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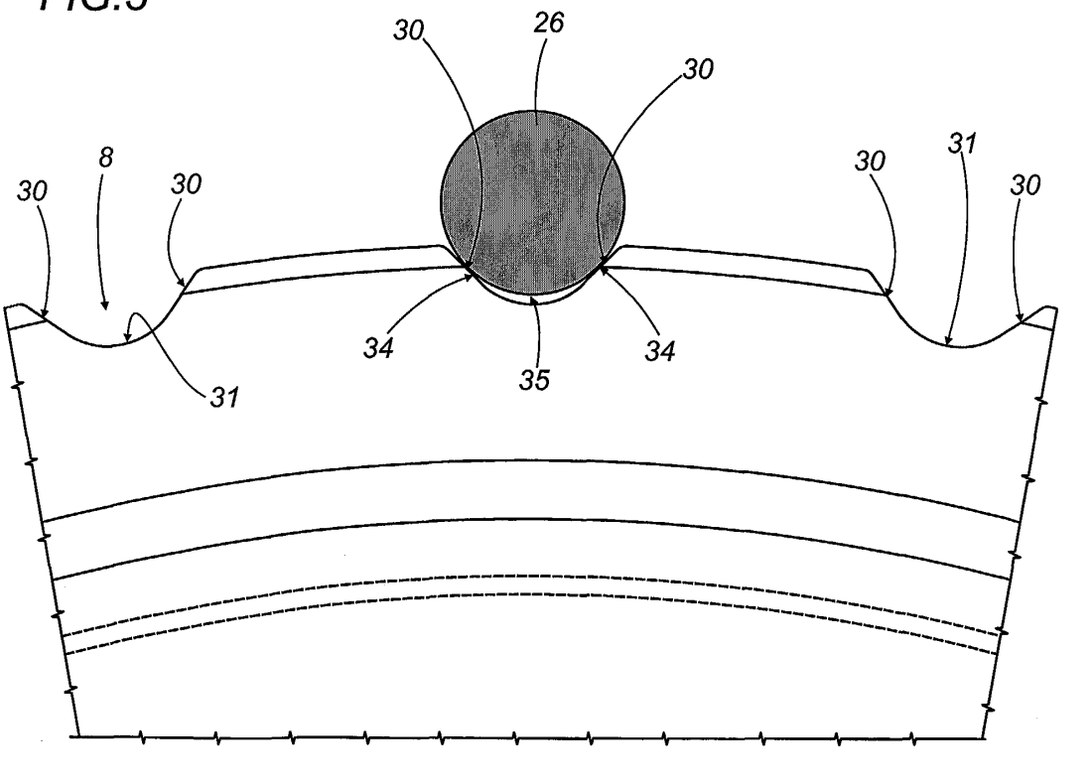
(54) A method and a machine for making filter cigarettes

(57) Cigarettes are manufactured on a machine that includes a filter tip attachment comprising a train of rollers (R) with peripheral suction grooves (8), each proportioned to hold a single cigarette (26). The grooves (8) are set parallel to the axis of rotation of the relative rollers (R) and combine to establish a feed path along which the cigarettes are attracted and released, passing from one roller to the next and advancing through a succession of processing stations. To optimize the attraction and release steps, the cigarettes (26) themselves are exploited in such a way as to create a chamber (35, 35a, 47) in each groove, compassed between the cylindrical surface of the cigarette and the bottom surface (31, 36, 39) of the groove (8) it occupies, and connected to the pneumatic circuits generating the suction.

FIG.3



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Description

[0001] The present invention relates to a method and a machine for making filter cigarettes.

[0002] In particular, the invention disclosed relates to a method of retaining and transferring cigarettes and relative filters by means of conveying rollers in an automatic cigarette manufacturing machine, described generally as a filter tip attachment, to which reference is made explicitly in the following specification albeit with no limitation implied.

[0003] Such filter tip attachments comprise an infeed station interfaced with a cigarette maker turning out one or two continuous cigarette rods, and are equipped, departing from the infeed station, with a train of rollers rotatable about mutually parallel axes, along which a succession of cigarette sticks and filters are caused to advance through a series of process stations, emerging ultimately as filter tipped cigarettes. On reaching the outfeed end of the train of rollers, the finished cigarettes are directed into a packer.

[0004] The outer surfaces of the rollers are typically fluted, fashioned with peripheral grooves such as will accommodate respective cigarette sticks and/or filters and retain them by suction. For the sake of simplicity, reference is made broadly to cigarettes in the following description.

[0005] The grooves are disposed parallel to the axis of the roller and present a cross sectional profile appearing as an arc to a circle; the bottom surface of each groove incorporates a plurality of suction holes connected to a source of negative pressure by way of relative valves operating on the pneumatic circuit in such a way as to allow of transferring the cigarettes from one roller to the next.

[0006] Each cigarette thus makes contact with the bottom surface of the respective groove along a straight line generator, and the portions of its cylindrical surface exposed to the force of suction are limited to the sum of the cross-sectional areas presented by the suction holes incorporated into the groove. The holes normally will be three or four in number, each approximately 4 mm in diameter, and given the high speeds at which filter tip attachments of the current generation are able to operate, it becomes necessary to generate appreciably powerful suction forces in order to retain the advancing cigarettes. This in turn dictates the use of high power vacuum equipment, and of pneumatic circuits that tend to be highly complex and costly by reason of the fact that they are specified with notably high strength pipelines and seals. Moreover, the high rated power of the equipment results in correspondingly high electrical energy consumption and high noise levels generated by the pneumatic circuits, particularly at the moment when cigarettes pass from one roller to the next.

[0007] Concerning this step, it will be observed that in the course of being transferred from one roller to the next, each cigarette makes a momentary radial flight from the releasing groove to the receiving groove. Accordingly, the aforementioned valves must be timed in such a way as to generate suction in the receiving groove before suction is deactivated in the releasing groove, so that the cigarette can pass from one to the other.

[0008] In practice, the effect of generating suction marginally before the cigarette enters the groove is to intensify the noise produced by the pneumatic circuits, and moreover, the flight accompanying the passage from one roller to the other results in a violent impact that can degrade the cigarette, in particular by causing tobacco filler to dislodge and shed.

[0009] The prior art includes a solution of adding slots to the groove in the neighbourhood of the suction holes, so as to widen the area of those portions of the cylindrical surface of the cigarette that are exposed to the force of attraction. Nonetheless, using fluted rollers with suction surfaces of this kind can create problems of instability and cause the cigarettes to deform, due to the discontinuous nature of the supporting surface.

[0010] The object of the present invention is to provide a method and a machine for making filter cigarettes from which the aforementioned drawbacks are absent.

[0011] A further object of the invention is to provide a method and a relative machine that can maximize the cylindrical surface area of the cigarette exposed to the force of suction, while avoiding deformation of the cigarette itself.

[0012] The stated object is realized in a method of making filter cigarettes according to the present invention, applicable to a machine comprising a plurality of rollers each furnished peripherally with a plurality of suction grooves accommodating respective cigarettes and aligned on axes parallel to the axis of rotation of the relative roller, in such a way as to establish a feed path along which the cigarettes are successively retained, released and transferred from a groove of one roller to a groove of a successive roller, characterized in that it includes a step of creating at least one negatively pressurized chamber within each groove of at least one of the rollers, compassed between the bottom surface of the groove and a cigarette occupying the selfsame groove.

[0013] The stated object is realized similarly according to the present invention in a machine comprising a plurality of rollers each furnished peripherally with a plurality of suction grooves accommodating respective cigarettes and aligned on axes parallel to the axis of rotation of the relative roller, in such a way as to establish a feed path along which the cigarettes are successively retained, released and transferred from a groove of one roller to a groove of a successive roller, characterized in that each groove of at least one roller comprises a bottom surface merging with two mutually opposed flank faces positioned to engage in contact along at least two longitudinal areas with a relative cigarette occupying the groove, thereby creating at least one chamber between

the bottom surface of the groove and the portion of the cylindrical surface of the cigarette directed toward the bottom surface of the groove, and in that the chamber is connected to a source of negative pressure.

[0014] 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 machine for making filter cigarettes by the method according to the present invention, viewed schematically in a fragmentary side elevation;
- figure 2 illustrates a roller of the machine in figure 1, viewed in an enlarged side elevation;
- figure 3 illustrates a detail of figure 2, viewed in an enlarged side elevation;
- figures 4 to 6 are enlarged side elevations each showing two portions of two respective contiguous rollers forming part of the machine in figure 1, and in particular two mutually opposed grooves, illustrated in three successive operating steps;
- figure 7 shows a possible embodiment of the detail illustrated in figure 3, viewed schematically and in perspective;
- figures 8 and 9 show a second embodiment of the detail illustrated in figure 3 viewed schematically from the side and in perspective, respectively;
- figures 10 and 11 show a third embodiment of the detail illustrated in figure 3 viewed schematically from the side and in perspective, respectively;
- figure 12 shows a detail of figure 11, illustrated in perspective;
- figures 13 and 14 show a fourth, and preferred embodiment of the detail illustrated in figure 3, viewed schematically from the side and in perspective, respectively;.
- figures 15, 16 and 17 illustrate three further embodiments of the grooves shown in figures 8, 12 and 14, respectively, viewed in perspective;
- figures 18, 19, 20 and 21 illustrate two further embodiments of the grooves according to the present invention, viewed schematically from the side and from above.

[0015] With reference to figure 1 of the accompanying drawings, 1 denotes a portion, in its entirety, of a machine known as a filter tip attachment, used in the manufacture of filter cigarettes. An infeed 2 of the attachment is coupled to the outfeed 3 of a beam 4 from which double length cigarette sticks 5 are directed in succession by a transfer unit 6 to the infeed 2 of the attachment, which will be seen to consist in a train of rollers rotatable about mutually parallel axes and furnished each with a plurality of suction grooves. In the interests of simplicity, the rollers are denoted R generically, except where identified by a specific numeral, and all the grooves are denoted 8.

[0016] The infeed 2 coincides with a first roller 7 set in rotation at a constant angular velocity, turning clockwise as viewed in figure 1 about a relative axis extending parallel to the predominating axis of the beam 4, by which the double length cigarette sticks 5 are taken up in grooves 8 lying parallel to the axis of rotation. The sticks 5 are thereupon advanced transversely to their longitudinal axes and transferred in succession to relative grooves 8 afforded by the periphery of a second roller 9 set in rotation anticlockwise as viewed in figure 1.

[0017] The double length sticks 5 are advanced by the second roller 9, again transversely to their axes, toward a cutting unit 10 where each is divided in conventional manner to produce two single sticks 5a of length corresponding to the length of a normal cigarette; the two sticks 5a are then advanced in axial alignment and transferred to the grooves 8 of a third roller 11, rotating clockwise, on which they will be distanced axially one from another.

[0018] The separated sticks 5a are transferred to a fourth roller 12 forming part of a conventional assembly station 13 that also comprises a feed roller 14 conveying double length filter plugs 15. As discernible in figure 1, the feed roller 14 is positioned substantially tangential to the fourth roller 12, rotating in the opposite direction and at the same peripheral speed, and is designed to place each successive double length filter plug 15 in a central portion of a relative groove 8 offered by the fourth roller 12. Each plug 15 transferred thus to a relative groove 8 of the fourth roller 12 will assume a position in between and in alignment with two single cigarette sticks 5a transferred to the selfsame groove 8, thus forming an assembly 5b on the roller 12 composed of two axially aligned cigarette sticks 5a separated by one double length filter plug 15. These assemblies 5b are then fed in succession from the fourth roller 12 to a fifth roller 16 coinciding with the infeed station of a finishing unit 17 of the type disclosed and claimed in Italian Patent n° 1 200 229, to which reference can be made for a full description.

[0019] Besides the fifth roller 16, as illustrated in' figure 1, the finishing unit 17 comprises a feed roller 18 positioned to supply tipping papers 19 separated from a continuous strip 20 by a cutting unit 21, of which the function is to join together the two cigarette sticks 5a and the double length filter plug 15 making up each assembly 5b. Forming a part of this same unit 17 is a rolling unit 22, including a respective roller 23, designed to take up each successive assembly 5b together with the relative tipping paper 19 from the fifth roller 16 and thereupon roll the tipping paper 19 around the double length filter plug 15 and the corresponding ends of the two cigarette sticks 5a to fashion a double length cigarette, denoted 5c. The double length cigarettes 5c pass in succession from the tipping roller 23 to a sixth roller 24 coinciding with the outfeed of the finishing unit 17.

[0020] At a given point while occupying the grooves 8 of the sixth roller 24, each successive double length cigarette 5c is directed through a cutting unit 25 posi-

tioned to engage the double filter plug 15, in such a manner as to generate respective pairs of axially aligned single cigarettes 26 that are then transferred from this same roller 24 onto further rollers 27 and 28, thence to other machine units of the filter tip attachment indicated schematically by a block denoted 29. One of the steps performed by these further units will be to order the cut cigarettes 26 in single file.

[0021] Figures 2, 3 and 7 show a portion of a typical roller R illustrating the relative grooves 8, each of which presents an arcuate profile with a concave face directed away from the axis of rotation of the roller R. More exactly, the groove 8 is fashioned with two mutually opposed flank faces 30 joined to a bottom surface 31 affording at least two holes 32 connected by way of radial ducts 33 to a source of negative pressure (conventional in embodiment, and not illustrated).

[0022] As already intimated, each groove 8 of a given roller R is designed to accommodate a double length cigarette stick 5, or a single cigarette stick 5a, or an assembly 5c composed of two single sticks 5a separated by a double length filter plug 15; in the interests of simplicity however, reference will be made hereinafter simply to cigarettes 26.

[0023] With reference in particular to figure 3, the two flank faces 30 are flat and rectilinear, so that the groove 8 presents a cross-sectional profile of substantially shallow "U" outline. Moreover, the groove 8 is proportioned (see figure 3) so that a relative cigarette 26 will come to rest with two longitudinal areas 34 of its cylindrical surface offered in contact to two respective longitudinal areas of the flank faces 30, in such a way as to create at least one chamber 35 between the bottom surface 31 of the groove 8 and a portion 26a of the cylindrical surface of the cigarette 26 directed toward the bottom surface 31. Thus, the chamber 35 is compassed between the part of the cylindrical surface of the cigarette 26 delimited by the two longitudinal areas 34 of contact, and the part of the surface of the groove 8 delimited by these same two areas 34 of contact.

[0024] The chamber 35 is connected to the aforementioned source of negative pressure by way of the relative holes 32 which, as discernible from figure 7, are located at points near to the two opposite ends of the groove 8 in such a way that the partial vacuum generated within the chamber 35 will be stronger in the central part, extending between the two suction holes 32, than at the two endmost parts; thus, the part of the cigarette 26 exposed to the greatest force of attraction will be, correspondingly, that part of the portion 26a of the cylindrical surface extending between the two holes 32.

[0025] In the example of figures 8 and 9, the two flank faces 30 of each groove 8 are joined to a bottom surface 36 presenting a cross-sectional profile of squarish outline, comprising a flat bottom face 37 extending between two flank walls 38 normal to the bottom face 37 and merged with the flank faces 30. In this instance the chamber 35 is enlarged, and whilst the contact made between the cigarette 26 and the flank faces 30 remains the same as in the first example described, the distance separating the portion 26a of the cylindrical surface of the cigarette 26 from the bottom face 37 of the groove is increased, so that if tobacco particles are shed from the end of the cigarette 26, this will not occasion any loss of grip between the cigarette 26 and the flank faces 30.

[0026] The groove 8 illustrated in figures 10, 11 and 12 is fashioned with a bottom surface 39 presenting a longitudinal rib 40 positioned to make contact with an intermediate band 26b on the portion 26a of the cylindrical surface of the cigarette 26 directed toward the bottom surface 39, and combining with the selfsame portion 26a of the cylindrical surface to create two half-chambers 35a, as discernible in figure 10. Observing figure 12 in particular, the rib 40 in question presents transverse notches 41, coinciding with the suction holes 32, by which the holes 32 are connected with both half-chambers 35a.

[0027] Figures 4, 5 and 6 illustrate the steps by which a cigarette is transferred, in the portion 1 of the machine shown in figure 1, from a typical releasing roller R, rotating clockwise and indicated on the left in the three drawings, to a typical receiving roller R, rotating anticlockwise. More precisely, figure 4 illustrates the mutual positions of two grooves 8, releasing and receiving respectively, at a moment immediately preceding the transfer from left to right, in which the cigarette 26 is held by the partial vacuum generated in the chamber 35 of the groove 8 presented by the releasing roller R. Figure 5 illustrates the mutual positions of the same two grooves 8 during the subsequent transfer step, in which the cigarette 26 remains in contact simultaneously with the two flank faces 30 of the releasing groove 8 and with the two flank faces 30 of the receiving groove 8, along the respective longitudinal areas 34 and through a predetermined angular distance typically of 6°, as the rollers R rotate about their relative axes. Accordingly, the cigarette 26 makes contact simultaneously with four faces 30 of the two respective grooves 8 along four longitudinal areas 34 of its cylindrical surface.

[0028] At a given point during the transfer sequence, suction is deactivated initially in the chamber 35 of the releasing groove 8, through the agency of conventional valve means not shown in the drawings, and simultaneously activated in the chamber 35 of the receiving groove 8. In this way, the transfer of a cigarette 26 from a releasing groove 8 to a receiving groove 8, which concludes as illustrated in figure 6, can be effected gradually and without causing the cigarette 26 to be propelled through a radial flight between the two grooves 8 that might damage it in any way.

[0029] To the end of ensuring that the position of the cigarettes 26 is correctly controlled throughout the entire operation of effecting a transfer from one roller R to the next, and as discernible in particular from figure 5, the diagonally opposed pairs of flank faces 30 presented re-

spectively by the releasing and receiving grooves 8 are set apart one from another by a distance marginally less than the diameter of a single cigarette 26, so that the selfsame cigarette will be lightly compressed along the four longitudinal areas 34 of contact with the four corresponding faces 30.

[0030] Where the grooves of two contiguous rollers R are embodied as in the example of figures 10, 11 and 12, the cigarette 26 will be held not only along the aforementioned four longitudinal areas 34 of contact during the transfer step, but also along the portions 26b in contact with the ribs 40, so that there are six points of contact between the cylindrical surface and the grooves, four of which coinciding with the longitudinal areas 34 along the flank faces 30, and two coinciding with areas 42 of the ribs 40 offered to the cigarette 26.

[0031] In the example of figures 13 and 14, the flank faces 30 of each groove 8 are joined to a bottom surface 39 presenting a cross-sectional profile of squarish outline, comprising a flat bottom face 43 and two flank wails 44 substantially perpendicular to the bottom face 43. The solution is therefore similar to that illustrated in figures 8 and 9, though with the difference that the cigarette 26 is offered in contact both to the two flank faces 30 and to the flat bottom face 43, thereby creating two half-chambers 35a. Each hole 32 presents a countersunk mouth 45 communicating with both the half-chambers 35a.

[0032] It will be observed, in the examples of figures 7 to 14, that the two opposite ends of the groove 8 can be embodied either as illustrated in figure 3, or in familiar manner with a portion, denoted 46, contoured in such a way as to minimize any loss of suction force from the chambers 35 or 35a. In the examples of 15, 16 and 17, the ends of the groove 8 are shaped in such a manner that the cigarette 26 engages fully in contact with the portions 46 lying between the two flank faces 30.

[0033] Finally, in the examples of figures 18 to 21, the single groove 8 is fashioned in such a manner that a cigarette 26 positioned on the bottom surface, denoted 48, will enter into contact only with a substantially central area 49. The central area 49 in question lies between two channels 50 presented by the bottom surface 48 and extending practically the full length of the groove 8. The purpose of the channels 50 is to establish two half-chambers 47a of a chamber, denoted 47 in its entirety, created between the bottom surface 48 and the cylindrical surface of the cigarette 26. The connection between the chamber 47 and the aforementioned source of negative pressure is provided by way of holes 32 in the bottom surface 48 located to coincide with the central area 49 of contact. Each hole 32 presents a countersunk mouth 52 communicating with both the channels 50.

[0034] The channels 50 might be fashioned with various cross-sectional profiles: the example of figure 18 shows a profile of squarish outline similar to that of figure 13, whilst the example of figure 20 shows a curved outline similar to that of figures 10, 11 and 12.

[0035] It will be observed in the examples of figures 18 to 21 that the partial vacuum is generated within a chamber 47 that has open sides, unlike the chamber denoted 35. Accordingly, the inclusion of the two end portions 46 in the manner described above will be particularly advantageous in this instance, with the end in view of minimizing any loss of suction force from the chamber 47.

Claims

1. A method of making filter cigarettes in a machine comprising a plurality of rollers (R) each furnished peripherally with a plurality of suction grooves (8) accommodating respective cigarettes (26) and aligned on axes parallel to the axis of rotation of the relative roller (R), in such a manner as to establish a feed path along which the cigarettes (26) are successively retained, released and transferred from a groove (8) of one roller (R) to a groove of a successive roller (R), **characterized in that** it includes a step of creating at least one negatively pressurized chamber (35, 35a, 47) within each groove (8) of at least one of the rollers (R), compassed between the bottom surface (31, 36, 39, 48) of the groove and a cigarette (26) occupying the selfsame groove.

2. A method as in claim 1, wherein the chamber (47) is created by causing the cigarette (26) to engage in contact with the relative groove (8) along at least one longitudinal area (49) presented by the bottom surface (48) of the groove (8).

3. A method as in claim 2, wherein the chamber (47) is located at least on one side of the longitudinal area (49).

4. A method as in claim 2, wherein the chamber (47) is divided by the area (49) of contact into two half-chambers (47a).

5. A method as in claim 1, wherein the chamber (35, 35a) is created by causing the cigarette (26) to engage in contact with the relative groove (8) along at least two longitudinal areas (34) of the mutually opposed flank faces (30) presented by the groove (8), in such a way that the chamber (35, 35a) is compassed between a portion (26a) of the cylindrical surface of the cigarette (26) delimited by the two areas (34) of contact, and the portion of the surface of the groove (8) delimited by the selfsame areas (34) of contact.

6. A method as in claim 1, wherein the chamber (35) is divided into two negatively pressurized half-chambers (35a).

7. A method as in claim 6, wherein the half-chambers (35a) are created by causing the cigarette (26) to engage in contact with the relative groove (8) not only along the two longitudinal areas (34) of the mutually opposed flank faces (30) presented by the groove (8), but also along an intermediate rib (40) presented by the bottom surface (39) of the groove.

8. A method as in claim 1, wherein at least one negatively pressurized chamber (35, 35a) is created in each of the grooves of at least two contiguous rollers (R), compassed between the bottom surface (31, 36, 39) of the groove (8) and a cigarette (26) occupying the selfsame groove (8).

9. A method as in claim 8, comprising a step whereby the cigarettes (26) are transferred from releasing grooves (9) presented by a first of the two contiguous rollers (R) to receiving grooves (8) presented by the second roller, during which the cigarette (26) remains in contact simultaneously, as the rollers (R) rotate through a predetermined angular distance, with at least two longitudinal areas (34) of the mutually opposed flank faces (30) of the releasing groove (8) and with at least two longitudinal areas (34) of the mutually opposed flank faces (30) of the receiving groove (8).

10. A method as in claim 8 where dependent on claim 4, comprising a step whereby the cigarettes (26) are transferred from releasing grooves (9) presented by a first of the two contiguous rollers (R) to receiving grooves (8) presented by the second roller, during which the cigarette (26) remains in contact simultaneously, as the rollers (R) rotate through a predetermined angular distance, with three longitudinal areas (34, 42) of the releasing groove (8) and with three longitudinal areas (34, 42) of the receiving groove (8).

11. A method as in claims 8, 9 and 10, wherein the transfer step is effected as the rollers (R) rotate about their respective axes through an angular distance substantially of six degrees.

12. A machine for making filter cigarettes, comprising a plurality of rollers (R) each furnished peripherally with a plurality of suction grooves (8) accommodating respective cigarettes (26) and aligned on axes parallel to the axis of rotation of the relative roller (R), in such a manner as to establish a feed path along which the cigarettes (26) are successively retained, released and transferred from a groove (8) of one roller (R) to a groove of a successive roller (R), **characterized**
in that each groove (8) of at least one roller (R) comprises a bottom surface (48) merging with two mutually opposed flank faces (30) and positioned to engage in contact along a longitudinal area (49) with a relative cigarette (26) occupying the groove, thereby creating at least one chamber (47) delimited on one side by the longitudinal area (48) of contact, and in that the chamber (47) is connected to a source of negative pressure.

13. A machine for making filter cigarettes, comprising a plurality of rollers (R) each furnished peripherally with a plurality of suction grooves (8) accommodating respective cigarettes (26) and aligned on axes parallel to the axis of rotation of the relative roller (R), in such a manner as to establish a feed path along which the cigarettes (26) are successively retained, released and transferred from a groove (8) of one roller (R) to a groove of a successive roller (R), **characterized**
in that each groove (8) of at least one roller (R) comprises a bottom surface (31, 36, 39) merging with two mutually opposed flank faces (30) positioned to engage in contact along at least two longitudinal areas (34) with a relative cigarette (26) occupying the groove, thereby creating at least one chamber (35, 35a) between the bottom surface (31, 36, 39) of the groove (8) and the portion (26a) of the cylindrical surface of the cigarette (26) directed toward the bottom surface (31, 36, 39) of the groove, and in that the chamber (35, 35a) is connected to a source of negative pressure.

14. A machine as in claim 13, wherein the chamber (35) is divided into two half-chambers (35a) connected to a source of negative pressure.

15. A machine as in claim 14, wherein the division between the two half-chambers (35a) is created by a longitudinal rib (40) extending along the bottom surface (39) of the groove and affording a relative area (42) offered in contact to the cigarette (26).

16. A machine as in claim 13, wherein each groove (8) of at least two contiguous rollers (R) comprises a bottom surface (31, 36, 39) merging with two . mutually opposed flank faces (30) positioned to enter into contact along at least two longitudinal areas (34) with a relative cigarette (26) occupying the groove, thereby creating at least one chamber (35, 35a) compassed between the bottom surface (31, 36, 39) of the groove (8) and the portion (26a) of the cylindrical surface of the cigarette (26) directed toward the bottom surface (31, 36, 39) of the groove, and connected to a source of negative pressure.

17. A machine as in claim 16, configured in such a manner that when cigarettes (26) are transferred from the releasing grooves (9) of a first of the two contiguous rollers (R) to the receiving grooves (8) of a second roller, a first flank face (30) of the releasing

groove (8) and a first flank face (30) of the receiving groove (8) and a second flank face (30) of the releasing groove (8) and a second flank face (30) of the receiving groove (8) are separated respectively by a distance marginally less than the diameter of a single cigarette (26), with the result that the cigarette remains in contact simultaneously, as the rollers (R) rotate through a predetermined angular distance, with two longitudinal areas (34) of the flank faces (30) of the releasing groove (8) and with two longitudinal areas (34) of the flank faces (30) of the receiving groove (8).

18. A machine as in claim 15 or claim 16, wherein the longitudinal ribs (40) of the releasing groove (8) and the receiving groove (8) are separated, during the rotation of the two contiguous rollers (R) through the predetermined angular distance, by a distance marginally less than the diameter of a single cigarette (26), with the result that the cigarette remains in contact simultaneously with three longitudinal areas (34, 42) of the releasing groove (8) and with three longitudinal areas (34, 42) of the receiving groove (8).

19. A machine as in claims 12 to 18, wherein each groove (8) is furnished with at least one hole (32) connected to the source of negative pressure.

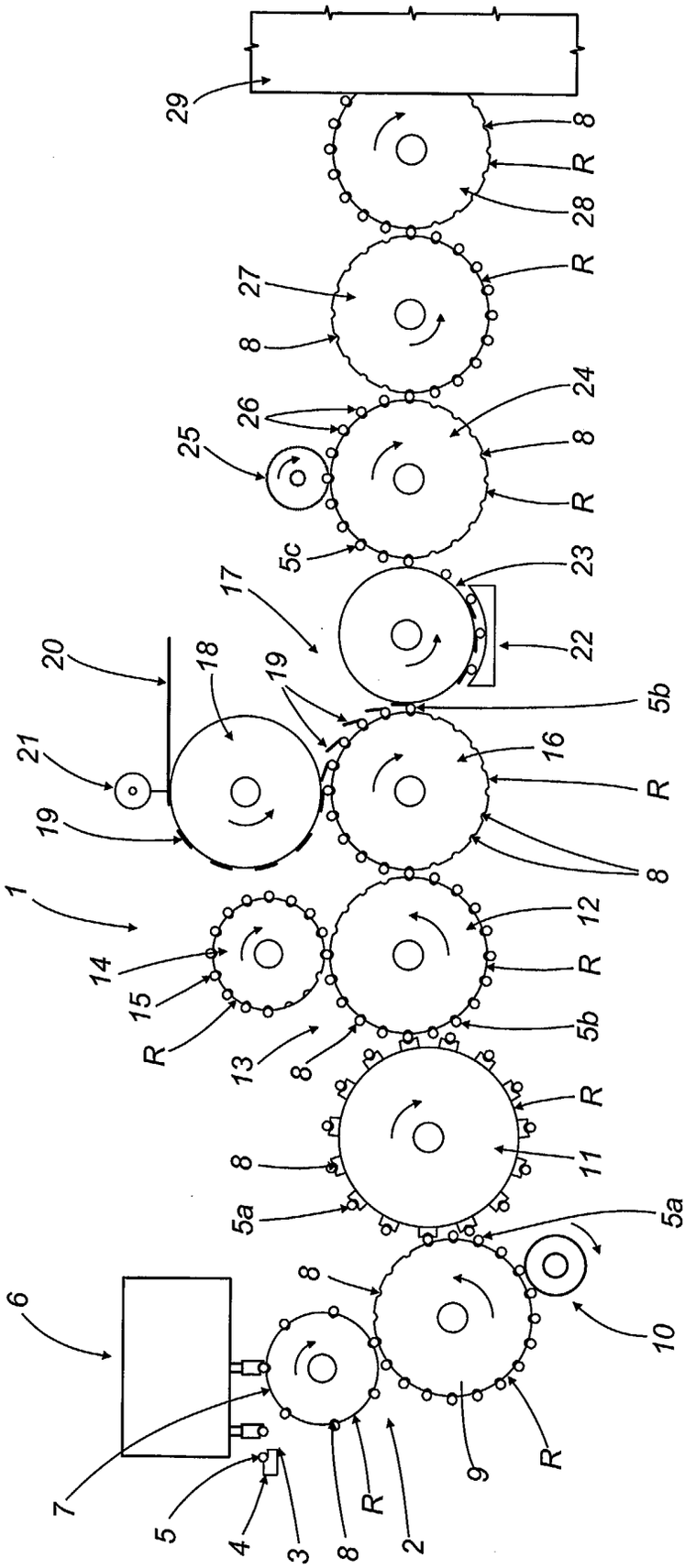
20. A machine as in claims 12 to 18, wherein each groove (8) is furnished with at least two holes (32) located at points near to the opposite ends of the selfsame groove (8) and connected to the source of negative pressure.

21. A machine as in claims 12 to 20, wherein each groove (8) is fashioned with portions (46), located to coincide at least with the two ends, contoured in such a way as to engage substantially in flush contact with a relative cigarette (26) over the full area extending between the two longitudinal areas (34) of contact.

22. A machine as in claim 12, wherein the chamber (47) consists in two longitudinal channels (50) afforded by the bottom surface (48) of the groove (8) and combining with the area (49) of contact to create two half-chambers (47a).

23. A machine as in claim 22, wherein the groove (8) is furnished with at least one hole (32) positioned to coincide with the area (49) of contact, connected to the source of negative pressure and presenting a countersunk mouth (52) allowing communication with both of the half-chambers (47a).

FIG.1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R
28
R
27
8
24
26
8
25
R
5c
23
17
22
20
18
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16
R
19
8
1
12
14
R
15
5b
R
13
8
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R
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3
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R
2

FIG.2

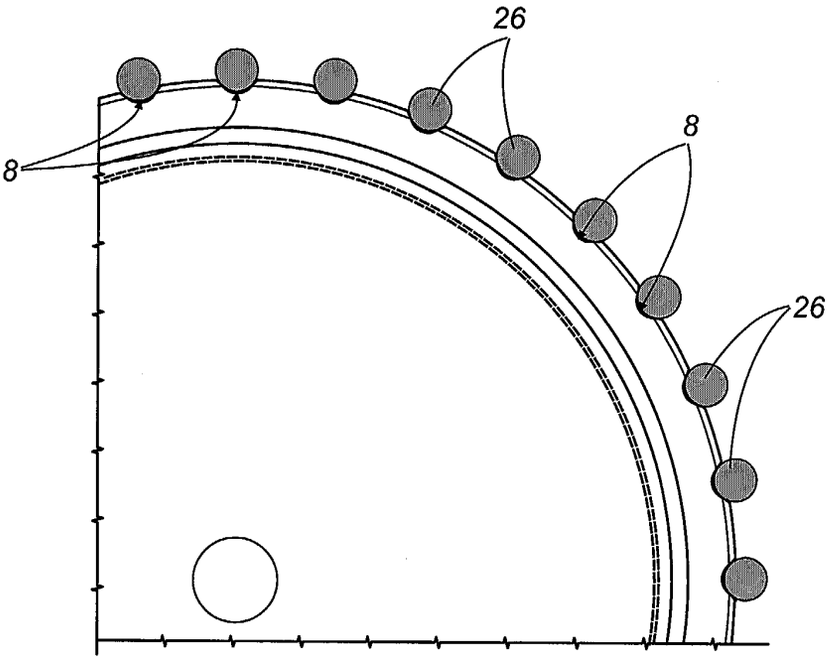


FIG.3

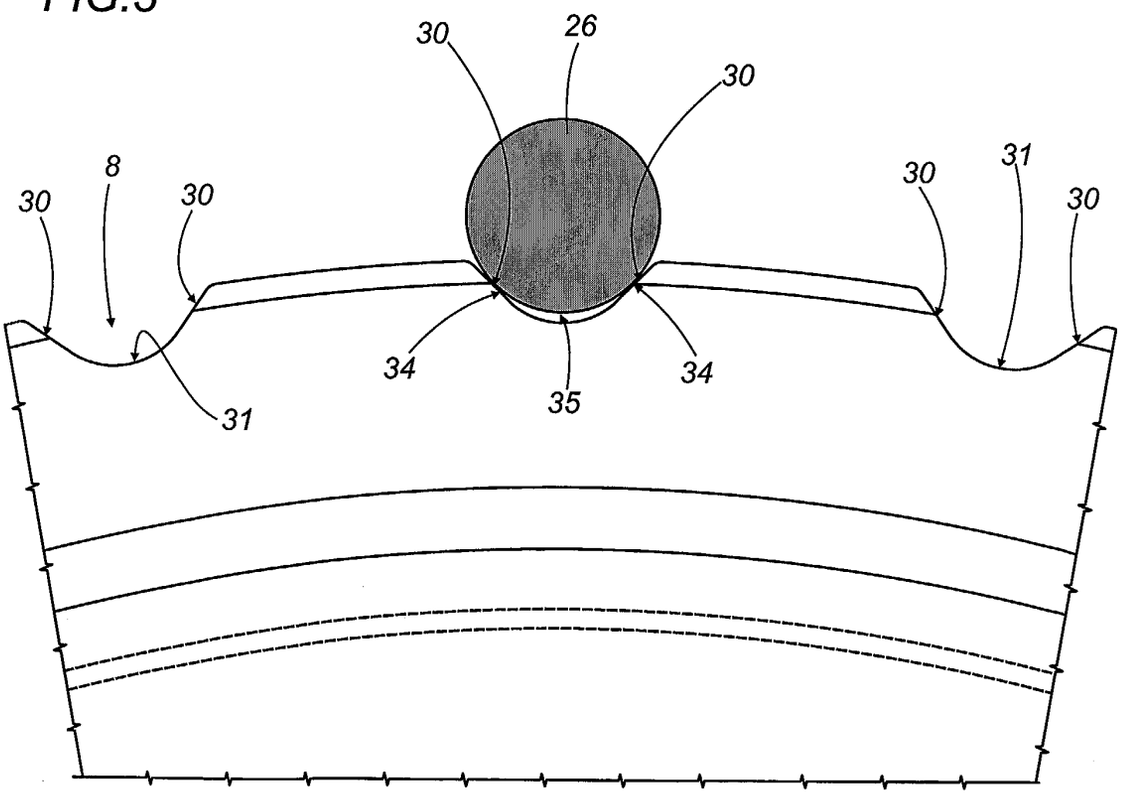


FIG.4

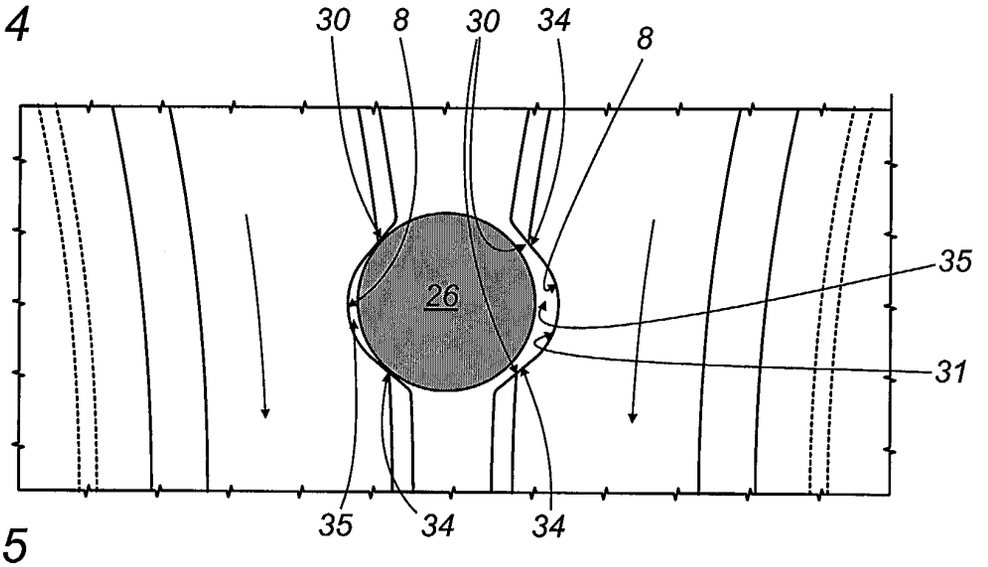


FIG.5

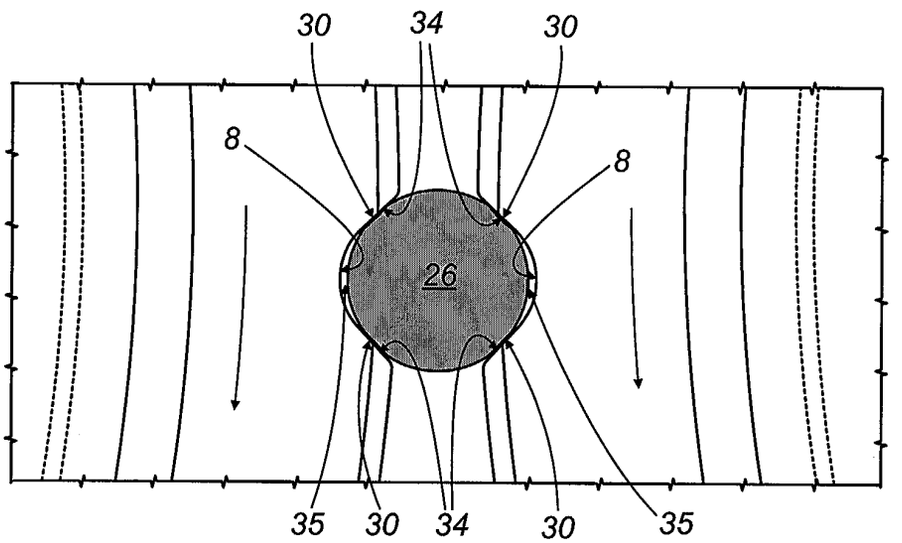


FIG.6

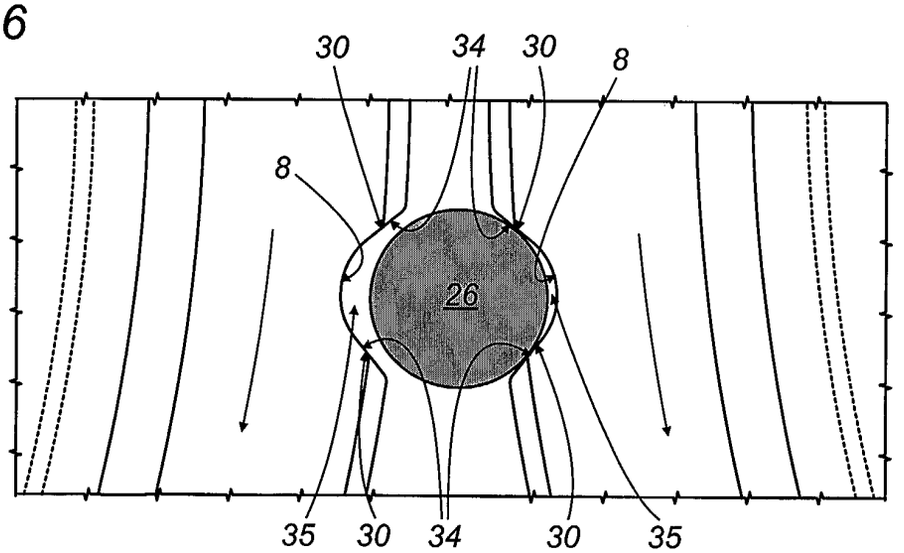


FIG.7

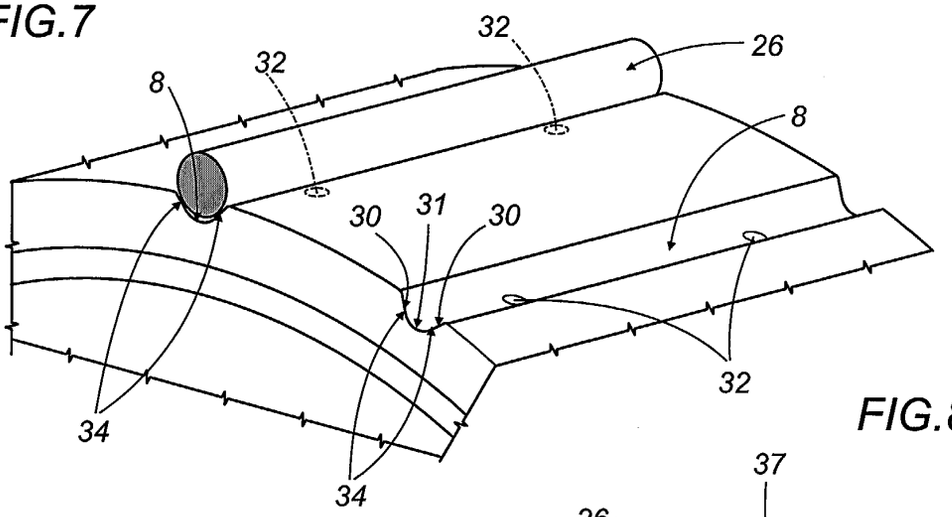


FIG.8

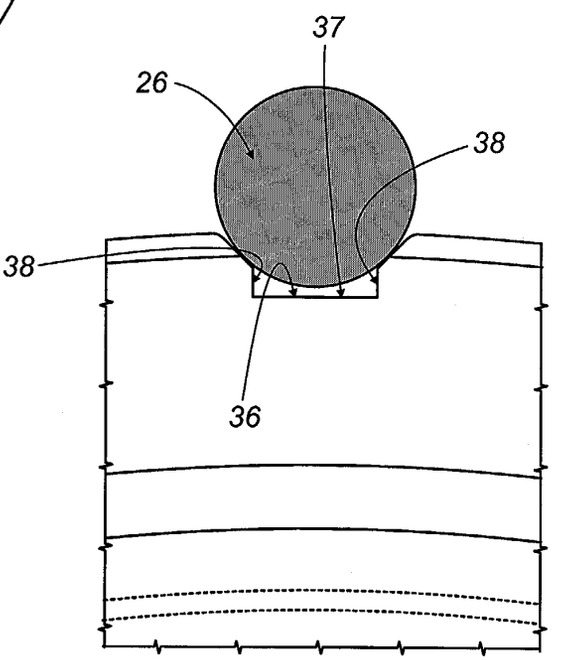


FIG.9

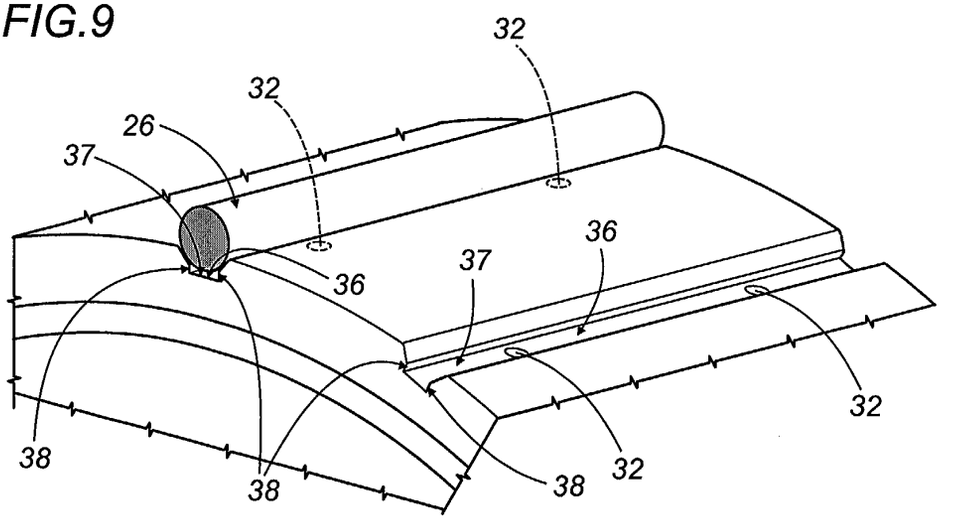


FIG.10

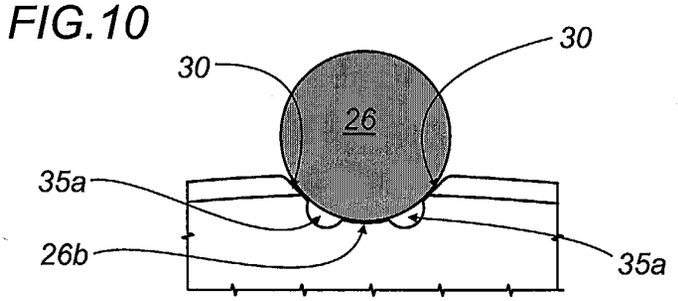


FIG.11

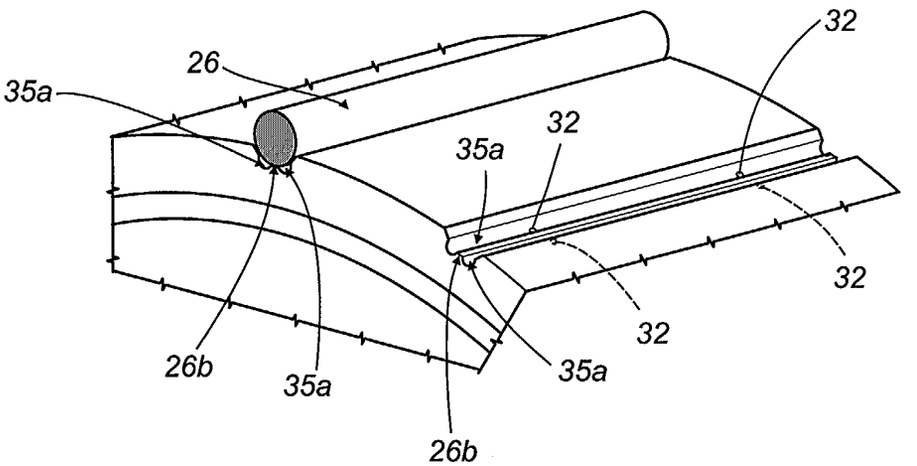


FIG.12

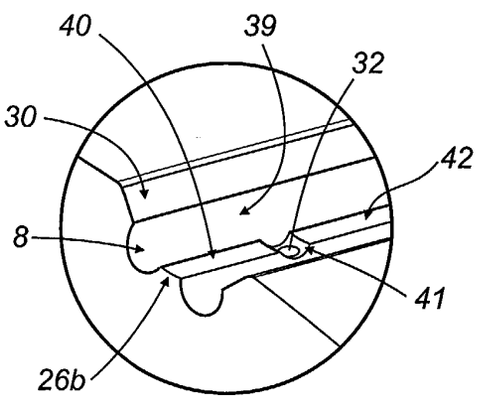


FIG.13

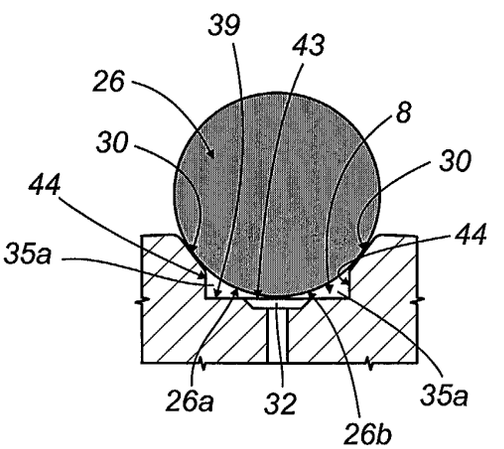


FIG.14

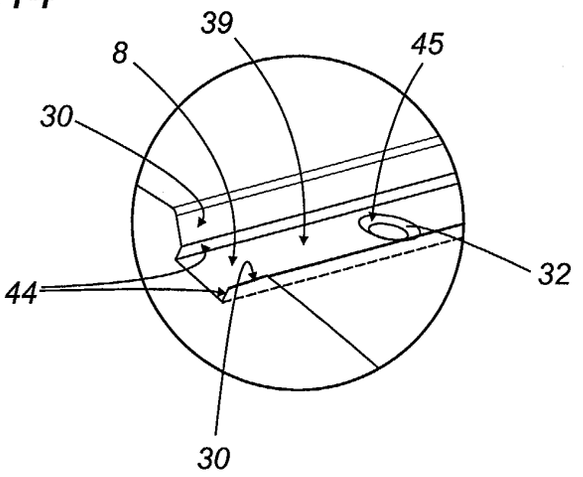


FIG.15

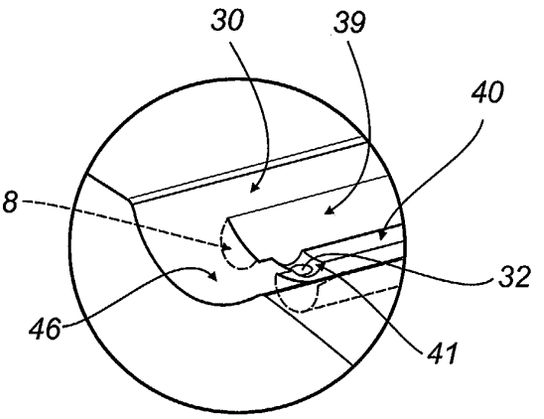


FIG.16

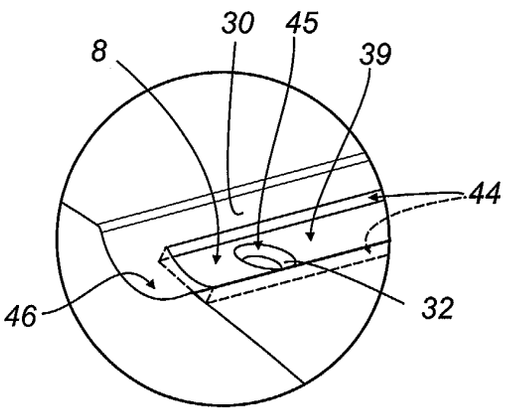
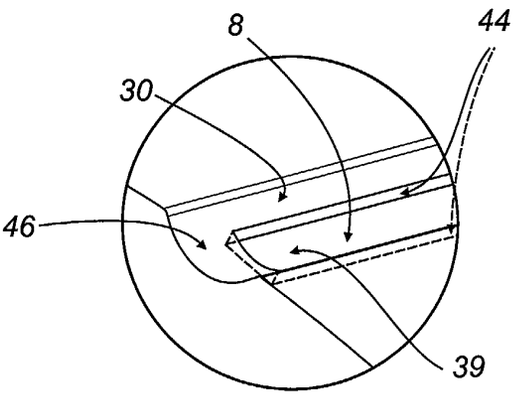


FIG.17



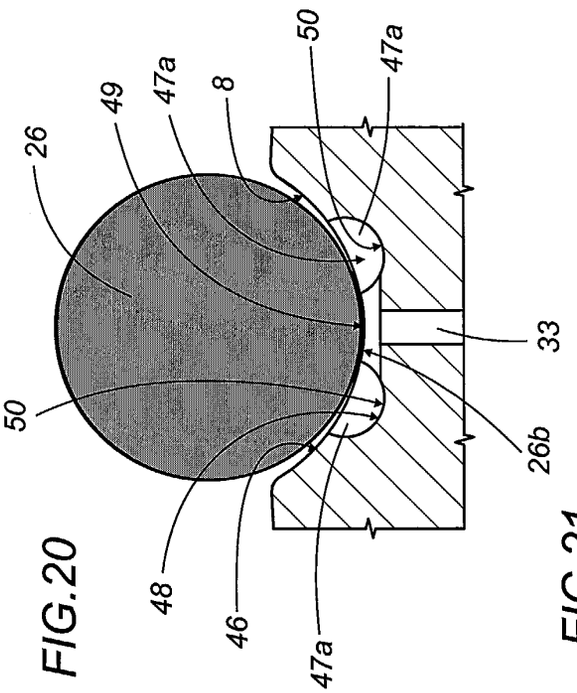


FIG.20

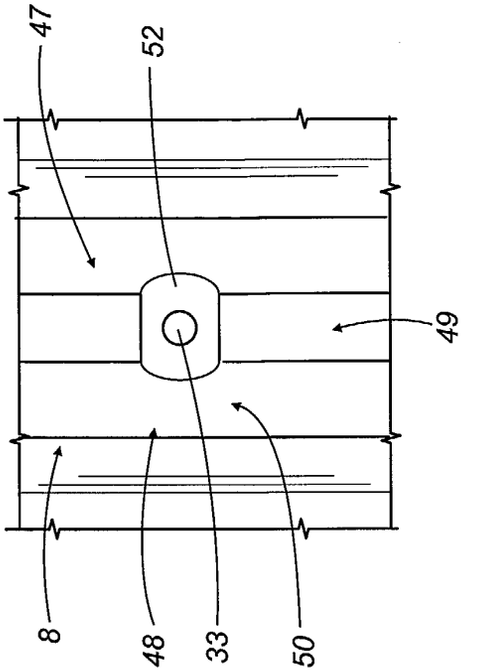


FIG.21

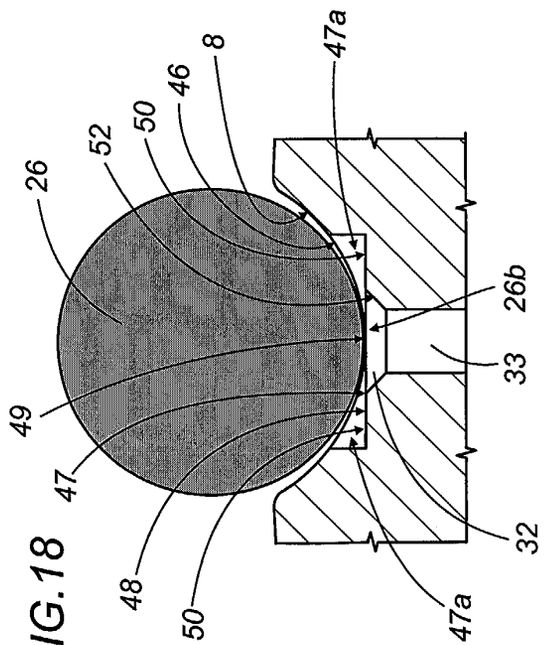


FIG.18

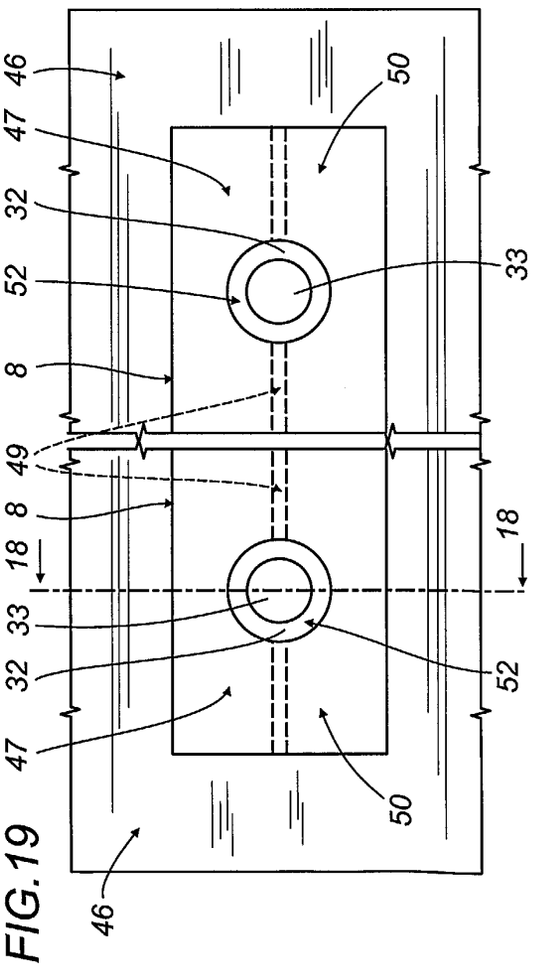


FIG.19