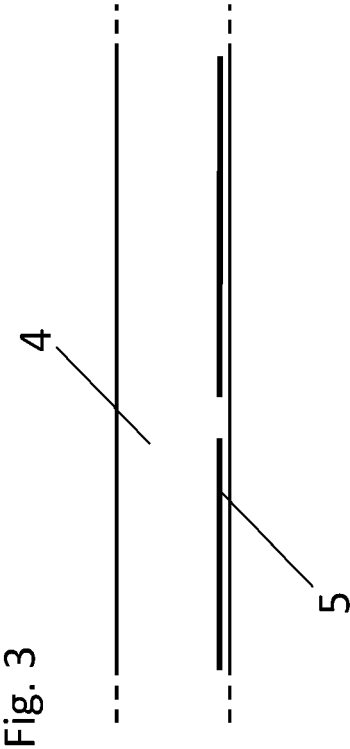


Fig. 6

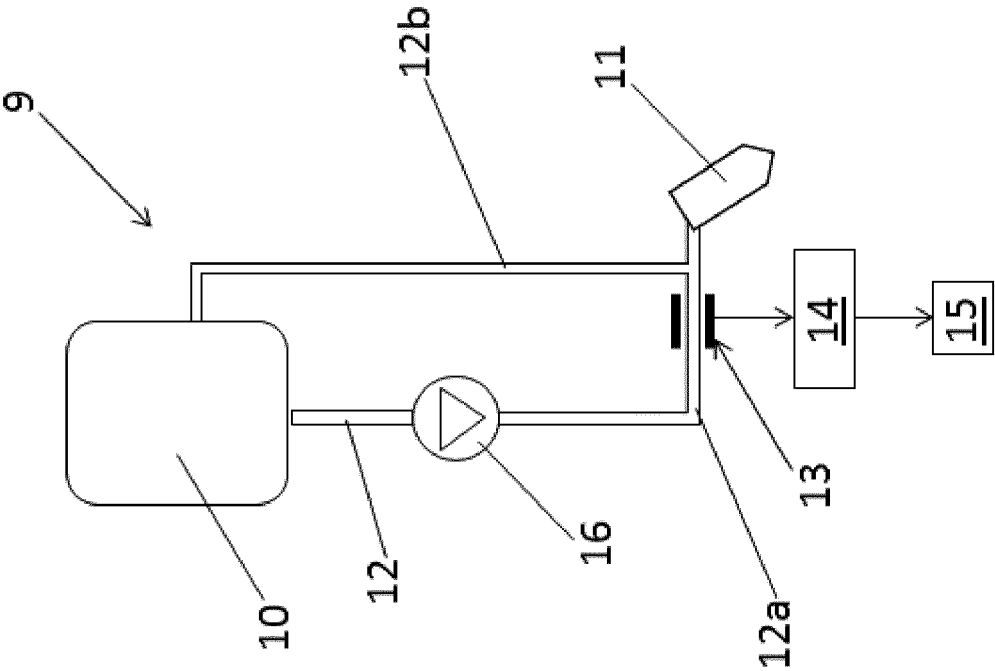
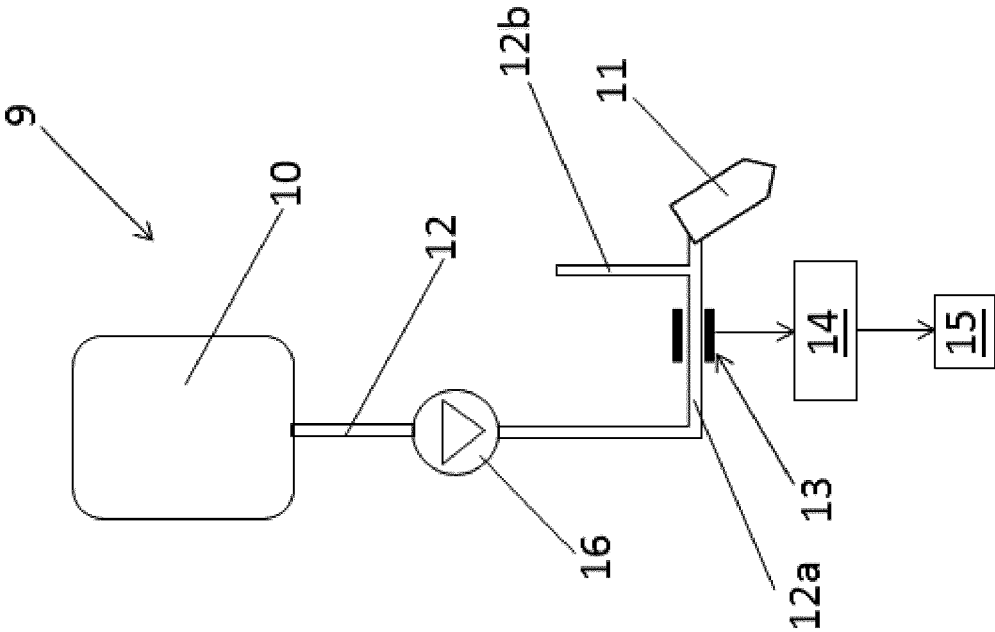


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 21 17 1032

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	GB 693 523 A (AMERICAN TOBACCO CO) 1 July 1953 (1953-07-01) * page 1, line 53 - line 65 * -----	1-14	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 September 2021	Examiner Coniglio, Carlo
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			

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

EP 21 17 1032

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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