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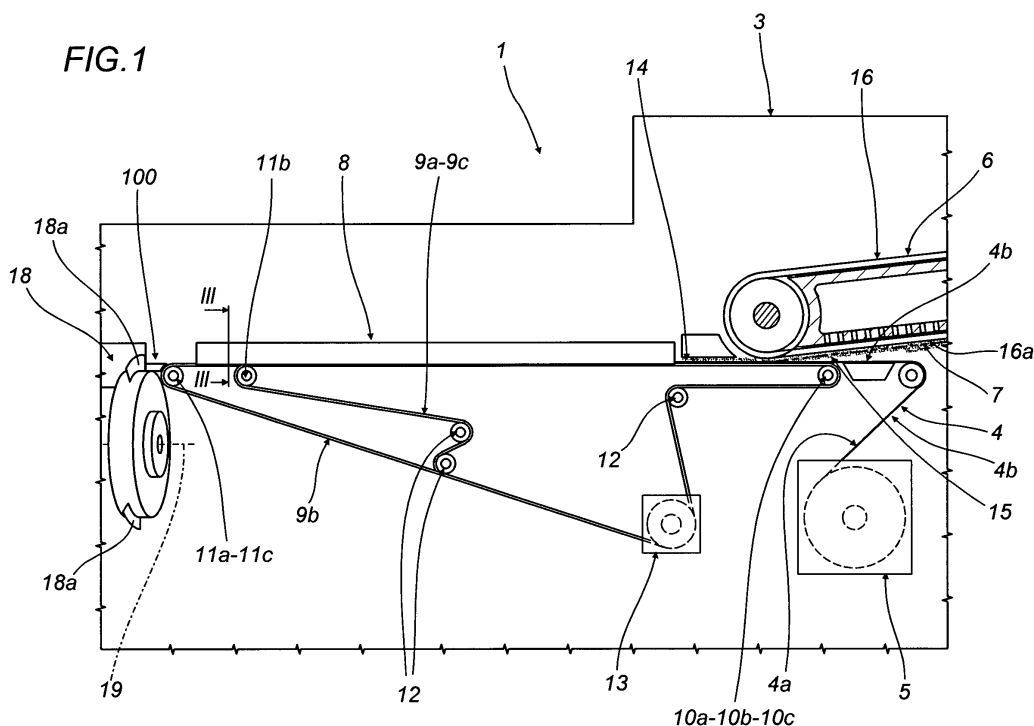
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(54) **A cigarette maker**

(57) In a cigarette maker equipped with a table (8) on which continuous cigarette rods (2a, 2b, 2c) are assembled from respective strips (4) of paper and streams of shredded tobacco (7), a cutter (18) by which the rods (2a, 2b, 2c) are divided up into cigarette sticks, and

guide ways (100) by which the assembled rods (2a, 2b, 2c) are directed toward the cutter (18), the table (8) or the guide ways (100), or both, will be positioned so that the rods (2a, 2b, 2c) advance along respective paths (P1, P2, P3) converging one with another.



Description

[0001] The present invention relates to a cigarette maker.

[0002] More particularly, the present invention relates to a cigarette-making machine of the type equipped with means by which to form two or more continuous cigarette rods.

[0003] It is the practice when manufacturing cigarettes to fashion a continuous cigarette rod from starting materials that consist in a strip of paper decoiled from a roll on the one hand, and a mass of shredded tobacco on the other.

[0004] In the course of the following specification, the term cigarette rod indicates the assemblage of the paper strip and the tobacco, from the moment when the tobacco is deposited on the paper through the step whereby the paper is wrapped around the stream of tobacco. The continuous rod formed in this way is fed toward a cutter device and divided up into single sticks, each of which will provide at least one cigarette.

[0005] Having undergone further processing operations if envisaged, such as the attachment of a filter tip, the cigarettes are conveyed to a further machine, typically a packer.

[0006] With the recent development of ultra high speed packers able to turn out several hundred packets per minute, the need arises to design cigarette makers such as can keep the new packers supplied more effectively, and thus ensure their increased potential can be exploited to the full.

[0007] The problem in question was addressed initially by coupling a high speed packer to two cigarette makers operating in parallel, each turning out a single cigarette rod.

[0008] Though effective functionally, this solution involved a significantly increased cost burden, due mainly to the duplication of mechanical components, but also to the additional testing, servicing and manning requirements involved.

[0009] To the end of overcoming the drawbacks connected with the adoption of two cigarette makers operating in parallel, but without substantially increasing production costs, the industry adopted new machines designed to fashion two continuous cigarette rods simultaneously, utilizing a single strip of paper decoiled from a roll, on the one hand, and a single mass of shredded tobacco on the other.

[0010] Further improvements since made to the functional effectiveness of packers have shown clearly that even cigarette makers capable of assembling two rods simultaneously are not capable of matching the increased output capacity of the new packers.

[0011] In addition, the solution of assembling more than two cigarette rods one alongside another has been rendered problematical hitherto by difficulties connected, in particular, with the step of cutting the rods into sticks, which typically involves the use of a single rotat-

ing cutter device equipped in most cases with two peripheral blades.

[0012] In effect, a cigarette maker equipped to assemble two continuous rods can be likened, for instance, to a machine producing a single imaginary rod of which the diameter is equal to the distance between centres of the two rods, plus the diameter of one rod, and will measure 3-4 cm or thereabouts.

[0013] The operation of cutting such a rod calls for faultless adjustment of the cutter device, as the time for which each cutting edge remains in contact with the rod would be much longer than in the case of a conventional single-rod type machine.

[0014] In other words, and by reason also of the high speed at which the rod advances, the risk of making an imperfect cut, and in particular of a cut not generated exactly at right angles to the axis of the rod, is increased significantly by the diameter of the imaginary rod.

[0015] The object of the present invention is to provide a high speed cigarette maker such as will be simple and economical to implement.

[0016] The stated object is realized according to the present invention in a cigarette maker of which the characterizing features are as recited in claim 1.

[0017] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 illustrates a preferred embodiment of the cigarette maker according to the invention, viewed schematically in a side elevation and with certain parts omitted in the interests of clarity;
- figure 2 illustrates a portion of the cigarette maker in figure 1, viewed schematically from above and with certain parts omitted in the interests of clarity;
- figure 3 is a detail of the cigarette maker in figure 1, viewed schematically in a section taken on III-III in figure 1 with certain parts omitted in the interests of clarity;
- figure 4 illustrates a portion of an alternative embodiment of the cigarette maker according to the invention, viewed schematically from above and with certain parts omitted in the interests of clarity;
- figure 5 illustrates a detail of an alternative embodiment of the cigarette maker according to the invention, viewed schematically in section and with certain parts omitted in the interests of clarity.

[0018] Referring to figure 1 of the drawings, 1 denotes a portion, in its entirety, of a cigarette making machine able to fashion a plurality of continuous cigarette rods 2a, 2b and 2c simultaneously, as indicated by the section drawing of figure 3.

[0019] In particular, albeit implying no limitation, the drawings illustrate a machine able to form three cigarette rods 2a, 2b and 2c simultaneously.

[0020] The machine 1 comprises a frame 3 carrying a feed unit by means of which to advance three strips 4

of paper, each marginally greater in width than the developable circumference of the single rods 2a, 2b and 2c in production. The feed unit in question is essentially familiar in embodiment, and indicated schematically by a block 5 in figure 1.

[0021] The machine 1 further comprises a feeder device 6 supplying shredded tobacco 7, also a table 8 on which the continuous cigarette rods 2a, 2b and 2c are assembled.

[0022] The assembly table 8, likewise carried by the frame 3, comprises three conveyor belts 9a, 9b and 9c associated respectively with each of the three paper strips 4.

[0023] The three belts 9a, 9b and 9c are looped around a plurality of rollers 10a, 10b, 10c, 11a, 11b, 11c and 12 and set in motion by a drive roller 13, in such a way that the strips 4 are caused to advance along respective predetermined paths P1, P2 and P3 extending along the assembly table 8 and indicated in figure 2.

[0024] The feed unit 5 is designed to advance each of the three strips 4 onto a respective belt 9a, 9b and 9c, in such a manner that one face 4a of the strip 4 is offered in contact to a top branch 14 of the relative belt 9a, 9b and 9c.

[0025] The top branch 14 of each belt 9a, 9b and 9c extends along the assembly table 8 between sets of return rollers 10a-10b-10c and 11a-11b-11c located respectively downstream and upstream relative to the direction of movement of the selfsame belts.

[0026] Referring to figure 2, each belt 9a, 9b and 9c is designed to advance a respective strip 4 along a respective path P1, P2 and P3 in a predetermined direction F1, F2 and F3, passing through a loading station 15 (figure 1) located along the selfsame path P1, P2 and P3.

[0027] The loading station 15 coincides with a point at which a continuous and substantially uniform stream of tobacco 7 is released onto the upwardly directed face 4b of each strip 4 by the feeder device 6 aforementioned.

[0028] The three streams of tobacco are substantially identical one to another and generated in familiar manner while clinging to three downwardly directed faces 16a presented by the bottom branches of three respective aspirating conveyor belts 16, familiar likewise in embodiment, forming part of the feeder device 6 and extending in part above the assembly table 8.

[0029] As mentioned in the preamble and reiterated here for additional clarity, the cigarette rod 2a, 2b or 2c is identifiable as the assemblage of the paper strip 4 and the tobacco 7, from the moment in which the tobacco is released onto the face 4b of the strip 4 at the loading station 15 to the moment, subsequent to the paper being gathered around the tobacco filler into a tubular wrapper 17, when the assembled rod is separated by a cutter device into discrete lengths or sticks, not illustrated, that will emerge ultimately as single cigarettes.

[0030] As illustrated in figure 1, the aforementioned

cutter device is of conventional type, appearing as a cylindrical cutter head 18 rotatable about an axis 19 substantially parallel to the assembly table 8, and presenting a pair of diametrically opposed blades 18a. In the plan views of figures 2 and 4, the cutter head is indicated schematically as a block, likewise denoted 18.

[0031] The machine 1 further comprises guide means 100, interposed between the downstream rollers 11a, 11b and 11c and the cutter head 18, serving to direct the rods 2a, 2b and 2c from the runout ends of the respective belts 9a, 9b and 9c into the path of the blades 18a.

[0032] The table 8 and the guide means 100 combine to establish the aforementioned paths P1, P2 and P3 followed by the respective cigarette rods 2a, 2b and 2c.

[0033] The assembly table 8 comprises three divisions consisting in beams on which the three continuous rods 2a, 2b and 2c are formed, denoted 20a, 20b and 20c respectively.

[0034] The forming beams 20a, 20b and 20c are identical one to another, conventional in embodiment and not illustrated in detail. The three beams extend one beside another along the relative paths P1, P2 and P3 downstream of the loading station 15, following the feed directions F1, F2 and F3 of the strips 4. The three paths P1, P2 and P3 are convergent, as will be explained in due course, and in particular, the two lateral divisions 20a and 20c are disposed symmetrically and convergently on opposite sides of the central division 20b.

[0035] The cigarette rods 2a, 2b and 2c are illustrated in section, in figure 3, and in plan in figures 1 and 4.

[0036] As discernible from figure 3, which presents a sectional view of the central or middle beam 20b, each beam 20a, 20b and 20c affords a corresponding groove 21 proportioned to accommodate a relative belt 9a, 9b and 9c. The groove 21 presents a cross-sectional profile of varying geometry that narrows to the point of assuming an essentially cylindrical shape with a radius of curvature substantially matched to the radius of the single cigarette.

[0037] Each belt 9a, 9b and 9c thus extends along a respective groove 21 in contact with the concave profile, and is caused to bend progressively until forced into the substantially cylindrical shape aforementioned.

[0038] As a result of the transverse deformation of the belt, the relative paper strip 4 is caused likewise to roll around the respective stream of tobacco 7 and form the corresponding tubular wrapper 17.

[0039] At least one longitudinal edge of each paper strip 4 is engaged by a gumming device of familiar embodiment (not illustrated), and thereupon joined to the other edge to seal the rod 2a, 2b and 2c.

[0040] Figure 3 is a schematic representation showing the cross-sectional profile of the central beam 20b at a point along the feed direction F2 beyond the formation of the substantially cylindrical section described above. In effect, the section shown in figure 3 illustrates a moment in which the belt 9b, rolled previously into a cylindrical tube to form the rod 2b, begins opening out

again gradually to a flat profile before passing around the cylindrical return roller 11b.

[0041] More exactly, the upstream rollers 10a, 10b and 10c and the downstream rollers 11a, 11b and 11c at the opposite ends of the respective branches 14 are necessarily cylindrical, presenting an axial length substantially equal to the width of the respective belt 9a, 9b and 9c, since a roller of any shape other than cylindrical will not allow the belt 9a, 9b and 9c to form a clean loop.

[0042] Conventionally, the cutter device 18 operates in conjunction with a striker device by which the continuous rods 2a, 2b and 2c are supported and guided during the step of cutting the sticks.

[0043] As illustrated in figure 3, the feed paths P1, P2 and P3 lie substantially in a common plane G, at least on a line coinciding with or immediately upstream of the cutter head 18.

[0044] The feed paths P1, P2 and P3 and the relative beams 20a, 20b and 20c are shown in figures 2 and 4 as being positioned one relative to the next, in the common plane G, at an angle α of convergence that has been accentuated in the drawings for the sake of clarity, but which in practice will be less than 5° .

[0045] Preferably, the angle α of convergence will be less than 1° .

[0046] Experimental trials have shown that particularly advantageous results are obtained with the paths disposed at an angle α of convergence in the order of 0° to 30° .

[0047] In an alternative embodiment of the machine 1, not illustrated in detail, the feed paths P1, P2 and P3 might not occupy a common plane, at least on a line coinciding with or immediately upstream of the cutter head 18. In a preferred embodiment of this type, the central or middle path P2 of the three paths P1, P2 and P3 will lie above or below the level of the plane occupied by the two outer or lateral paths P1 and P3.

[0048] With reference to figure 5, which illustrates schematically how the cigarette rods 2a, 2b and 2c are arranged in an example of the aforementioned alternative embodiment, the three paths P1, P2 and P3 followed by the three cigarette rods 2a, 2b and 2c combine, in a plane perpendicular to at least one of the paths P1, P2 and P3 and coinciding with or immediately upstream of the cutter head 18, to describe corresponding points T1, T2 and T3 on a circumference C of predetermined diameter.

[0049] Advantageously, this arrangement is particularly convenient when transferring the cigarette sticks onto the infeed drum of a filter tip attachment machine and/or when dividing up the rods 2a, 2b and 2c with a cutter device 18 that consists in a rotor of cylindrical shape carrying a pair of peripheral blades 18a, as described above.

[0050] In the example of figure 2, the central belt 9b associated with the middle beam 20b extends further along the relative path P2 in the respective feed direction F2 than the two belts 9a and 9c located on either

side.

[0051] The central belt 9b reassumes its flat profile, beyond the relative groove 21 of varying geometry, along a part of the respective feed path P2 that lies downstream of the part of each path P1 and P3 along which the lateral belts 9a and 9c reassume their flat profile after leaving the grooves 21.

[0052] In short, thanks to this arrangement, there is no interference of the three belts one with another notwithstanding the convergence of the three feed paths P1, P2 and P3. In other words, the runout end of the middle belt 9b extends a certain distance beyond the corresponding ends of the two lateral belts 9a and 9c.

[0053] In practice, the belts 9a, 9b and 9c are made of a material such that they cannot be looped around rollers tending to induce deformation (rollers with concave surfaces, for example), reducing the width at the point where the three paths P1, P2 and P3 converge. Accordingly, given that the three belts must be looped over cylindrical rollers of which the axial length will be matched to the width of the belts, as aforementioned, the three runout portions must present the type of configuration illustrated in figures 2 and 4.

[0054] Figure 4 illustrates the assembly table 8 in an embodiment alternative to the one illustrated in figure 2 and described in detail above. The table 8 of figure 4 again presents three belts 9a, 9b and 9c extending substantially one alongside the other along the relative paths P1, P2 and P3, from the upstream rollers 10a, 10b and 10c to the downstream rollers 11a, 11b and 11c. In contrast to the table of figure 2, however, the downstream rollers 11a, 11b and 11c are positioned substantially alongside one another so that there is no projection of the central belt 9b beyond the lateral belts 9a and 9c.

[0055] In the context of the machine 1, the belts 9a, 9b and 9c constitute means 22 by which the rods 2a, 2b and 2c are conveyed along the corresponding feed paths P1, P2 and P3.

[0056] The guide means 100, indicated schematically in figures 1 and 4 as blocks, can also be embodied so as to incorporate the striker device supporting and guiding the rods 2a, 2b and 2c during the step of cutting the rods into sticks.

[0057] The operation of the machine 1 is easily deduced from the foregoing description, and therefore will not be described further.

[0058] It will be noted all the same that the convergent arrangement of at least one part of the paths P1, P2 and P3 is instrumental in enabling the cigarette rods 2a, 2b and 2c to be kept particularly close together on reaching the cutter head 18, and thus ensuring that the sticks are cut correctly.

[0059] In further possible embodiments of the present invention, not illustrated but falling nonetheless within the scope of the disclosure, the convergent part of the feed paths P1, P2 and P3 could extend along the table 8 only, in which case the rods 2a, 2b and 2c would advance parallel one with another downstream of the con-

vergent part, oriented by the guide means 100, or alternatively, the convergence could be limited to the guide means 100 only, in which case these would be equipped with suitable means by which to take up the cigarette rods 2a, 2b and 2c from beams 20a, 20b and 20c substantially parallel one with another.

[0060] In particular, and referring to the examples of figures 2 and 4, even if the angle of convergence between the two outermost paths P1 and P3 can be considered negligible in relation to the overall length of the forming beams and therefore having no influence on correct adjustment of the transverse cut made through the rods 2a, 2b and 2c, the rods could nonetheless be diverted immediately upstream of the cutter head 18, by the guide means 100, in such a manner as to bring the paths P1, P2 and P3 parallel one with another.

Claims

1. A cigarette making machine comprising means (8) by which to form at least two continuous cigarette rods (2a, 2b) from respective paper strips (4) and respective streams of shredded tobacco (7), cutter means (18) by which the rods (2a, 2b) are divided into discrete cigarette sticks, and means (100) by which each rod (2a, 2b) is guided toward the cutter means (18),

characterized

in that the forming means (8) and/or the guide means (100) combine to create respective mutually convergent paths (P1, P2) along which the rods (2a, 2b) are directed.

2. A machine as in claim 1, wherein forming means (8) comprise three divisions (20a, 20b, 20c) along which to fashion three respective continuous cigarette rods (2a, 2b, 2c).

3. A machine as in claim 2, wherein the three rods (2a, 2b, 2c) follow respective feed paths (P1, P2, P3) occupying the same plane, at least on a line coinciding with the cutter means (18).

4. A machine as in claim 2, wherein the paths (P1, P2, P3) followed by the rods (2a, 2b, 2c) coincide with respective points (T1, T2, T3) on a circumference (C) located in a plane coinciding at least with the cutter means (18) and lying perpendicular to at least one of the feed paths (P1, P2, P3).

5. A machine as in claim 2, wherein forming means (8) comprise a central division (20b), also two lateral divisions (20a, 20c) disposed symmetrically on either side of the central division (20b) and convergent one with another.

6. A machine as in claim 5, wherein the divisions (20a,

20b, 20c) of the forming means (8) comprise respective power driven looped belts (9a, 9b, 9c) each presenting a top branch (14) slidable along a prescribed distance in contact with a groove (21) of varying cross-section, of which the belt (9b) occupying the central division (20b) is of length dissimilar to the length of the two belts (9a, 9c) occupying the two lateral divisions (20a, 20c).

7. A machine as in claim 6, wherein the central belt (9b) extends beyond the lateral belts (9a, 9c).

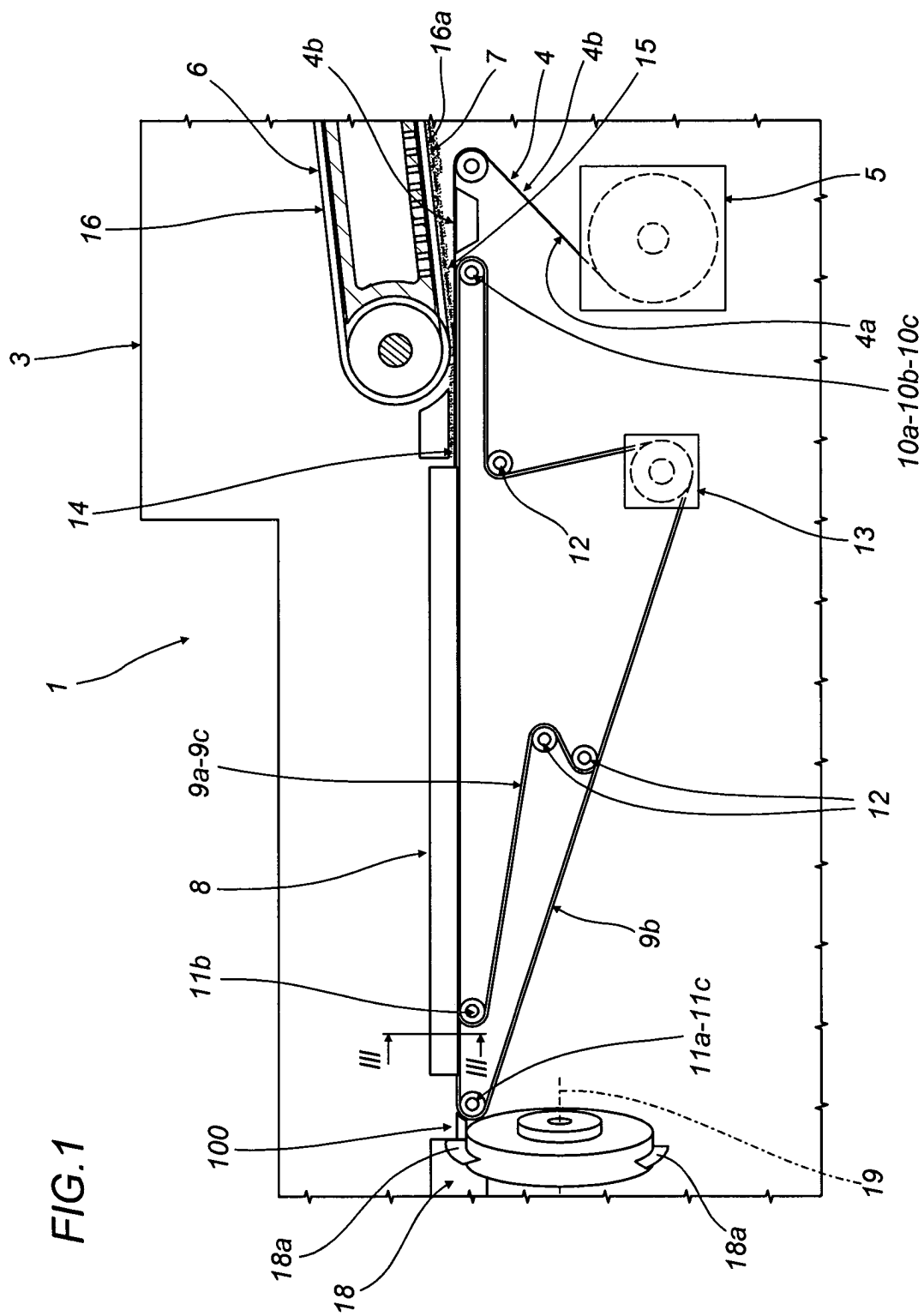
8. A machine as in claim 7, wherein the central belt (9b) reassumes a normal flat profile, beyond the respective groove (21) of varying cross-section, along a part of the relative feed path (P2) lying downstream of the parts of the two paths (P1, P3) along which the lateral belts (9a, 9c) reassume a flat profile, beyond the respective grooves (21) of varying cross-section.

9. A machine as in claims 2 to 8, wherein the feed paths (P1, P2, P3) converge at an angle of less than 5°.

10. A machine as in claim 9, wherein the feed paths (P1, P2, P3) converge at an angle of less than 1°.

11. A machine as in claim 10, wherein the feed paths (P1, P2, P3) converge at an angle of approximately 0° 30'.

FIG.1



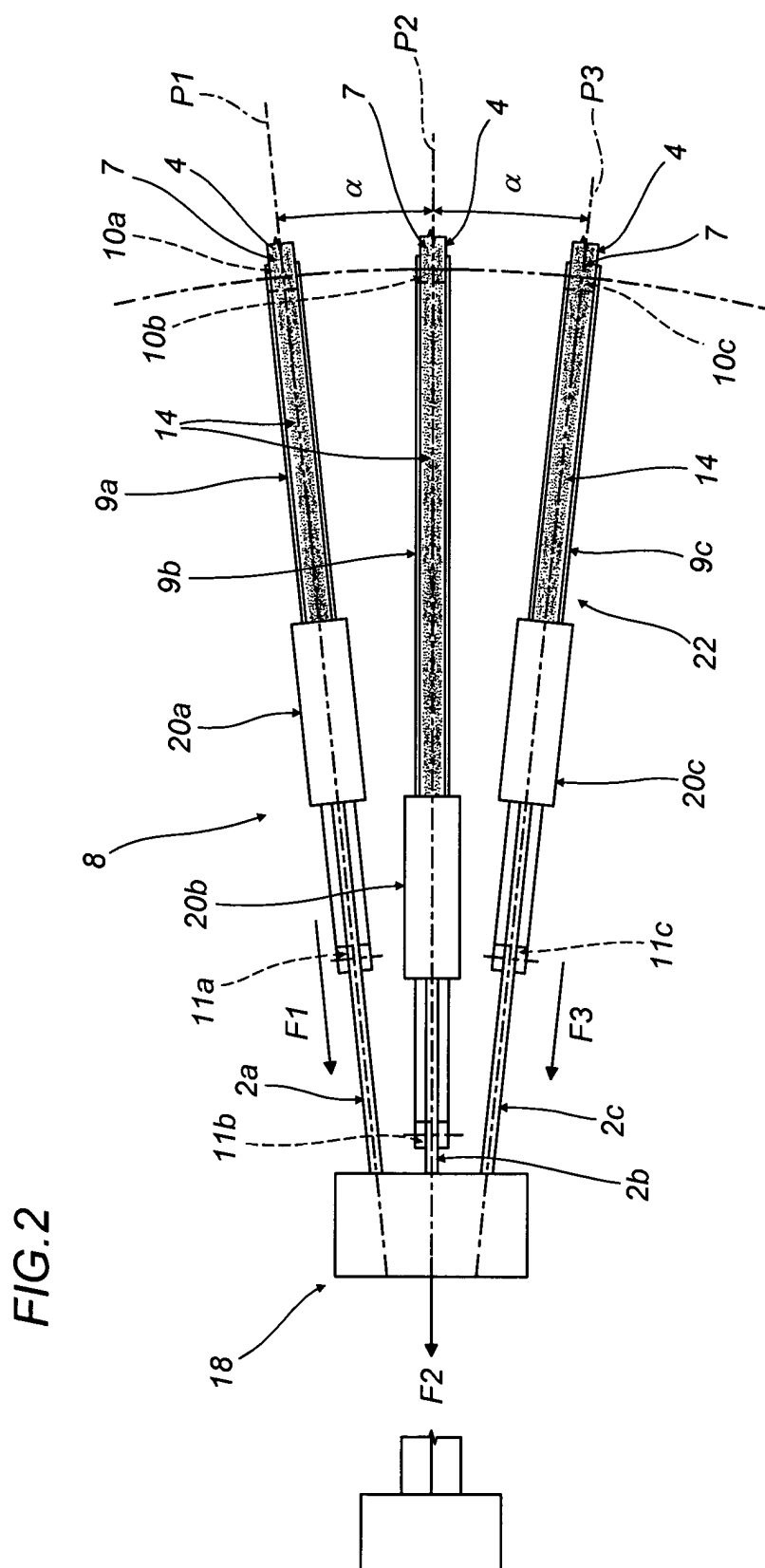


FIG.3

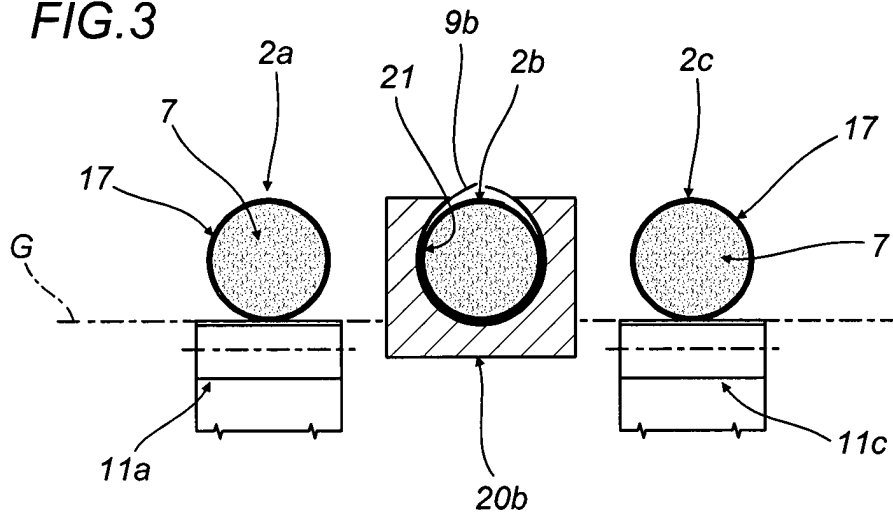
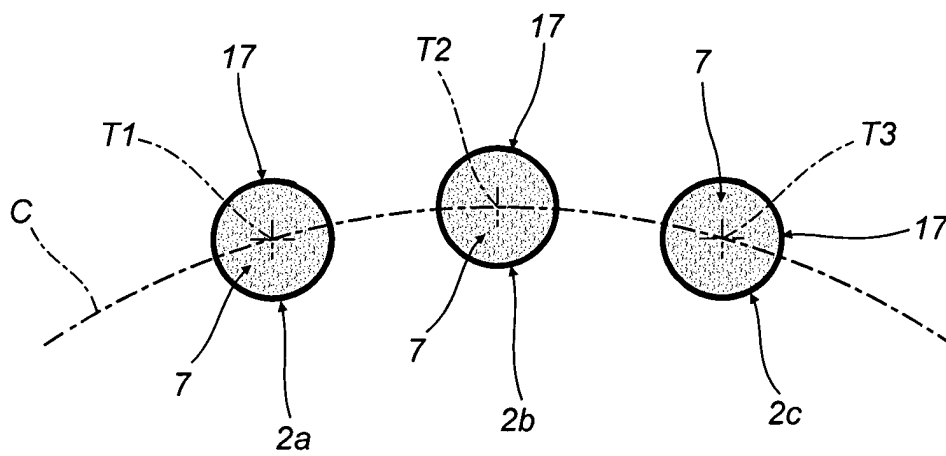
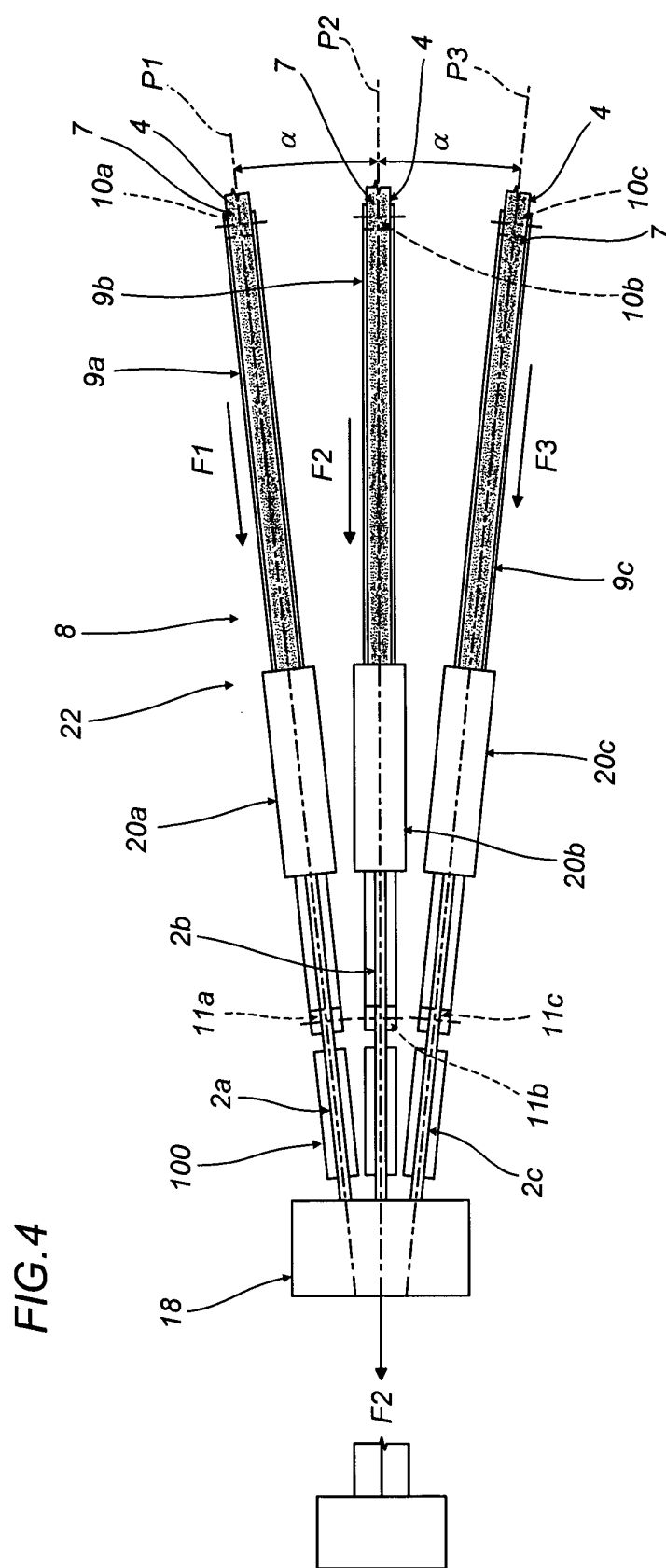


FIG.5







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5140

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)
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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 13 June 2005	Examiner MARZANO MONTEROSSO
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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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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