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(54) MACHINE FOR MAKING ADJUSTABLY VENTILATED CIGARETTES

MASCHINE ZUR HERSTELLUNG EINSTELLBAR BELÜFTETER ZIGARETTEN

MACHINE DE PRODUCTION DE CIGARETTES VENTILÉES DE MANIÈRE RÉGLABLE

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Description

Technical field

[0001] This invention relates to a machine for making adjustably ventilated cigarettes.

Background art

[0002] By "adjustably ventilated cigarette" is meant a cigarette which has on the outside surface of the filter one or more slits whose opening can be adjusted in such a way that the smoker can decide the degree to which the cigarette is aerated.

[0003] The opening of the external slits on the outside surface of the filter can be adjusted by turning a portion of the filter so that the external slits made on the outside surface of the filter are placed in a desired position relative to corresponding internal slits made in the filter itself.

[0004] More specifically, the maximum degree of ventilation is achieved when the external slits are exactly aligned with and perfectly match the internal slits, while the external slits are fully closed when the aforementioned filter portion is turned in such a way that the external slits are no longer in communication with the respective internal slits.

[0005] Usually, adjustably ventilated cigarettes are made with the external slits in the closed position, so as to give the smoker the possibility of increasing the degree of cigarette ventilation, on which the concentration of nicotine depends.

[0006] Known from document WO84/00478 is a method of making adjustably ventilated cigarettes.

[0007] This method involves conveying the cigarettes in a cigarette rotating device which comprises two conveyor belts and a skid plate, which is fixed relative to the conveyor belts.

[0008] The cigarettes are placed between the two conveyor belts in such a way that at least one portion of the filter of each cigarette is in contact with the skid plate.

[0009] Thus, the filter portion which is in contact with the skid plate turns relative to the cigarette portion which is between the two conveyor belts and which remains fixed between the two belts. This turning movement causes the external slits of each cigarette to be offset relative to the internal slits made in the filter, thereby closing the internal slits.

[0010] This device is not free of disadvantages. In effect, skid plate wear may prevent the filter portion from being held firmly, allowing unwanted turning of the filter portion which is in contact with the skid plate itself.

[0011] This causes imprecise offsetting of the internal slits relative to the external slits, thus preventing the internal slits from being fully closed.

[0012] As a result, the cigarettes feeding out of the device are ventilated to different degrees, failing to meet the standards of quality required for the manufacture of the cigarettes.

[0013] An apparatus for making adjustably ventilated cigarettes is also disclosed in document EP 0 212 879 A1.

Disclosure of the invention

[0014] This invention has for an aim to provide a machine for making adjustably ventilated cigarettes which is capable of making cigarettes having the same degree of ventilation and which is capable of turning a cigarette filter portion with greater precision than prior art devices.

[0015] The technical purpose indicated and the aims specified are achieved by a machine for making adjustably ventilated cigarettes which comprises the technical features set out in the independent claim 1.

Brief description of the drawings

[0016] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it, and in which:

- Figure 1 is a schematic front view of a machine for making adjustably ventilated cigarettes according to this invention;
- Figure 2 illustrates an adjustably ventilated cigarette in a configuration of maximum ventilation;
- Figure 3 illustrates an adjustably ventilated cigarette in a configuration of no ventilation;
- Figure 4 illustrates an adjustably ventilated cigarette, with some parts cut away in order to better illustrate others;
- Figure 5 is a scaled-up view, in cross section, of the cigarette of Figure 2;
- Figure 6 is a scaled-up view, in cross section, of a further detail from Figure 5;
- Figure 7 is a perspective view, with some parts cut away in order to better illustrate others, of a first embodiment of the cigarette turning unit;
- Figure 8 is a schematic front view of the turning unit shown in Figure 7;
- Figure 9 is a perspective view of a second embodiment of the cigarette turning unit;
- Figure 10 is a side view of the turning unit shown in Figure 9;
- Figure 11 is a schematic front view of the turning unit shown in Figure 9.

Detailed description of preferred embodiments of the invention

[0017] With reference to Figure 1, the numeral 1 denotes a machine for making adjustably ventilated cigarettes.

[0018] The machine 1 comprises a section 2 for making cigarettes 3 with filter tip 10 and comprising a unit 4 for feeding cigarette sticks 7, a unit 5 for feeding filter plugs 8 and a unit 9 for assembling the cigarette sticks 7 with the respective filter plugs 8.

[0019] The assembly unit 9 is located downstream of the unit 4 for feeding the cigarette sticks 7 and of the unit 5 for feeding the filter plugs 8, each wrapped in a respective wrapping sheet 22.

[0020] The assembly unit 9 is capable of associating a cigarette stick 7 with a respective filter plug 8.

[0021] More specifically, the assembly unit 9 receives from the feed unit 4 double cigarette sticks 7, the two in each pair being spaced from each other, and places a filter plug 8 between every two.

[0022] The filter plug 8 interposed between the two cigarette sticks 7 is also double, that is to say, will eventually define two filter tips 10, each associated with one cigarette stick 7.

[0023] The filter plug 8 may comprise one or more modular elements placed one after the other to make up the filter plug 8.

[0024] The assembly unit 9 comprises a rolling device 11 and a device 12 for feeding patches 13.

[0025] The rolling device 11 is designed to receive the patches 13 from the feed device 12.

[0026] The rolling device 11 receives two cigarette sticks 7 in succession with the filter plug 8 interposed between them and wraps a patch 13 around them to obtain a double cigarette 3.

[0027] The double cigarettes 3 are then cut at the filter plugs 8 to obtain a succession of cigarettes 3, each with a filter tip 10.

[0028] Each cigarette 3 has a main longitudinal axis of extension 3a. Downstream of the assembly unit 9, a final roller unit, labelled 15 in its entirety, performs further finishing operations of known type on the cigarettes 3.

[0029] Each cigarette 3 with filter tip 10 feeding out of the unit 2 for making cigarettes 3 comprises a cigarette stick 7 and a filter tip 10 consisting of a core of filter material 21 wrapped in the wrapping sheet 22 which is in turn wrapped in the patch 13, as illustrated in Figures 2 to 4.

[0030] The patch 13 has a circumferential precut line 14 extending round the cylindrical outside surface of the cigarette 3.

[0031] The patches 13 fed into the rolling device 11 may already have the precut lines 14 on them.

[0032] Alternatively, the machine 1 may comprise a device for making precut lines on the patches 13.

[0033] A laser perforating unit 16 is located downstream of the final roller unit 15. The laser perforating unit 16 comprises a first conveying roller 17 and a laser perforating device 18 facing the outer periphery of the first conveying roller 17.

[0034] The first conveying roller 17, which rotates about its axis 17a in the direction indicated in Figure 1, receives the cigarettes 3, each with a filter tip 10, in succession.

[0035] During the rotation of the first roller 17, the laser perforating device 18 makes on each cigarette 3 a first slit 19 and a second slit 20, exactly aligned with the first slit 19.

[0036] The first and second slits 19 and 20 of each cigarette 3 are located between the precut line 14 of the respective patch 13 and the free end of the filter tip 10.

[0037] In an alternative embodiment not illustrated, the laser perforating unit 16 can make the circumferential precut line 14 on the patch 13 of each cigarette 3 with filter tip 10.

[0038] The first and second slits 19 and 20 are made, respectively, on a portion 13a of the patch 13 and on a portion 22a of the wrapping sheet 22 of the filter tip 10, lying under the portion 13a of the patch 13.

[0039] The first slit 19 is thus located on the outside surface of the cigarette 3 and the second slit 20 is located, relative to the first slit 19, inside the cigarette 3 since it is made on the portion 22a of the wrapping sheet 22 of the filter tip 10, as illustrated in Figures 3 to 5.

[0040] By varying the position of the first slit 19 relative to the second slit 20 it is possible to adjust the degree of ventilation of the cigarette 3, because air can pass through the filter tip 10 only if the first slit 19 is in communication with the second slit 20, otherwise there is no ventilation.

[0041] The highest degree of ventilation of the cigarette 3 is obtained when the first and second slits 19 and 20 are exactly superposed and matched because they allow air to enter the core of filter material 21.

[0042] There is no ventilation of the cigarette 3 when the first and second slits 19 and 20 are mutually offset in such a way that they are not in communication with each other.

[0043] In other words, the cigarette 3 is in the configuration of no ventilation when the second slit 20 is closed by the patch 13 above it, around the filter tip 10, thus preventing air from entering the core of filter material 21.

[0044] It should be noted that the number of slits 19 and 20 is variable as a function of the degree of ventilation specified by manufacturers of cigarettes 3 with filter tip 10.

[0045] The position of the first slit 19 relative to the second slit 20 is adjusted by turning one of the two portions 23, 24 of the cigarette relative to the other. More specifically, the first portion 23 is turned relative to the second portion 24 of the cigarette 3 about the axis 3a or the second portion 24 is turned relative to the first portion 23 of the cigarette 3 about the axis 3a. With reference in particular to Figure 5, the filter tip 10 of each cigarette 3 comprises a circumferential incision 6.

[0046] The circumferential incision 6, having the shape of a circular crown, extends from an inside edge 6a of the core of filter material 21 to the wrapping sheet 22, according to a section transversal to the axis 3a.

[0047] It should be noted that the first portion 23 overlaps the second portion 24, in particular at a portion of the filter tip 10 extending between the circumferential incision 6 and the precut line 14 along the direction of the axis 3a.

[0048] In other words, the first portion 23 comprises a portion of the filter tip 10 extending from the latter's free

end to the incision 6 and a portion of the patch 13, comprising the first slit 19, extending from the free end of the filter tip 10 to the precut line 14, with reference to the axis 3a of the cigarette 3.

[0049] In effect, the patch 13 is connected to the wrapping sheet 22 of the filter plug 8 along a first cylindrical surface 8a which extends from the free end of the filter tip 10 to the circumferential incision 6 and along a second cylindrical surface 8b which extends from the precut line 14 to the cigarette stick 7.

[0050] Preferably, the patch 13 is connected to the filter plug 8 on the first and second cylindrical surfaces 8a and 8b by adhesive means.

[0051] On the portion of the wrapping sheet 22 between the circumferential incision 6 and the precut line 14, the patch 13 is free to slide and, once the precut line 14 is broken, is caused to turn by the first portion 23 of the cigarette 3.

[0052] Consequently, the second portion 24 comprises a portion of the filter tip 10 which is overlapped by and lies under the first portion 23 and which extends from the incision 6 to the precut line 14 and comprises the second slit 20 and the rest of the cigarette 3 which extends from the precut line 14 to the free end of the cigarette stick 7.

[0053] The first and second portions 23 and 24 are connected to each other solely by a length 21 a of filter material capable of twisting when the first portion 23 is turned relative to the second portion 24 or vice versa.

[0054] The circumferential incision 6 of the filter tip 10 may be made in the machine 1 by a dedicated cutting unit. Alternatively, the circumferential incision 6 may already be present in the filter plugs 8 which are fed to the machine 1.

[0055] As mentioned above, at the outfeed of the laser perforating unit 16, the first and second slits 19 and 20 are exactly matched.

[0056] A second conveying roller 25, which rotates about its axis 25a in the direction indicated in Figure 1 is located downstream of the first conveying roller 17. The cigarettes 3 with the first and second slits 19 and 20 are received and spaced by the second roller 25 which conveys them towards a roller 26 for rolling the cigarettes 3.

[0057] A tile 27 is opposed to the periphery of the rolling roller 26. The tile 27 has a cylindrical outside surface facing the periphery of the rolling roller 26. Preferably, the tile 27 comprises a relief element on its outside surface, also opposed to the rolling roller 26.

[0058] The rolling roller 26, which rotates about its axis 26a in the direction indicated in Figure 1, receives the spaced cigarettes 3 from the second conveying roller 25 and conveys them towards the tile 27.

[0059] During the rotation of the rolling roller 26, the cigarettes 3 come into contact with the cylindrical outside surface of the tile 27 and roll thereon. More specifically, the relief element is located on the cylindrical outside surface 28 so that as the cigarette 3 rolls thereon, the precut line 14 comes into contact with, and is broken by, the relief element 29.

[0060] It should be noted that once the precut line 14 is broken, the first portion 23 and the second portion 24 of the cigarette 3 are free to turn about the axis 3a of the cigarette 3.

[0061] In an alternative embodiment not illustrated, the relief element of the rolling roller 26 is located along a peripheral stretch of the rolling roller 26 opposed to the cylindrical outside surface of the tile 27. In this alternative embodiment, too, the relief element breaks the precut line 14 of the patch 13 of each cigarette 3 as the cigarette 3 rolls on the periphery of the roller 26.

[0062] It should be noted that the spacing of the cigarettes 3 conveyed by the second conveying roller 25 is proportional to the circular arc which the cigarettes 3 must travel as they roll on the rolling roller 26 and on the cylindrical outside surface of the tile 27.

[0063] The machine 1 comprises a first conveyor 30 which moves along a first feed path P1 and a second conveyor 31 which moves along a second feed path P2 substantially parallel to the first path P1.

[0064] The first conveyor 30 comprises a plurality of first flutes 32 for receiving the second portions 24 of the cigarettes 3.

[0065] The second conveyor 31 comprises a plurality of gripping means 33 having second flutes 34 for retaining the first portions 23 of the cigarettes 3.

[0066] As the two conveyors 30 and 31 move, movement means 35 of the gripping means 33 are able to impart torque to the one of the two portions 23, 24 of each cigarette 3 which, by turning about the axis 3a by a predetermined angle θ , offsets the first slit 19 relative to the second slit 20, thus causing the second slit 20 to close.

[0067] This turning action is obtainable by the twist in the length 21 a of filter material connecting the first portion 23 to the second portion 24.

[0068] The first conveyor 30 and the second conveyor 31 define a turning unit 36 by which one of the two portions 23, 24 of each cigarette 3 is turned.

[0069] The turning unit 36 turns one of the two portions 23, 24 relative to the other in order to offset the first slit 19 relative to the second slit 20, in such a way that they are not in communication with each other.

[0070] The first conveyor 30 comprises a first drum 37 for conveying the cigarettes 3 and whose cylindrical outside surface 37a comprises the first flutes 32 for receiving the second portions 24.

[0071] The first drum 37 rotates about its axis 49 in the direction indicated in Figure 1.

[0072] The first, receiving flutes 32 are located along the cylindrical outside surface 37a of the first drum 37 in such a way that the axes 3a of the cigarettes 3 are parallel to the axis of rotation 49 of the first drum 37 itself. Each of the first flutes 32 receives and retains a respective second portion 24 of a cigarette 3.

[0073] Preferably, each of the first flutes 32 retains a respective second portion 24 of a cigarette 3 by suction.

[0074] As the first drum 37 rotates, the second portions

24 of the cigarettes 3 maintain their position relative to the first drum 37 itself.

[0075] The second conveyor 31 comprises a second drum 38 coaxial with the first drum 37.

[0076] The second drum 38 rotates about its axis 50 in the direction indicated in Figure 1.

[0077] On its cylindrical outside surface 38a, the second drum 38 has the gripping means 33, each of whose second, retaining flutes 34 is associated with a respective first, receiving flute 32.

[0078] More specifically, the first and second drums 37 and 38 are fed with the cigarettes 3 at a feed station 39.

[0079] A feed roller 40, with an axis 40a, is located upstream of the first and second drums 37 and 38.

[0080] The feed roller 40 receives the cigarettes 3 from the rolling roller 26, spaces them and conveys them towards the first and second drums 37 and 38.

[0081] The first and second drums 37 and 38 convey the cigarettes 3 along the respective first and second paths P1 and P2 which extend along a circular arc A defined by a subtended angle θ_1 .

[0082] The first slit 19 might turn relative to the second slit 20 along the circular arc A or, alternatively, along a circular arc B lying within the circular arc A and defined by a subtended angle θ_2 smaller than the subtended angle θ_1 .

[0083] The subtended angle along whose arc the first slit 19 turns relative to the second slit 20 is, in practice, proportional to the rotation θ to be imparted to the first slit 19 in order to offset the latter relative to the second slit 20 and close it.

[0084] The first and second drums 37 and 38 release the cigarettes 3 with the first portion 19 turned and the second slit 20 positioned in its closed configuration, at a release station 41.

[0085] Downstream of the first and second drums 37 and 38 there is an outfeed roller 48, which rotates about its axis 48a in the direction indicated in Figure 1, which picks up the cigarettes 3 at the release station 41 and feeds them out of the machine 1.

[0086] Described below are two different embodiments of the turning unit 36 of the machine 1.

[0087] A first embodiment of the turning unit 36 is described with reference in particular to Figures 7 and 8.

[0088] In this embodiment, each gripping means 33 rotates about its axis of rotation 33a as it moves along the second feed path P2.

[0089] The axis of rotation 33a of each gripping means 33 is parallel to the axis of rotation of the second drum 38.

[0090] As each of the gripping means 33 turns about its axis 33a, each of the second, retaining flutes 34 turns about the respective first portion 23 of the cigarette 3.

[0091] More specifically, the gripping means 33 turn as they travel along the circular arc A defined by the subtended angle θ_1 during the rotation of the second drum 38.

[0092] In this embodiment, the subtended angle θ_1 is substantially 180° .

[0093] It should be noted that as it moves along the circular arc A and relative to the second drum 38, each of the gripping means 33 turns by 360° about its axis 33a.

[0094] Consequently, if each of the gripping means 33 turns by 360° about its axis 33a along the circular arc A defined by an angle θ_1 of 180° , one of the two portions 23, 24 of the cigarette 3 must be turned relative to the other along a circular arc B defined by a subtended angle θ_2 equal to half the angle θ .

[0095] The second flutes 34 for retaining the first portions 23 of the cigarettes 3 are thus activated along at least one stretch of the second feed path P2 corresponding to the circular arc B, in order to impart the torque to the first portions 23 which turn about the axes 3a relative to the respective second portions 24 held in position by the first, receiving flutes 32 of the first drum 37.

[0096] Along the stretches of the second path P2 defined by the circular arc A, excluding the circular arc B, the gripping means 33 turn about their axes 33a without turning the respective second portions 24 along with them. The movement means 35 drive each of the gripping means 33 in rotation about a respective axis 33a.

[0097] More specifically, the movement means comprise an epicyclic gear train 42 which drives each of the gripping means 33 in rotation.

[0098] In this embodiment, the movement means 35 act directly on the gripping means 33, driving them in rotation in such a way as to impart the torque to one of the two portions 23, 24 of the cigarettes 3.

[0099] The 360° rotation of each of the gripping means 33 along the circular arc A is particularly advantageous for feeding and releasing the cigarettes 3 to the second drum 38.

[0100] In effect, each of the second, retaining flutes 34 has a cavity having a substantially semi-circular shape and being capable of receiving the respective cigarette 3 when the cavity is directed towards the outside of the second drum 38.

[0101] Consequently, the cigarette 3 may be fed to the respective second, retaining flute 34 along a radial direction at right angles to the second drum 38.

[0102] To release the cigarette 3 after it has travelled along the circular arc A, each second, retaining flute 34 must again be at a position where its cavity is directed outwards in such a way that each cigarette 3 can come out of the second, retaining flute 34 in a radial direction at right angles to the second drum 38.

[0103] Lastly, it should be noted that to close the second slit 20 in this embodiment, the gripping means 33, which are driven in rotation by the movement means 35, turn the first portion 23 of each cigarette 3 relative to the second portion 24, which is held in a fixed position in the respective first, receiving seat 32 of the first drum 37.

[0104] A second embodiment of the turning unit 36 is described with reference in particular to Figures 9 to 11.

[0105] In this embodiment, the gripping means 33 differ from those of the first embodiment of the turning unit 36 in that they maintain a predetermined configuration at

least while the gripping means 33 themselves move along the second path P2.

[0106] More specifically, the predetermined configuration of the gripping means 33 is such that, during the rotation of the second drum 38, the cavity of the second, retaining flute 34 of each of the gripping means 33 remains directed upwards.

[0107] From this configuration, it follows that the cigarettes 3 must be fed to the respective second, retaining flutes 34 along a direction radial to the second drum 38 which makes with the axis of symmetry of the respective gripping means 33 an angle of approximately 30° .

[0108] The cigarettes 3 must also be released from the respective second, retaining flutes 34 along a direction radial to the second drum 38 which makes with the axis of symmetry of the respective gripping means 33 an angle of approximately 30° .

[0109] As may be observed in Figure 11, the roller 40 for feeding the cigarettes 3 and the roller 48 for feeding out the cigarettes 3 are positioned in such a way that the straight lines R1, R2 joining a respective centre of rotation of the rollers 40 and 48 to the centre of rotation of the second drum 38 make an angle equal to twice the angle of infeed and outfeed of the cigarettes 3. More specifically, the straight lines R1 and R2 make an angle of 60° with each other.

[0110] The angle θ_1 subtended by the circular arc A along which extend the first and second paths P1 and P2 of the first and second drums 37 and 38, respectively, is equal to the angle made the straight lines R1, R2.

[0111] In order to impart the torque to one of the two portions 23, 24 of the cigarette 3 to turn it relative to the other by the predetermined angle θ , the movement means 35 comprise an articulated joint 43 associated with each of the gripping means 33.

[0112] Preferably, the articulated joint 43 is a "Schmidt" joint.

[0113] More in detail, the articulated joint 43 comprises a first, a second and a third arm 45, 46 and 47 connected one after the other in succession.

[0114] The first arm 45 is connected to the second arm 46 which is in turn connected to the third arm 47.

[0115] The first and third arms 45, 47 are parallel to the axis of rotation 50 of the second drum 38, and the second arm 46, which is interposed between the first and third arms 45, 47, is at right angles to both.

[0116] The second arm 46 of each articulated joint 43 defines an eccentricity, labelled e in the drawing, relative to the axis of rotation 50 of the second drum 38.

[0117] In other words, each articulated joint 43 has a crank-like form which allows the second, retaining flutes 34, to be kept in the predetermined configuration.

[0118] In this embodiment, the articulated joint 43 associated with each of the gripping means 33 allows the first portion 23 of each cigarette 3 to be kept fixed relative to the second portion 24 in order to impart the torque to the second portion 24 of the cigarette 3.

[0119] In effect, considering the rotation of the first

drum 37 relative to the second drum 38, the articulated joint 43 keeps the second, retaining flutes 34 in the same configuration relative to the first, receiving flutes 32, which follow the rotation of the first drum 37 itself.

[0120] That way, the second portion 24 of each cigarette 3 turns relative to the first portion 23 by the predetermined angle θ .

[0121] Since the second portion 24 is made to turn relative to the first portion 23 by the turning of the first drum 37 relative to the second drum 38 whose second, retaining flutes 34 are kept fixed by the respective articulated joints 43 and in particular the eccentricity defined by the second arms 46, the circular arc A which extends from the feed station 39 to the release station 41 subtends an angle θ_1 equal to the predetermined angle θ . From this it may be inferred that the movement means 35 are capable of imparting the torque to the second portions 24 relative to the first portions 23 because they keep the second, retaining flutes 34 fixed relative to the first, receiving flutes 32 which are driven in rotation by the first drum 37.

[0122] It should be noted that the retaining system applied by the second, retaining flutes 34 may be embodied in a known manner not illustrated by a vacuum system.

To guarantee better adherence between the second, retaining flutes 34 and the first portions 23 of the cigarettes 3 to be retained, an endless belt, not illustrated, might be provided to apply pressure, with one of its sections, from the outside towards the centre of the drum 38, thus pressing each of the first portions 23 against the respective flute 34. This retaining action might also be applied by providing a system of grippers where each gripper comprises two jaws and each flute 34 is part of one of the two jaws.

[0123] When the cigarette 3 feeds out of the turning unit 36, the first slit 19 and the second slit 20 on it are offset by the predetermined angle θ .

[0124] Lastly, it should be noted that the breaking of the precut line 14 may occur on the turning unit 36, when one of two portions 23, 24 of each cigarette 3 is turned.

[0125] Thus, the turning unit 36 may be located immediately downstream of the laser perforating unit 16.

[0126] Advantageously, the turning unit 36 of the machine 1 allows one of the two portions 23, 24 of each cigarette 3 to be precisely turned relative to the other in order to close second slit 20.

[0127] More specifically, in the embodiments described, the first slit 19 is turned relative to the second slit 20 by an angle θ in such a way that the first slit 19 itself is no longer in communication with the second slit 20, thus placing the cigarette 3 in a configuration of no ventilation.

[0128] On being fed out of the machine 1 according to the invention, the cigarettes 3 all have the same degree of ventilation, thus minimizing production rejects.

Claims

1. A machine for making adjustably ventilated cigarettes, comprising a section (2) for making filter-tipped (10) cigarettes (3); the section (2) comprising a unit (4) for feeding cigarette sticks (7), a unit (5) for feeding filter plugs (8) each wrapped in a respective wrapping sheet (22), a unit (9) for assembling the cigarette sticks (7) with the filter plugs (8), a device (12) for feeding patches (13) and a rolling device (11) designed to receive the patches (13) and wrapping a patch (13) round at least one portion of cigarette stick (7) and a respective filter plug (8) to make a succession of cigarettes (3) with filter tips (10) with a longitudinal axis (3a); each cigarette (3) with filter tip (10) has a respective circumferential precut line (14) and at least a first slit (19) made in the patch (13) and a second slit (20) made in the wrapping sheet (22) of the filter plug (8) and matching the first slit (19); each cigarette (3) with filter tip (10) comprising a first portion (23) with the first slit (19) and a second portion (24) with the second slit (20); the machine (1) comprising a first conveyor (30) movable along a first feed path (P1) and comprising a plurality of first flutes (32) for receiving the second portions (24) of the cigarettes (3), a second conveyor (31) movable along a second feed path (P2) substantially parallel to the first path (P1) and comprising a plurality of gripping means (33) having second flutes (34) for retaining the first portions (23) of the cigarettes (3) and movement means (35) for moving the gripping means (33); during the movement of the two conveyors (30, 31) the movement means (35) for moving the gripping means (33) being capable of imparting torque to one of the two portions (23, 24) of the cigarette (3) which, by turning about the axis (3a) of the selfsame cigarette (3) by a predetermined angle (θ), offsets the first slit (19) relative to the second slit (20), thus causing the second slit (20) to close.
2. The machine according to claim 1, **characterized in that** the first conveyor (30) comprises a first drum (37) whose cylindrical outside surface (37a) comprises the first flutes (32) for receiving the second portions (24) of the cigarettes (3); the second conveyor (31) comprises a second drum (38) which is coaxial with the first drum (37) and whose cylindrical outside surface (38a) comprises the gripping means (33); each gripping means (33) being associated with a respective first, receiving flute (32).
3. The machine according to any one of claims 1 to 2, **characterized in that** each gripping means (33) rotates about its axis of rotation (33a) along the second feed path (P2) of the second drum (38); the second flutes (34) for retaining the first portions (23) of the cigarettes (3) imparting the torque to the selfsame first portions (23) along at least one stretch of the second feed path (P2) by turning the respective gripping means (33) about its axis (33a).
4. The machine according to any one of claims 1 to 3, **characterized in that** each gripping means (33) rotates about its axis (33a) by 360° along the second feed path (P2) defined by a circular arc (A) having a subtended angle (θ_1) equal to 180° ; the second, retaining flutes (34) turning the respective first portions (23) along a stretch of the second path (P2) defined by a circular arc (B) having a subtended angle (θ_2) equal to half the angle of rotation (θ).
5. The machine according to any of claims 1 to 4, **characterized in that** the gripping means (33) hold their position relative to the second drum (38); during the rotation of the first drum (37) the first, receiving flutes (32) setting the second portions (24) of the cigarettes (3) in rotation by the predetermined angle (θ) relative to the first portions (23) which are held in position by the second, retaining flutes (34).
6. The machine according to any one of claims 1 to 5, **characterized in that** an articulated joint (43) is connected to each gripping means (33) and keeps the second, retaining flute (34) in a fixed position relative to the second drum (38).
7. The machine according to any one of claims 1 to 6, **characterized in that** each articulated joint (43) comprises at least a first, a second and a third arm (45, 46, 47) connected one after the other; the first and third arms (45, 47) being parallel to the axis of rotation (50) of the second drum (38) and the second arm (46) being interposed between the first and third arms (45, 47) and being at right angles to both; the second arm (46) defining an eccentricity (e) relative to the axis of rotation (50) of the second drum (38).
8. The machine according to any one of claims 1 to 7, **characterized in that** the first, receiving flutes (32) rotate the second portions (24) of the cigarettes (3) relative to the respective first portions (23) along a first feed path (P1) defined by a circular arc (A) having a subtended angle (θ_1) which is equal to the angle of rotation (θ).
9. The machine according to any one of claims 1 to 8, **characterized in that** it comprises a roller (40) for feeding the cigarettes (3) and a roller (48) for releasing the cigarettes (3) located upstream and downstream of the first and second drums (37, 38) respectively, at respective feed and release stations (39, 41); the circular arc (A) defined by a subtended angle (θ_1) of 60° extending from the feed station (39) to the release station (41).

Patentansprüche

1. Maschine zur Herstellung einstellbar belüfteter Zigaretten, umfassend einen Bereich (2) zur Herstellung von Zigaretten (3) mit Filterspitze (10), wobei der Bereich (2) eine Einheit (4) zum Zuführen von Zigarettenstiften (7), eine Einheit (5) zum Zuführen von Filterstäben (8), die jeweils in einem jeweiligen Einwickelblatt (22) eingewickelt sind, eine Einheit (9) zum Zusammenfügen der Zigarettenstifte (7) mit den Filterstäben (8), eine Vorrichtung (12) zum Zuführen von Umhüllungen (13) und eine Rollvorrichtung (11) umfasst, die ausgestaltet ist, um die Umhüllungen (13) zu empfangen und eine Umhüllung (13) rund um mindestens einen Zigarettenstiftabschnitt (7) und einen entsprechenden Filterstab (8) zu wickeln, um eine Abfolge von Zigaretten (3) mit Filterspitze (10) mit einer Längsachse (3a) herzustellen, wobei eine jede Zigarette (3) mit Filterspitze (10) eine jeweilige vorgestanzte Umfangslinie (14) und mindestens einen ersten Schlitz (19) aufweist, der in der Umhüllung (13) ausgebildet ist, sowie einen zweiten Schlitz (20), der im Einwickelblatt (22) des Filterstabs (8) passend zum ersten Schlitz (19) ausgebildet ist, wobei eine jede Zigarette (3) mit Filterspitze (10) einen ersten Abschnitt (23) mit dem ersten Schlitz (19) und einen zweiten Abschnitt (24) mit dem zweiten Schlitz (20) umfasst, wobei die Maschine (1) eine erste Fördereinrichtung (30) umfasst, die entlang eines ersten Zuführwegs (P1) bewegbar ist und eine Vielzahl an ersten Furchen (32) zum Aufnehmen der ersten Abschnitte (24) der Zigaretten (3) umfasst, eine zweite Fördereinrichtung (31), die entlang eines zweiten Zuführwegs (P2) bewegbar ist, der im Wesentlichen parallel zum ersten Weg (P1) verläuft und eine Vielzahl an Greifmitteln (33) umfasst, die zweite Furchen (34) aufweisen, um die ersten Abschnitte (23) der Zigaretten (3) zu halten, sowie Bewegungsmittel (35), um die Greifmittel (33) zu bewegen, wobei die Bewegungsmittel (35) zum Bewegen der Greifmittel (33) während der Bewegung der zwei Fördereinrichtungen (30, 31) in der Lage sind, ein Torsionsmoment auf einen der zwei Abschnitte (23, 24) der Zigarette (3) zu übertragen, der sich um einen vorgegebenen Winkel (θ) um die Achse (3a) der Zigarette dreht und den ersten Schlitz (19) zum zweiten Schlitz (20) versetzt, wodurch der zweite Schlitz (20) verschlossen wird.
2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Fördereinrichtung (30) eine erste Trommel (37) umfasst, deren zylindrische außenseitige Oberfläche (37a) die ersten Furchen (32) zum Aufnehmen der zweiten Abschnitte (24) der Zigaretten (3) umfasst, wobei die zweite Fördereinrichtung (31) eine zweite Trommel (38) umfasst, die koaxial zur ersten Trommel (37) angeordnet ist, und deren zylindrische außenseitige Oberfläche (38a) die Greifmittel (33) umfasst, wobei ein jedes Greifmittel (33) mit einer jeweiligen ersten Aufnahmefurche (32) assoziiert ist.
3. Maschine nach einem der Ansprüche 1 bis 2, **dadurch gekennzeichnet, dass** sich ein jedes Greifmittel (33) um seine Rotationsachse (33a) entlang des zweiten Zuführungswegs (P2) der zweiten Trommel (38) dreht, wobei die zweiten Furchen (34) zum Halten der ersten Abschnitte (23) der Zigaretten (3) das Torsionsmoment auf die ersten Abschnitte (23) entlang mindestens eines Teilstücks des zweiten Zuführungswegs (P2) übertragen, indem die jeweiligen Greifmittel (33) um ihre Achse (33a) gedreht werden.
4. Maschine nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** sich ein jedes Greifmittel (33) um 360° um seine Achse (33a) entlang des zweiten Zuführungswegs (P2) dreht, definiert durch einen Kreisbogen (A), aufweisend einen gegenüberliegenden Winkel ($\theta 1$) gleich 180° , wobei die zweiten Haltefurchen (34) die jeweiligen ersten Abschnitte (23) entlang eines Teilstücks des zweiten Wegs (P2) drehen, definiert durch einen Kreisbogen (B), aufweisend einen gegenüberliegenden Winkel ($\theta 2$) gleich der Hälfte des Rotationswinkels (θ).
5. Maschine nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Greifmittel (33) ihre Position relativ zur zweiten Trommel (38) beibehalten, wobei die ersten Aufnahmefurchen (32) während der Drehung der ersten Trommel (37) die zweiten Abschnitte (24) der Zigaretten (3) um den vorgegebenen Winkel (θ) relativ zu den ersten Abschnitten (23) in Drehung versetzen, die von den zweiten Haltefurchen (34) in Position gehalten werden.
6. Maschine nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** eine Gelenkverbindung (43) mit einem jeden Greifmittel (33) verbunden ist und die zweite Haltefurche (34) in einer fixierten Position relativ zur zweiten Trommel (38) hält.
7. Maschine nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** eine jede Gelenkverbindung (43) mindestens einen ersten, einen zweiten und einen dritten Arm (45, 46, 47), die nacheinander verbunden sind, aufweist, wobei der erste und der dritte Arm (45, 47) parallel zur Rotationsachse (50) der zweiten Trommel (38) angeordnet sind und der zweite Arm (46) zwischen dem ersten und dem dritten Arm (45, 47) eingesetzt ist und in rechten Winkeln zu beiden angeordnet ist, wobei der zweite Arm (46) einen Mittenversatz (e) relativ zur Rotationsachse (50) der zweiten Trommel (38) definiert.

8. Machine nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die ersten Aufnahme-
furchen (32) die zweiten Abschnitte (24) der Zigaret-
ten (3) relativ zu den jeweiligen ersten Abschnitten
(23) entlang eines ersten Zuführungswegs (P1) dreh-
en, definiert durch einen Kreisbogen (A), aufwei-
send einen gegenüberliegenden Winkel (θ_1), der
gleich dem Rotationswinkel (θ) ist.
9. Machine nach einem der Ansprüche 1 bis 8, **da-
durch gekennzeichnet, dass** sie eine Walze (40)
zum Zuführen der Zigaretten (3) und eine Walze (48)
zum Freigeben der Zigaretten (3) umfasst, angeord-
net jeweils vor bzw. nach der ersten und der zweiten
Trommel (37, 38) an einer jeweiligen Zuführungs-
bzw. Freigabestation (39, 41), wobei sich der Kreis-
bogen (A), der durch einen gegenüberliegenden
Winkel (θ_1) von 60° definiert ist, von der Zuführungs-
station (39) zur Freigabestation (41) erstreckt.

Revendications

1. Machine de production de cigarettes ventilées de
manière réglable, comprenant une section (2) pour
produire des cigarettes (3) à bout-filtre (10) ; la sec-
tion (2) comprenant une unité (4) pour alimenter des
bâtonnets de cigarette (7), une unité (5) pour alimen-
ter des bouchons filtres (8) chacun enveloppé dans
une feuille d'emballage respective (22), une unité (9)
pour assembler les bâtonnets de cigarette (7) aux
bouchons filtres (8), un dispositif (12) pour alimenter
des bandes (13) et une rouleuse (11) conçue pour
recevoir les bandes (13) et envelopper une bande
(13) autour d'au moins une portion de bâtonnet de
cigarette (7) et d'un bouchon filtre respectif (8) pour
produire une succession de cigarettes (3) à bouts-
filtres (10) ayant un axe longitudinal (3a); chaque
cigarette (3) à bout-filtre (10) possède une ligne pré-
coupée circonférentielle (14) respective et au moins
une première fente (19) réalisée dans la bande (13)
et une seconde fente (20) réalisée dans la feuille
d'emballage (22) du bouchon filtre (8) et correspon-
dant à la première fente (19) ; chaque cigarette (3)
à bout-filtre (10) comprenant une première portion
(23) avec la première fente (19) et une seconde por-
tion (24) avec la seconde fente (20) ; la machine (1)
comprenant un premier convoyeur (30) mobile le
long d'un premier parcours d'alimentation (P1) et
comprenant une pluralité de premières cannelures
(32) pour recevoir les secondes portions (24) de ci-
garettes (3), un second convoyeur (31) mobile le
long d'un second parcours d'alimentation (P2) subs-
tamment parallèle au premier parcours (P1) et
comprenant une pluralité de moyens de préhension
(33) ayant des secondes cannelures (34) pour rete-
nir les premières portions (23) de cigarettes (3) et
des moyens de déplacement (35) pour déplacer les
moyens de préhension (33) ; les moyens de dépla-
cement (35) servant à déplacer les moyens de pré-
hension (33) pouvant, lors du déplacement des deux
convoyeurs (30, 31), imprimer un couple à l'une des
deux portions (23, 24) de la cigarette (3) qui, en tour-
nant autour de l'axe (3a) de la même cigarette (3)
selon un angle prédéfini (θ), décale la première fente
(19) par rapport à la seconde fente (20), provoquant
ainsi la fermeture de la seconde fente (20).
2. Machine selon la revendication 1, **caractérisée en
ce que** le premier convoyeur (30) comprend un pre-
mier tambour (37) dont la surface cylindrique externe
(37a) comprend les premières cannelures (32) pour
recevoir les secondes portions (24) de cigarettes (3);
le second convoyeur (31) comprend un second tam-
bour (38) étant coaxial au premier tambour (37) et
dont la surface cylindrique externe (38a) comprend
les moyens de préhension (33) ; chaque moyen de
préhension (33) étant associé à une première can-
nelure de réception (32) respective.
3. Machine selon l'une quelconque des revendications
de 1 à 2, **caractérisée en ce que** chaque moyen de
préhension (33) tourne autour de son axe de rotation
(33a) le long du second parcours d'alimentation (P2)
du second tambour (38) ; les secondes cannelures
(34), servant à retenir les premières portions (23) de
cigarettes (3), imprimant le couple aux mêmes pre-
mières parties (23) le long d'au moins un segment
du second parcours d'alimentation (P2) en tournant
les moyens de préhension (33) respectifs autour de
son axe (33a).
4. Machine selon l'une quelconque des revendications
de 1 à 3, **caractérisée en ce que** chaque moyen de
préhension (33) tourne autour de son axe (33a) sur
360° le long du second parcours d'alimentation (P2)
défini par un arc circulaire (A) ayant un angle sous-
tendu (θ_1) égal à 180°; les secondes cannelures de
retenue (34) tournant les premières portions (23) res-
pectives le long d'un segment du second parcours
(P2) défini par un arc circulaire (B) ayant un angle
sous-tendu (θ_2) égal à la moitié de l'angle de rotation
(θ).
5. Machine selon l'une quelconque des revendications
de 1 à 4, **caractérisée en ce que** les moyens de
préhension (33) maintiennent leur position par rap-
port au second tambour (38) ; lors de la rotation du
premier tambour (37), les premières cannelures de
réception (32) mettant les secondes portions (24) de
cigarettes (3) en rotation selon l'angle prédéfini (θ)
par rapport aux premières portions (23) étant main-
tenues en position par les secondes cannelures de
retenue (34).
6. Machine selon l'une quelconque des revendications

de 1 à 5, **caractérisée en ce qu'**un joint articulé (43) est relié à chaque moyen de préhension (33) et maintient la seconde cannelure de retenue (34) dans une position fixe par rapport au second tambour (38).

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7. Machine selon l'une quelconque des revendications de 1 à 6, **caractérisée en ce que** chaque joint articulé (43) comprend au moins un premier, un second et un troisième bras (45, 46, 47) reliés l'un après l'autre; les premier et troisième bras (45, 47) étant parallèles à l'axe de rotation (50) du second tambour (38) et le second bras (46) étant interposé entre les premier et troisième bras (45, 47) et étant orthogonal à ceux-ci; le second bras (46) définissant une excentricité (e) par rapport à l'axe de rotation (50) du second tambour (38). 10 15
8. Machine selon l'une quelconque des revendications de 1 à 7, **caractérisée en ce que** les premières cannelures de réception (32) font tourner les secondes portions (24) de cigarettes (3) par rapport aux premières portions (23) respectives le long d'un premier parcours d'alimentation (P1) défini par un arc circulaire (A) ayant un angle sous-tendu (θ_1) étant égal à l'angle de rotation (θ). 20 25
9. Machine selon l'une quelconque des revendications de 1 à 8, **caractérisée en ce qu'**elle comprend un rouleau (40) pour alimenter les cigarettes (3) et un rouleau (48) pour libérer les cigarettes (3) situés, respectivement, en amont et en aval des premier et second tambours (37, 38) au niveau des postes d'alimentation et de libération (39, 41) respectifs; l'arc circulaire (A) défini par un angle sous-tendu (θ_1) de 60° se prolongeant du poste d'alimentation (39) au poste de libération (41). 30 35

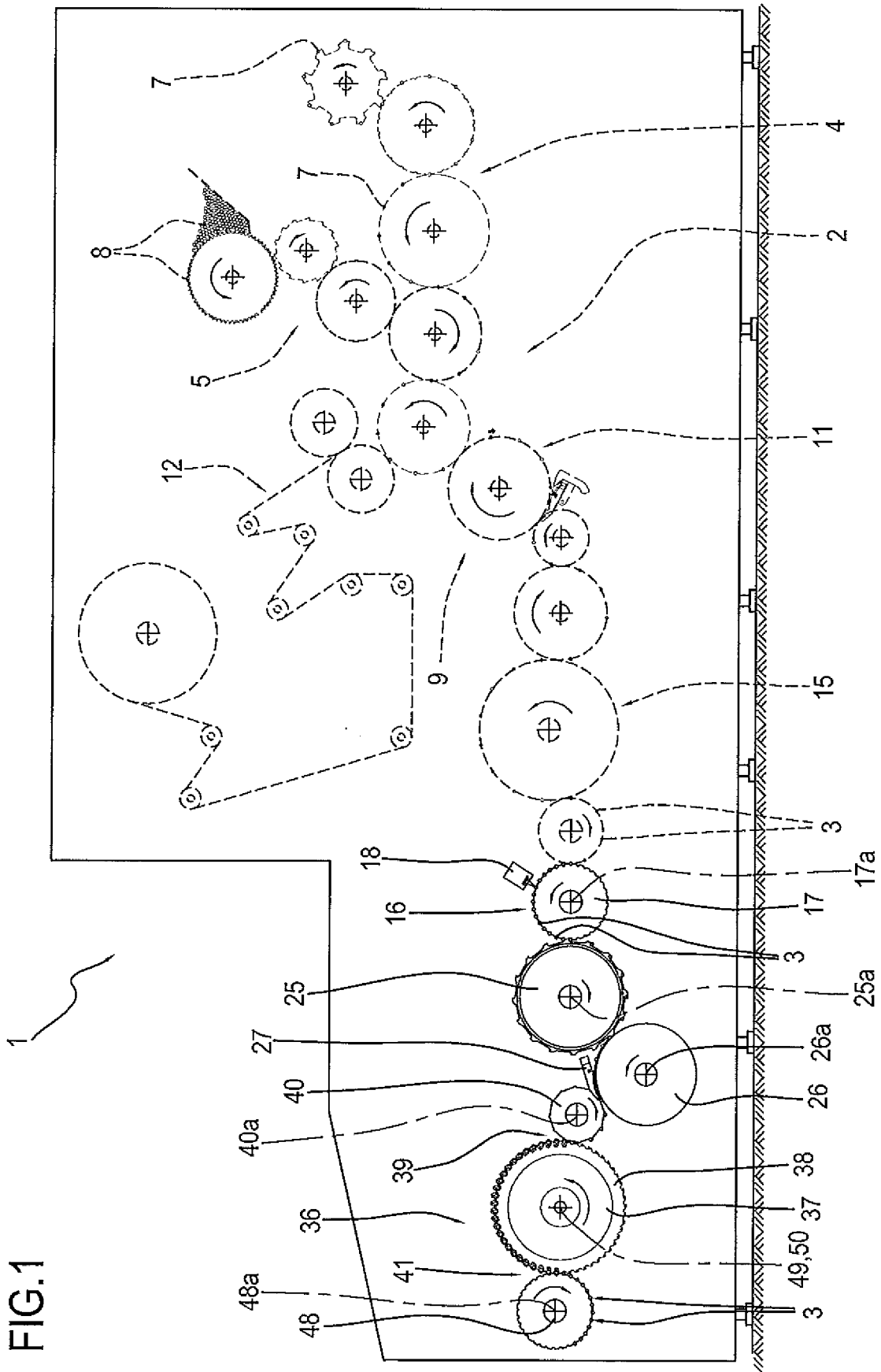
40

45

50

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FIG.1



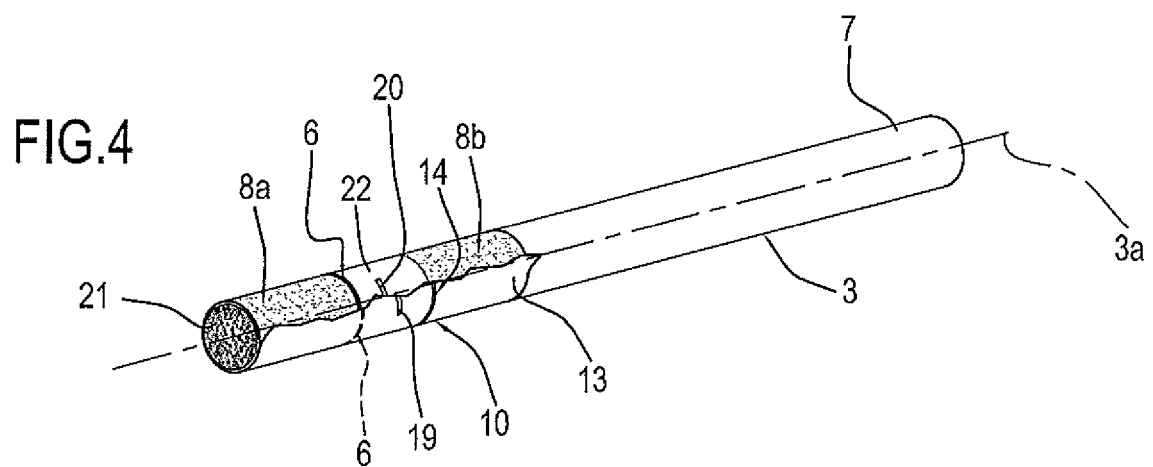
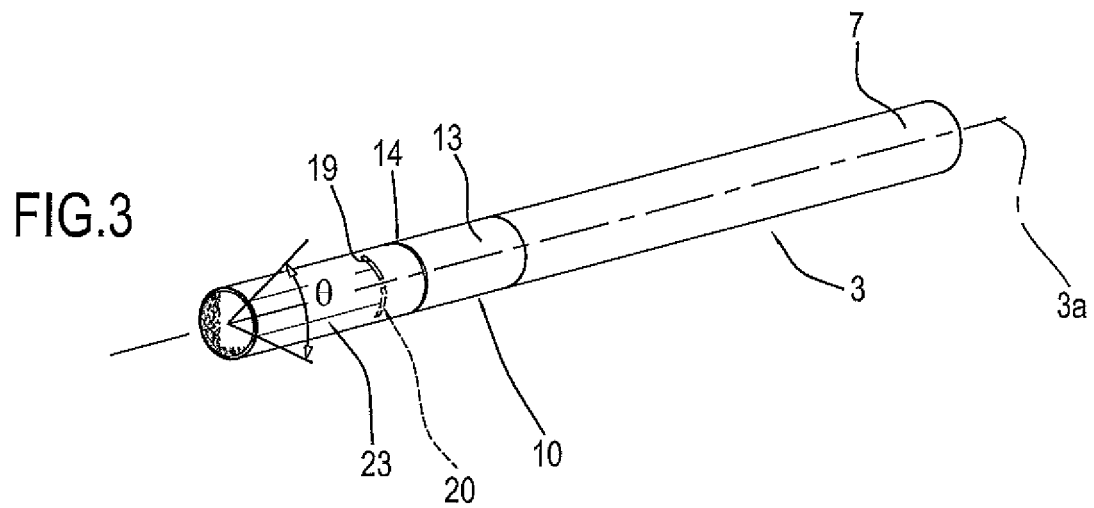
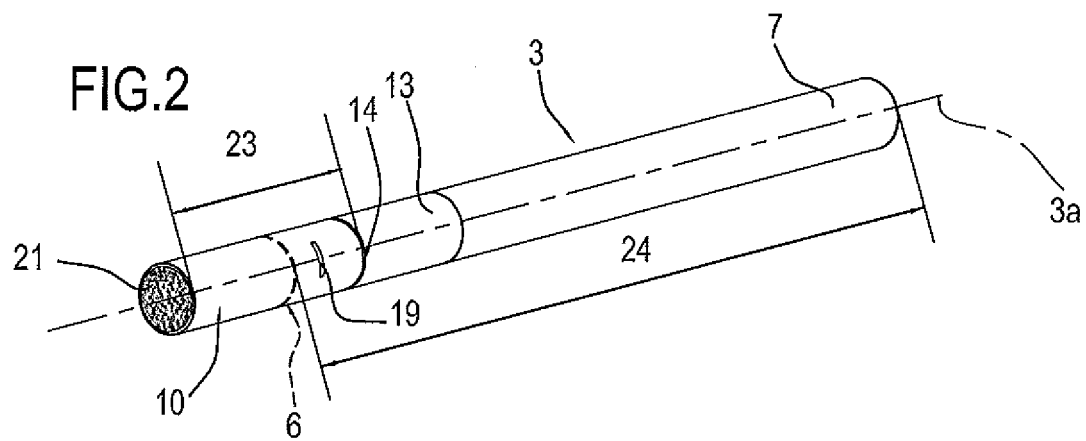


FIG.5

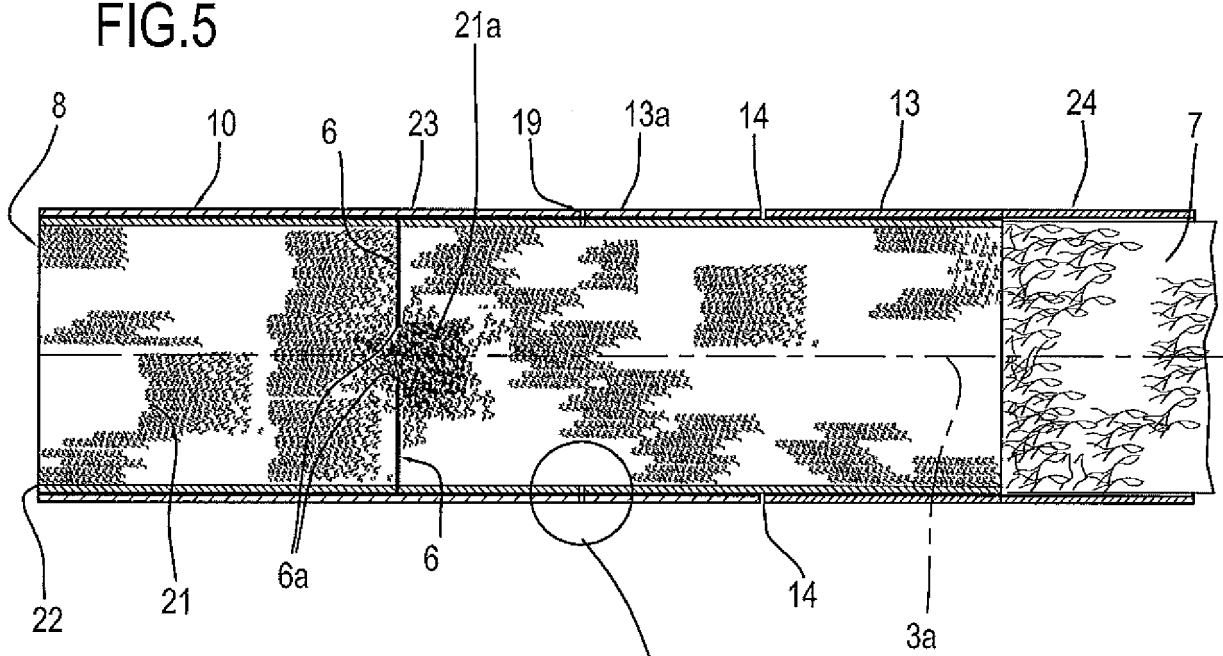


FIG.6

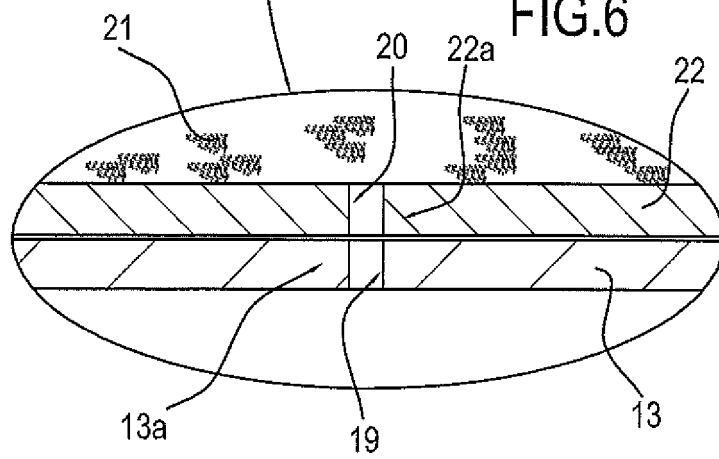


FIG.7

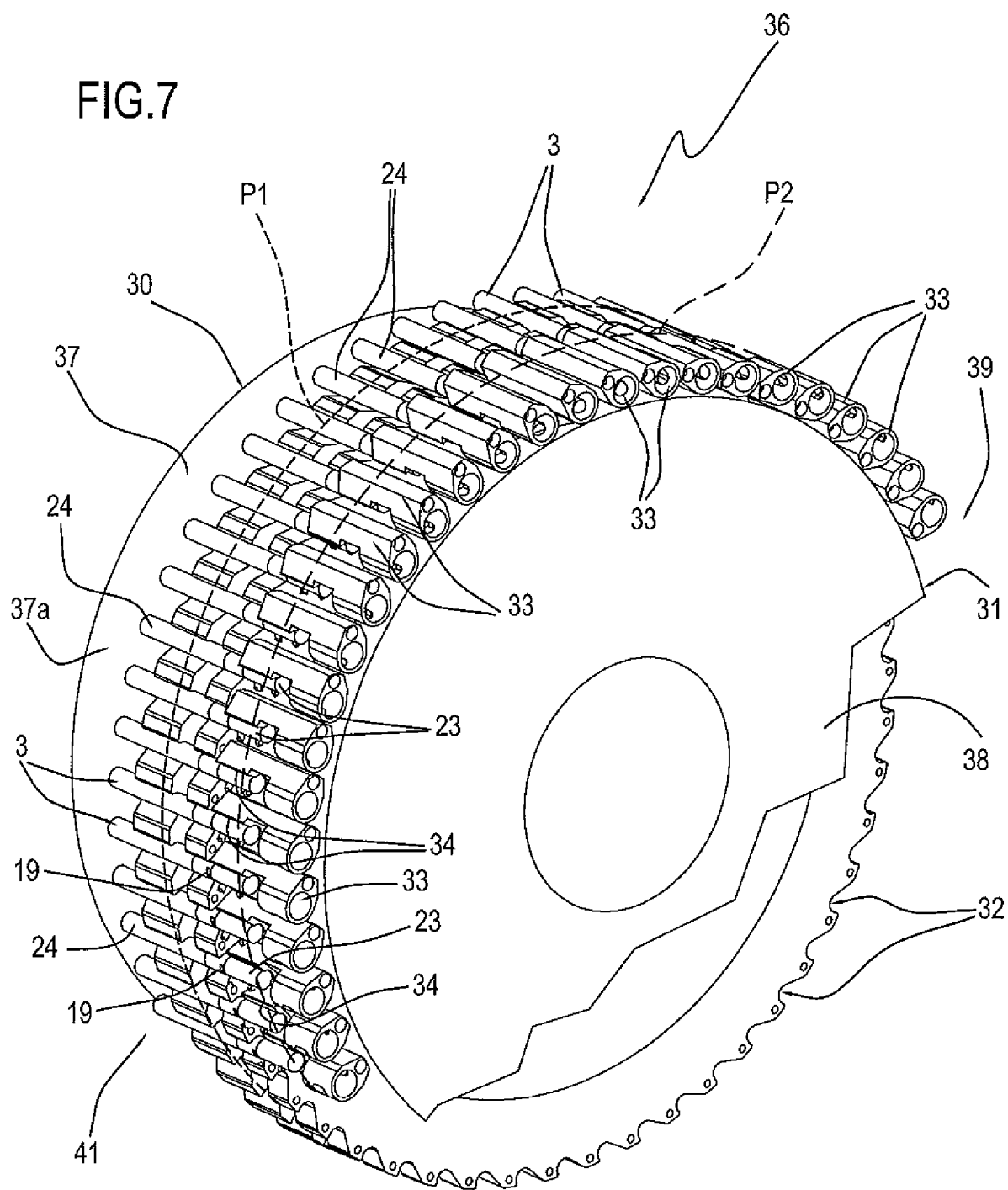


FIG.8

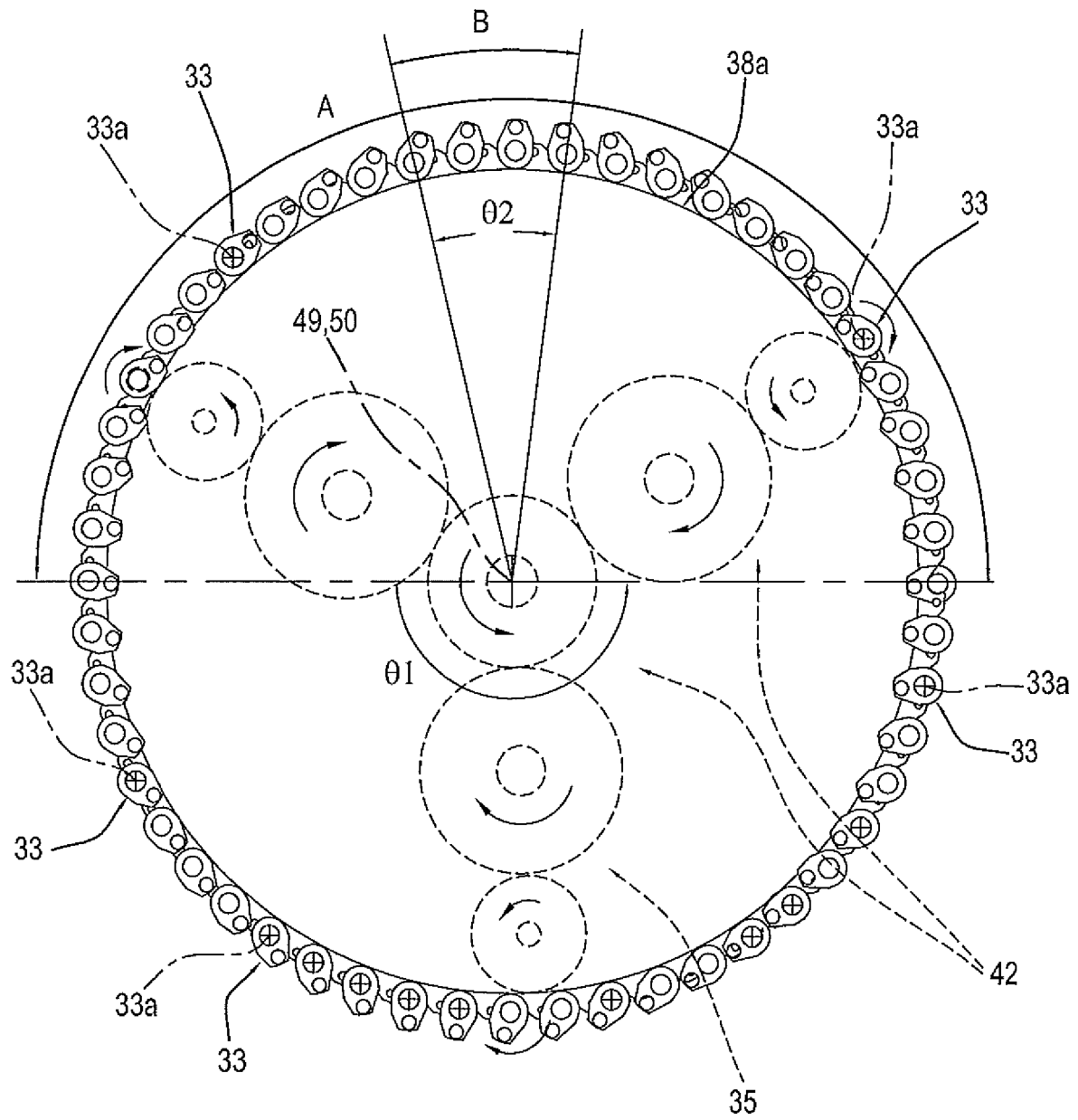


FIG.9

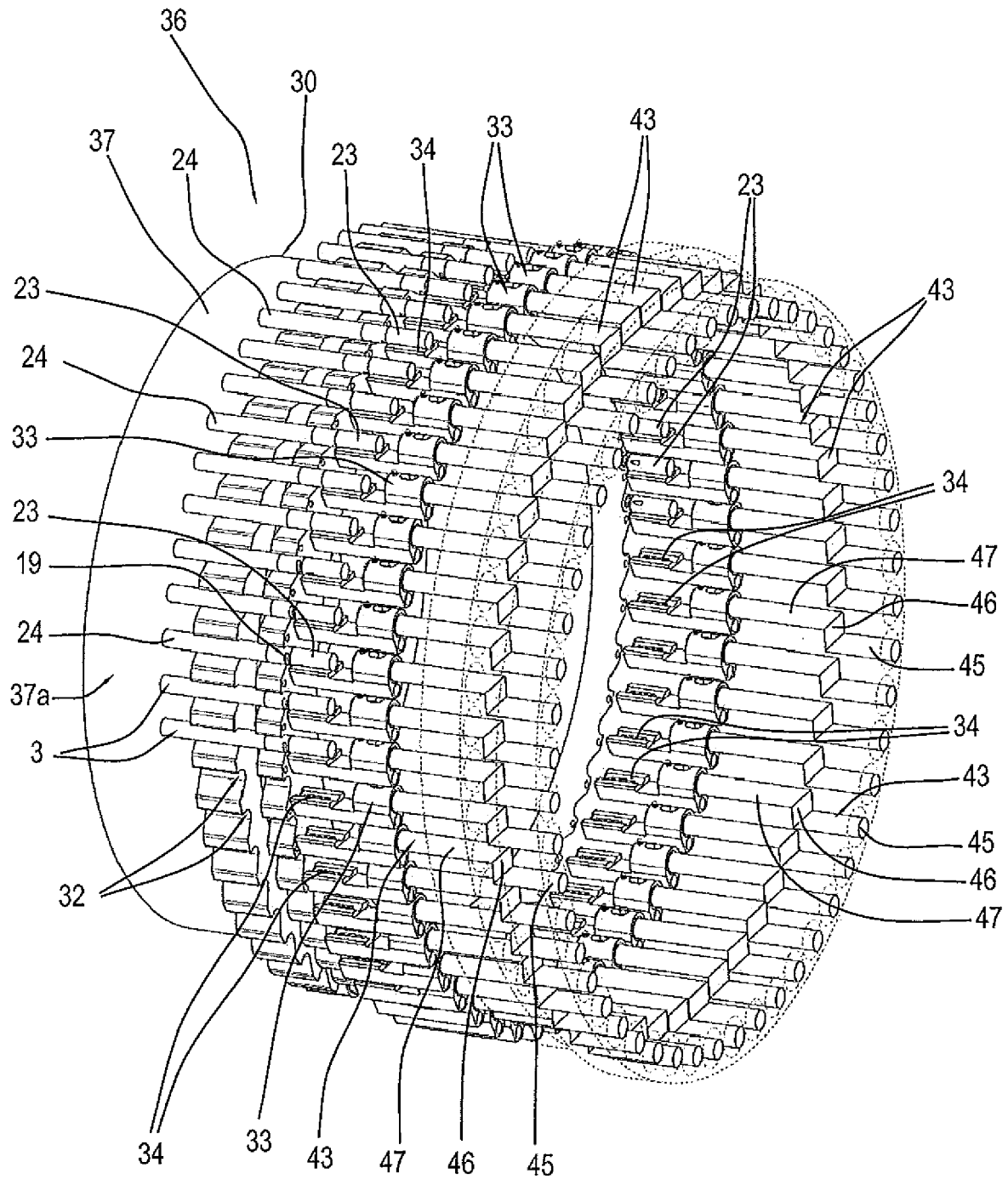


FIG.10

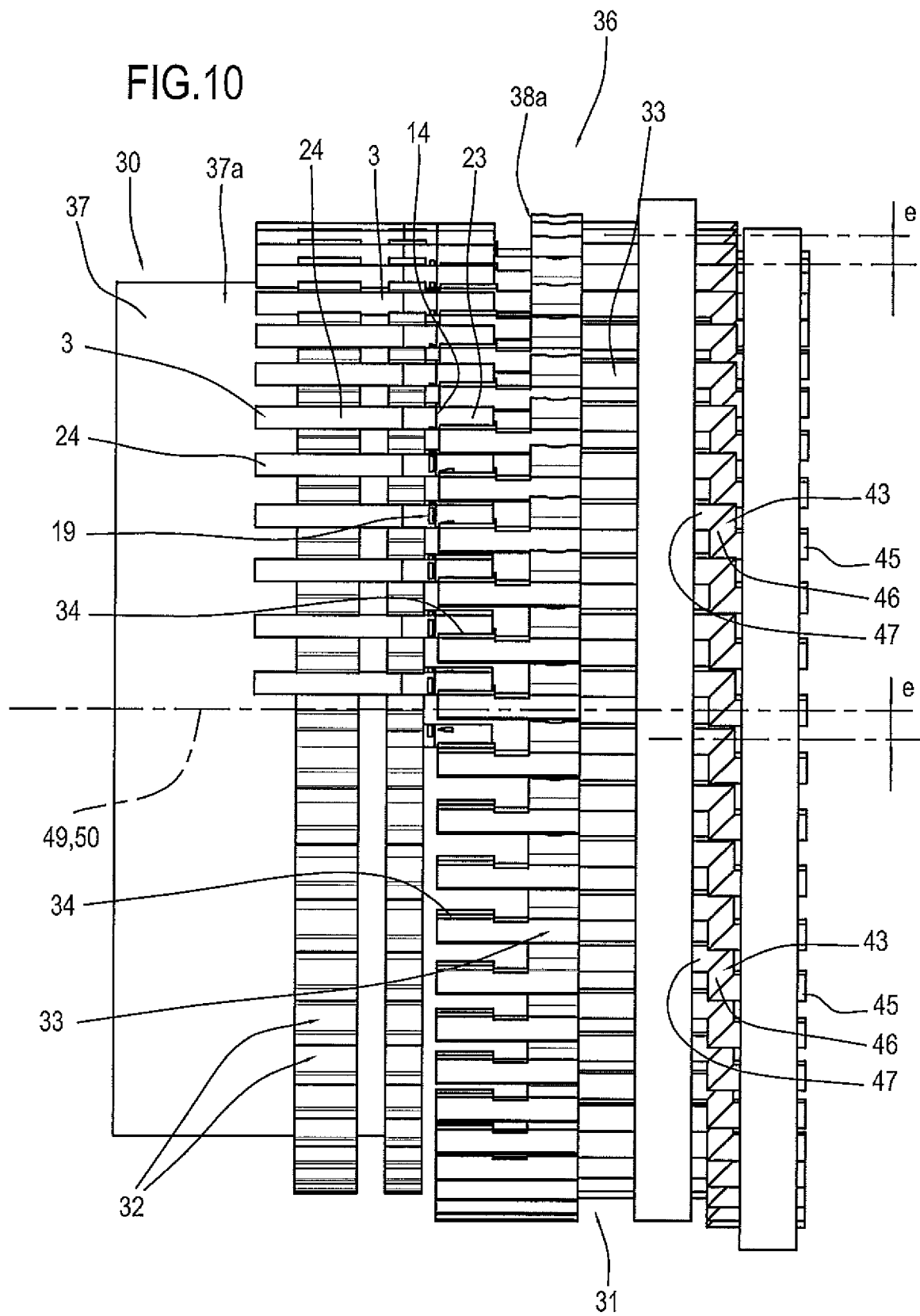
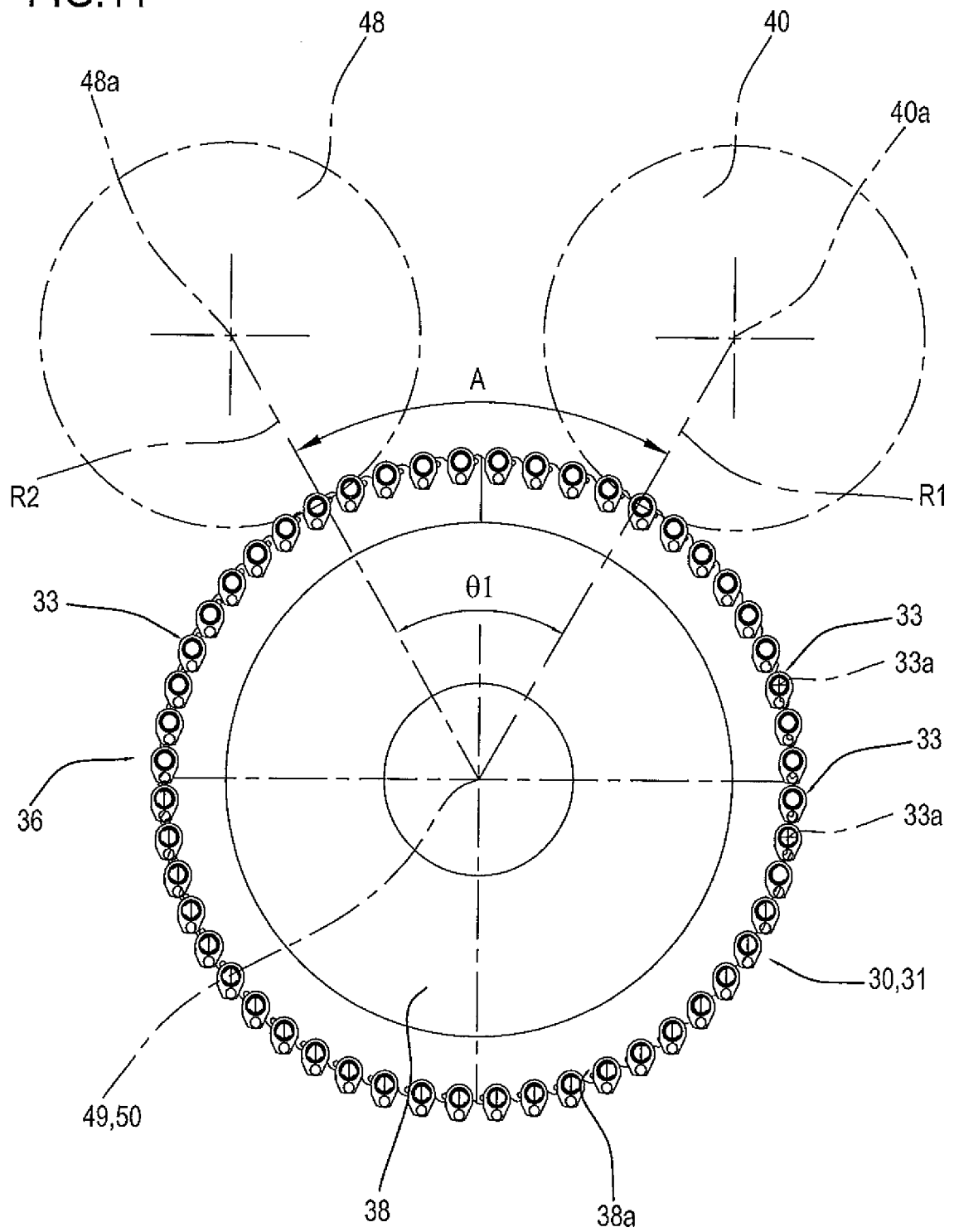


FIG.11



REFERENCES CITED IN THE DESCRIPTION

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