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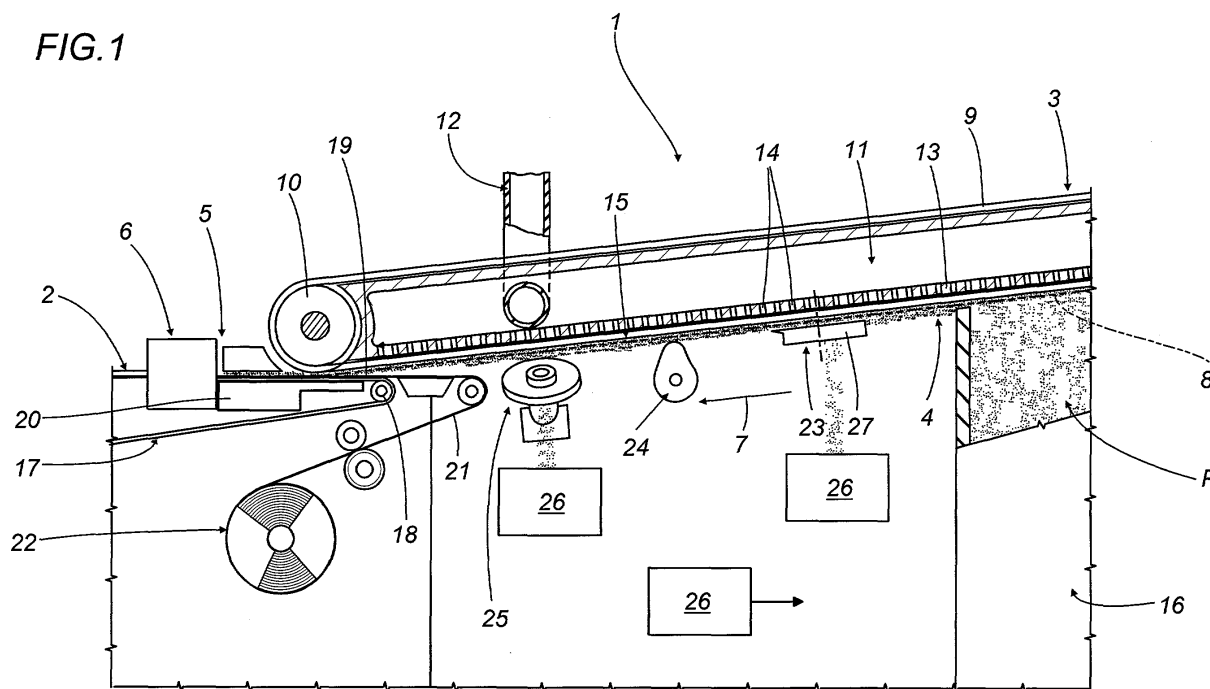
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(54) **A unit and a method for forming a continuous cigarette rod in a cigarette maker**

(57) A continuous cigarette rod (2) is prepared by a unit (1) comprising a looped conveyor (3) on which a continuous stream (4) of tobacco particles (P) advances toward the entry point (5) of a forming station (6) where the rod (2) is assembled. Also forming part of the unit (1), ordered in sequence along a predetermined feed path (8), are a first trimming device (23) designed to pro-

duce a cyclical skimming action, a compactor device (24) operating synchronously with the first trimming device (23), serving to increase the density of the stream (4) selectively at points coinciding with the portions skimmed by the first trimming device (23), and a second trimming device (25) by which the thickness of the stream is reduced uniformly to a prescribed value (S2).

FIG. 1



Description

[0001] The present invention relates to a unit and to a method for forming a continuous cigarette rod in a cigarette making machine, whether equipped with a single processing line or with two such lines.

[0002] A conventional cigarette maker of the type that operates by forming a continuous cigarette rod will generally comprise a vertical riser duct fed at the bottom end with a continuous flow of tobacco fibres and communicating at the top end with an aspirating conveyor belt on which a continuous stream of loose tobacco filler is formed.

[0003] The stream of tobacco filler is carried by the aspirating belt along a predetermined path toward a feed unit supplying a continuous strip of paper which is directed onto and along a forming block and wrapped progressively around the stream of tobacco to generate a continuous cigarette rod.

[0004] To ensure that cigarettes have compact ends, thus minimizing the loss of tobacco during successive steps of the manufacturing process and when handled by the smoker, the cigarette maker is equipped with suitable compression means, positioned along the aforementioned path, of which the function is to densify and compact predetermined portions of the tobacco stream that will ultimately form the ends of the cigarettes.

[0005] The tobacco is attracted by a bottom branch of the aspirating conveyor belt and gathered into a stream that does not present a uniform thickness, but will be of thickness greater at any given point than a prescribed value enabling it to be enveloped by the paper. This non-uniformity of thickness is attenuated at a first trimming station positioned upstream of the compression means, which removes a part of the tobacco so as to render the thickness of the stream more consistent and thus ensure that the compacted portions are of uniform density.

[0006] Finally, the conventional machines in question comprise a second trimming station downstream of the compression means, of which the function is to adjust the stream of tobacco to the aforementioned prescribed thickness before it is enveloped by the paper strip.

[0007] The tobacco removed at the two trimming stations is reclaimed by appropriate recovery means and put back into the cycle at a given point upstream of where the stream is formed, for example added to the continuous flow of tobacco fibres supplied to the riser duct.

[0008] The reclaimed tobacco is however significantly degraded as the result of undergoing two trimming steps, the particles being unable to bind either with one another or with more fibrous material and thus easily lost from the cut ends of a cigarette, so that the compression step included precisely in order to prevent such losses is rendered fruitless.

[0009] Due to the presence of extremely small particles, moreover, the reclaimed tobacco has limited filling capacity and is not of constant density, factors which

jeopardize the quality of the cigarettes.

[0010] In addition, the foregoing considerations apply for each of the single lines in a cigarette maker generating two cigarette rods, where the two lines run mutually parallel and at an extremely short distance one from another for accepted reasons of structural and functional optimization.

[0011] The object of the present invention is to provide a unit and a method for forming a continuous rod in a cigarette maker such as will be unaffected wholly or at least in part by the aforementioned drawback.

[0012] One object of the invention in particular is to provide a unit for forming a continuous cigarette rod in a cigarette maker, and a relative method, such as will ensure that the reclaimable degraded tobacco is not shredded to excess.

[0013] The stated object and others besides are realized in a unit for forming a continuous cigarette rod in a cigarette maker as recited in claim 1 appended, and in a relative method as recited in claim 10.

[0014] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a schematic elevation view of a unit for forming a continuous cigarette rod, embodied in accordance with the present invention;
- figure 2 shows a detail of the unit in figure 1, viewed from above with certain parts omitted better to reveal others;
- figure 3 is the section on III-III in figure 2;
- figures 4a, 4b, 4c and 4d illustrate successive processing steps performed on the tobacco rod by the unit according to the invention.

[0015] Figure 1 of the drawings illustrates a unit 1 for forming a continuous cigarette rod 2, constituting part of a cigarette making machine.

[0016] Such a unit 1 comprises a conveyor 3 by which a continuous stream 4 of tobacco particles is fed toward the entry point 5 of a forming station 6 serving to generate a continuous cigarette rod 2, advancing in a predetermined direction 7 along a predetermined path 8. The forming station 6 is of conventional embodiment and therefore not described further.

[0017] The conveyor 3 preferably takes the form of an aspirating belt 9 looped around rollers 10 at each end (one only of which is illustrated in figure 1) rotatable about mutually parallel and horizontal axes. The aspirating belt 9 establishes a closed loop compassing a chamber 11 connected by way of a relative duct 12 to a source of negative pressure (not illustrated) and delimited at the bottom by a wall 13 pierced with suction holes 14.

[0018] The bottom branch 15 of the conveyor belt 9 runs in sliding contact with the wall 13 and is able to retain the fibrous tobacco particles P by suction as they emerge from a vertical riser duct 16 (of which only the

left hand part is shown in figure 1) positioned beneath the bottom branch 15, so that the tobacco particles are formed into a continuous stream 4.

[0019] Operating at the entry point 5 of the station 6 where the continuous cigarette rod 2 is formed, the unit 1 comprises a looped conveyor 17 of which one branch extends beneath the bottom branch 15 of the aspirating belt 9, occupying a zone of convergence with this same belt 9.

[0020] The looped conveyor 17 passes around rollers 18 (one only of which is illustrated in figure 1) and includes a top branch 19 located in sliding contact with a table 20, which serves to support a strip of cigarette paper 21 decoiled from a roll 22.

[0021] The stream 4 of tobacco filler is released by the aspirating conveyor 9 onto the strip of paper 21 and carried into the forming station 6, where it is enveloped by the selfsame paper 21.

[0022] To prepare the stream 4 of tobacco filler for the subsequent step of being enveloped in the paper 21, predetermined portions C of densified consistency are created (see figures 4b to 4d), such as will prevent the filler being shed from the cut ends of the single cigarettes during subsequent steps of the manufacturing process. Accordingly, the unit 1 comprises a first trimming device 23 installed on the predetermined path 8 followed by the stream 4 and operating upstream of the forming station 6, also means 24 operating downstream of the first trimming device 23 relative to the feed direction 7 and serving to densify parts of the tobacco filler coinciding with the portions C aforementioned, and a second trimming device 25 operating downstream of the densifying means 24.

[0023] The first trimming device 23 brings about a first reduction in thickness of the stream 4 of tobacco filler at predetermined areas, as will become clear in due course.

[0024] The densifying means 24 and the second trimming device 25 are of conventional type. In the example illustrated, the densifying means 24 consist in cam-operated forcing elements (one for each line) and the second trimming device 25 comprises a pair of contrarotating circular blades.

[0025] Located in conventional manner beneath the first trimming device 23 and second trimming device 25 are respective recipients, indicated schematically as blocks denoted 26, positioned to collect the shredded tobacco removed by the trimming operation. The reclaimable shredded tobacco is directed back into the processing cycle through the action of conventional recovery means not illustrated in the drawings.

[0026] As illustrated in figures 2 and 3 and figure 4, the first trimming device 23 serves to reduce the thickness of the stream 4 at predetermined areas corresponding to the aforementioned predetermined densified portions C, and is therefore synchronized in operation with the densifying means 24.

[0027] The densifying means 24 and the first trimming

device 23 operate synchronously with a cutter of familiar type, not illustrated, located downstream of the forming station 6 and timed to divide the continuous cigarette rod into single sticks in such a manner that the densified areas coincide with the cut ends of the sticks.

[0028] More precisely, and referring to figures 4a, 4b, 4c and 4d, because the stream 4 transported away from the riser duct 16 is of irregular thickness and presents a non-uniform profile, deliberately accentuated in figure 4a, it is subjected to a first trimming step (figure 4b) only along the predetermined portions C destined to undergo the action of the densifying means 24, in such a way as to render the thickness of these same portions C uniform at a predetermined value S1 (figure 4c).

[0029] Following the compression step, the stream 4 undergoes a second trimming step (figure 4d) along its entire length, in such a way as to establish a predetermined thickness denoted S2.

[0030] In this way, the portions N not subjected to the action of the densifying means 24 are trimmed once only, with the result that the quantity of tobacco ultimately degraded is substantially reduced.

[0031] Referring to figures 2 and 3, the first trimming device 23, designed to carry out the first trimming step, comprises a rotating knife 27 spaced apart from the bottom branch 15 of the aspirating belt 9 at a distance equivalent to the first thickness S1.

[0032] More exactly, the rotating knife 27 comprises a disc 28 furnished with at least one blade 30 that extends radially from the peripheral edge 29 of the disc 28.

[0033] As illustrated in figure 2, the disc 28 presents just one blade 30 appearing as an arc to a circle concentric with the disc. The number of individual blades 30 presented by the disc 28, the angular distance compassed by each blade 30 on the edge 29 of the disc 28, and the radius of the blade 30, are design parameters that can vary, without prejudice to the scope of the present invention, according to the characteristics of the cigarettes in production or to the specifications of the machine.

[0034] The disc 28 rotates about an axis X coinciding with its centre, extending at right angles to the wall 13 of the suction chamber 11 and the bottom branch 15 of the aspirating belt 9.

[0035] When the rotating knife 27 assumes the position of interference with the stream 4 of tobacco, the blade 30 brushes against a locating or striker element 31 afforded by a wall 32 set transversely to the plane occupied by the disc 28 and extending parallel to the stream 4. To advantage, the striker element 31 is also capable of reciprocating motion in a direction parallel to the predetermined feed direction 7 followed by the stream 4 of tobacco, generated synchronously with the rotating knife 27, so as to avoid sliding contact with the movement of the blade 30 by accompanying its movement.

[0036] In effect, as the blade 30 skims the stream 4 of tobacco, the striker element 31 shifts in the same di-

rection V1 and at the same speed as the blade 30. As the blade 30 then completes a full revolution and rotates toward the position of interference, the striker element 31 will shift in the opposite direction V2 so as to regain its starting position (figure 2).

[0037] In the preferred embodiment illustrated, the stream 4 of tobacco advances along a confining channel 34 created between side walls denoted 33a and 33b. With the knife 27 in the position of interference, the blade 30 functions as a third wall 35 enclosing the channel 34.

[0038] It will be evident that the drawbacks associated with the prior art are overcome by the invention and that the stated objects are realized in a first trimming device 23 as described and illustrated, which operates cyclically and synchronously with the densifying means 24 in such a way as to reduce the thickness of the stream 4 of tobacco filler at selected areas coinciding with the predetermined densified portions C aforementioned.

[0039] The method and the unit according to the present invention are instrumental in improving the quality of reclaimed tobacco.

[0040] In practice, the only parts of the stream 4 of tobacco filler subjected to two trimming actions are the compacted portions C.

[0041] It follows that the average size of the recycled tobacco particles will be larger than that of the particles constituting the fraction removed by two successive trimming steps.

[0042] Given the increased average size of the particles in question, the filling capacity of the tobacco is improved compared to the prior art and the finished cigarettes will present a more uniform distribution of tobacco filler from end to end.

[0043] Finally, the generally larger reclaimed tobacco particles will bind more securely with the fibrous material, rather than being easily shed from the ends of the cigarette during subsequent processing operations or when handled by the smoker.

[0044] It will be seen that in figures 2 and 3, which refer to a cigarette maker with two cigarette rod forming lines, a second stream 4 of tobacco filler, a second channel 34 and a second knife 23 are shown in phantom lines.

Claims

1. A unit for forming a continuous cigarette rod in a cigarette making machine, comprising a conveyor (3) serving to feed a continuous stream (4) of tobacco particles (P) toward the entry point (5) of a station (6) where the cigarette rod (2) is formed, advancing in a predetermined direction (7) along a predetermined feed path (8), and incorporating, ordered in sequence along the feed direction (7), a first trimming device (23) designed to reduce the thickness of the advancing stream (4), means (24) serving to densify predetermined portions (C) of the stream

(4), and a second trimming device (25), **characterized**

in that the first trimming device (23) operates cyclically and synchronously with the densifying means (24), and is designed to reduce the thickness of the stream (4) at given portions corresponding to the predetermined densified portions (C).

2. A unit as in claim 1, wherein the first trimming device (23) comprises a rotating knife (27) capable of movement cyclically between a position of interference with the stream (4) and a position distanced from the stream (4).

3. A unit as in claim 2, wherein the first trimming device (23) also comprises a striker element (31) against which the rotating knife (27) locates when assuming the position of interference with the stream (4).

4. A method as in claim 3, wherein the rotating knife (27) comprises a disc (28) rotatable about its own centre, of which the peripheral edge (29) presents at least one radial blade (30) occupying only a part of the selfsame peripheral edge (29).

5. A unit as in claim 4, wherein the striker element (31) is afforded by a wall (32) set transversely to the plane occupied by the disc (28).

6. A unit as in claim 4, wherein the striker element (31) is capable of reciprocating motion parallel to the predetermined direction (7) followed by the stream (4) and synchronously with the rotating knife (27), so as to accompany the movement of the blade (30) and avoid sliding contact therewith.

7. A unit as in claim 3, wherein the conveyor (3) comprises an aspirating belt (9) of which a bottom branch (15) is designed to retain the tobacco particles (P) by suction, also a pair of side walls (33a, 33b) positioned to coincide at least with the first trimming device (23) and projecting from opposite edges of the bottom branch (15) of the aspirating belt (9) in such a way as to establish a channel (34) that serves to confine the advancing stream (4) and is enclosable by a bottom wall (35) afforded by the rotating knife (27) when in the position of interference with the stream (4).

8. A unit as in claim 6, wherein one of the side walls (33a) is provided by the striker element (31).

9. A unit as in claim 1, further comprising means by which to recover the shredded tobacco removed by trimming.

10. A method of forming a continuous cigarette rod in a cigarette maker, comprising the step of feeding a

continuous stream (4) of tobacco particles (P) to the entry point (5) of a forming station (6) where the cigarette rod (2) is assembled, advancing in a predetermined direction (7) along a predetermined path (8), also the steps of subjecting the stream (4) to a first trimming action, then densifying predetermined portions (C) of the stream (4) and thereafter subjecting the stream (4) to a second trimming action, **characterized** **in that** the first trimming step serves to reduce the thickness of the stream (4) of tobacco along given portions corresponding to the predetermined densified portions (C).

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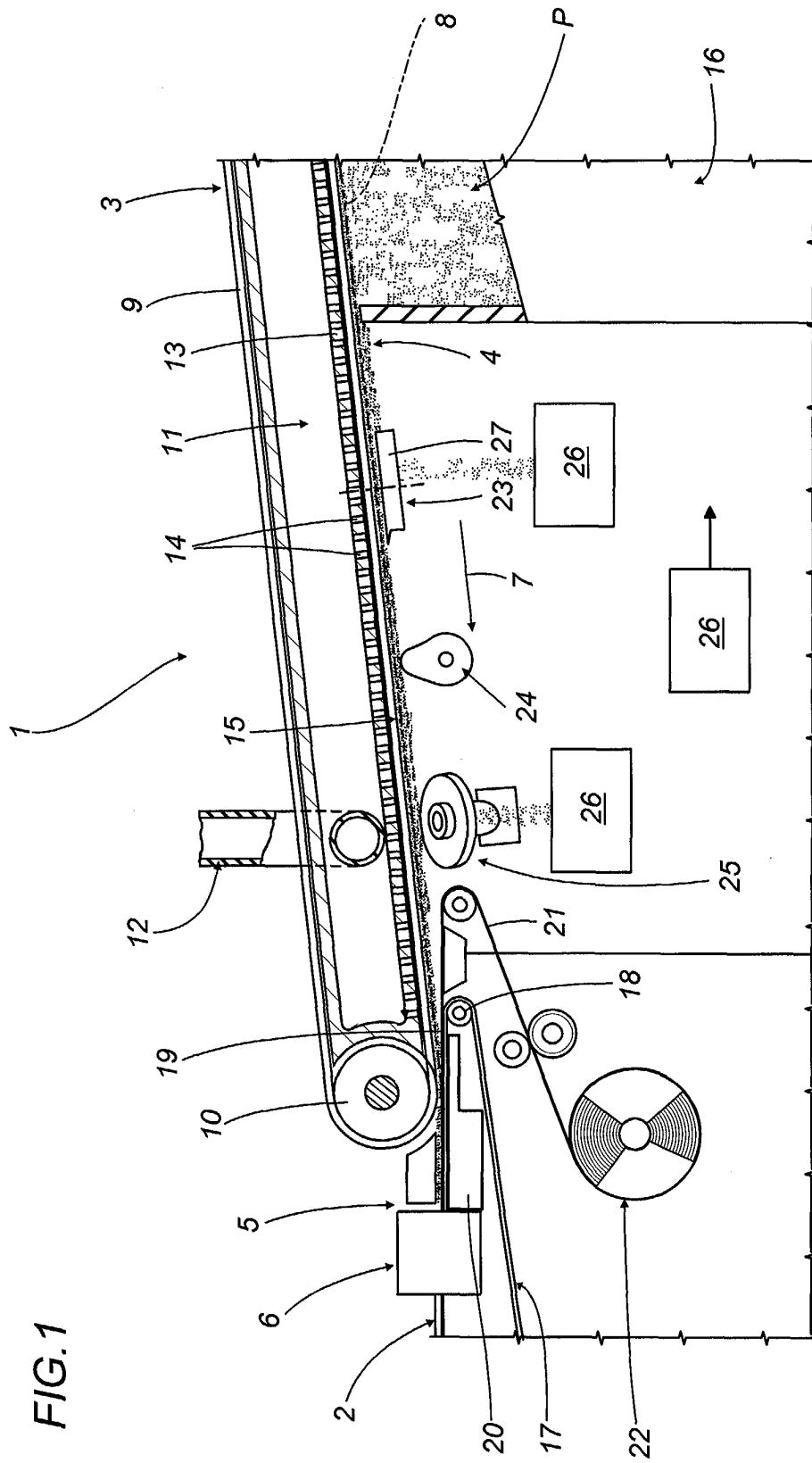
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FIG.1



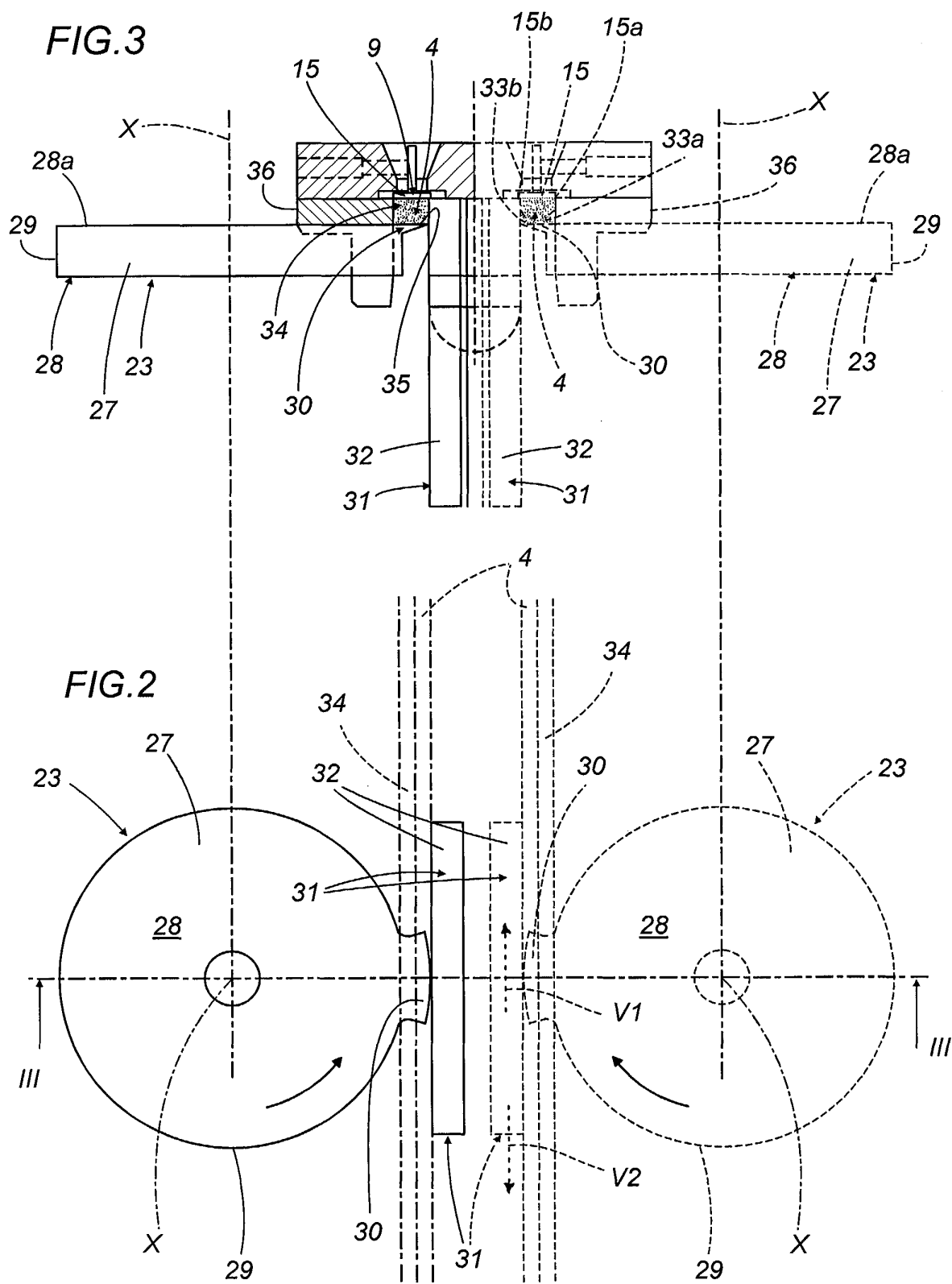


FIG.4a

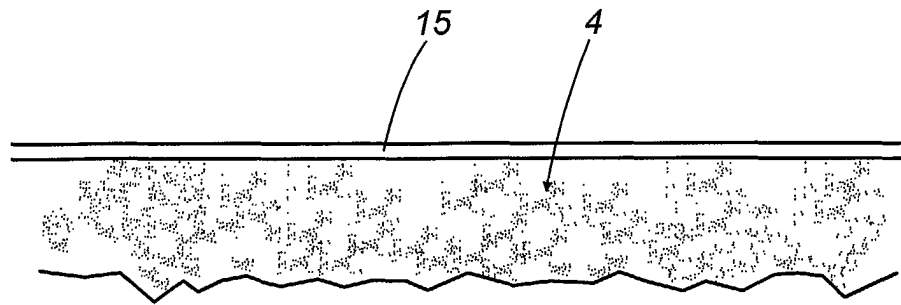


FIG.4b

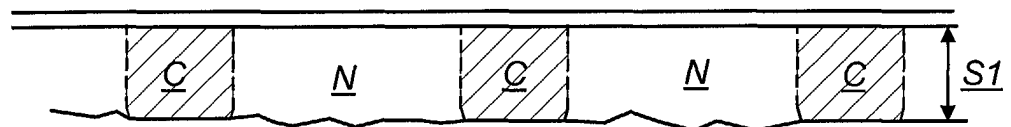


FIG.4c

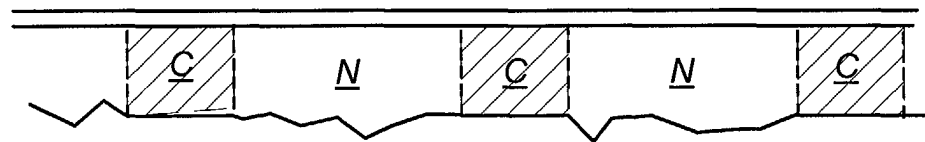
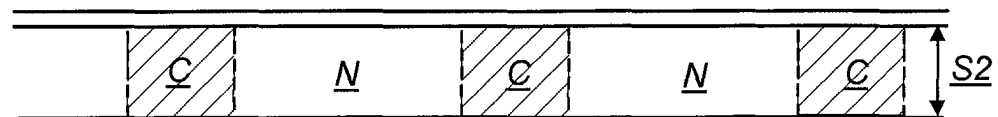


FIG.4d





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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5765

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Place of search Munich		Date of completion of the search 11 February 2005	Examiner Maier, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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