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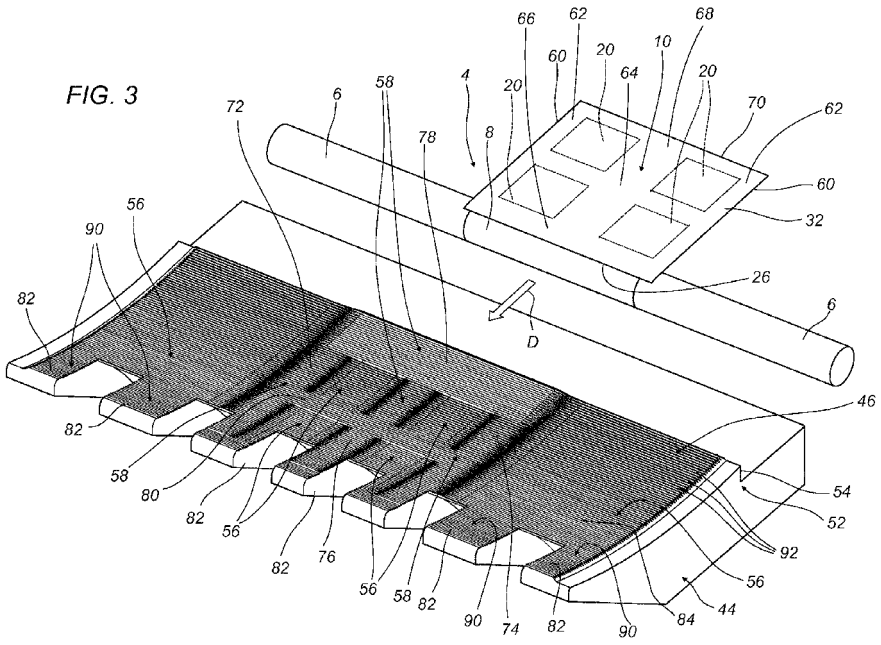
(54) Filter-tipped cigarette rolling device and method

(57) A device for rolling filter-tipped cigarettes comprises a rolling channel (30) where paper patches (10) are rolled round respective groups (4), each defined by two cigarette sticks (6) axially aligned with each other, and a double filter plug (8) interposed between the two cigarette sticks (6). The channel (30) comprises an infeed station (I) where the groups (4) and the respective patches (10) are fed in, and is defined by a first surface (38) and a second surface (40) mutually opposed and movable relative to each other. The patches (10) have a layer of glue spread on them according to a predetermined application pattern (32) and one of the two surfaces (38,40) has first zones (56) which are recessed relative to second zones (58), the latter being distributed according to a pattern reflecting the predetermined glue application pattern (32). Also, the first zones (56) and the second zones (58) define in the rolling channel (30) differentiated compression sections by which the patches (10) are pressed on the respective groups (4) to different degrees.

FIG. 3



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Description

[0001] This invention relates to a filter-tipped cigarette rolling device and method.

[0002] In filter-tip attachment machines, the term "rolling" means an operating step whereby each filterless cigarette, hereinafter referred to as "cigarette stick" is joined to a respective filter plug by means of a patch of paper to which glue has previously been applied by a gluing unit.

[0003] More specifically, rolling is performed in a channel where, according to a long-established technique, two filter-tipped cigarettes are made at a time. According to this technique, a double filter plug, that is, a filter plug which is twice as long as the filter tip of the end product, is first of all interposed between two cigarette sticks. Next, a double patch, that is, a patch which is twice as long as the one on the end product, is rolled and wrapped round the double filter plug and round the adjacent ends of the cigarette sticks, to obtain a semifinished product consisting of a double cigarette.

[0004] After rolling, the double cigarette is cut at the line half way along the double filter plug so as to obtain two single cigarettes.

[0005] As is known, the rolling channel is defined by two facing walls which are movable relative to one another. Usually, one wall is defined by the periphery of a conveyor drum on which the groups composed of "cigarette stick - double filter plug - cigarette stick" are held by suction in respective flutes, while the other wall is defined by a fixed tile facing the periphery of the conveyor drum.

[0006] In the jargon of the trade, and hereinafter, the fixed tile may be called "rolling bed".

[0007] One example of a rolling bed is described in patent application WO 2006120562 A1.

[0008] The height of the rolling channel is slightly smaller than the diameter of the filter-tipped cigarette to be made so that a light compressive, and hence frictional, force is applied to the filters and to the respective cigarette sticks adjacent thereto, as required to guarantee correct rolling and gluing of the patches.

[0009] It is also known that the paper patches can be provided with micro-perforations to guarantee that the filter-tipped cigarettes have the right degree of ventilation.

[0010] By "degree of ventilation" is meant the ability of a filter-tipped cigarette to dilute the smoke breathed in by the smoker with a certain percentage of fresh air. The fresh air serves to lower the temperature of the smoke and to make smoking less harmful, and is taken into the cigarette through the micro-perforations.

[0011] According to a first prior art technique, the micro-perforations are made in the finished cigarette by means of a laser perforator forming part of the filter tip attachment machine. According to another prior art technique, the micro-perforations are made in the paper patches beforehand either at the paper mill or in the filter tip attachment machine, using a laser perforator.

[0012] In both of these prior art techniques, it is known, for example from patent EP 766928 B1, that glue can be applied to the patches according to a predetermined pattern in such a way that the zones through which the cigarettes are ventilated do not have glue on them. These zones, known as "windows" in the jargon of the trade, are usually rectangular in shape.

[0013] If perforation is performed on the finished cigarettes using a laser device, the presence of the windows is preferable because burning the glue would alter the smoke flavour.

[0014] If the patches have the micro-perforations made in them beforehand, on the other hand, the windows are essential because otherwise the glue would clog up the micro-perforations.

[0015] In recent years, the market demand is for increasingly high degrees of ventilation in order to limit the damage to health caused by smoking. With the same number of micro-perforations per unit area, the degree of ventilation can be increased by enlarging the size of the windows. This, however, is possible up to a limit where the patches can no longer be properly and securely glued. On the other hand, experiments show that applying a higher compressive force in rolling in order to improve gluing efficacy has the effect of reducing the degree of ventilation.

[0016] This invention has for an aim to provide a filter-tipped cigarette rolling device which overcomes the above mentioned drawbacks of the prior art.

[0017] The invention also has for an aim to provide a filter-tipped cigarette rolling method which overcomes the above mentioned drawbacks of the prior art.

[0018] More specifically, it is an aim of this invention to provide a filter-tipped cigarette rolling device and method which allow the achievement of high degrees of ventilation and, at the same time, of high quality standards in terms of gluing the patches.

[0019] Another aim of the invention is to provide a filter-tipped cigarette rolling device and method which can be adopted on existing filter tip attachment machines easily and at low cost.

[0020] These aims are fully achieved by the device of the invention, for rolling filter-tipped cigarettes, comprising a rolling channel where paper patches are rolled round respective groups, each defined by two cigarette sticks axially aligned with each other, and a double filter plug interposed between the two cigarette sticks. The channel comprises an infeed station where the groups and the respective patches are fed in, and is defined by a first surface and a second surface mutually opposed and movable relative to each other. The patches have glue spread on them according to a predetermined application pattern.

[0021] According to the invention, the filter-tipped cigarette rolling device is **characterized in that** at least one of the surfaces has first zones which are recessed relative to second zones, the latter being distributed according to a pattern reflecting the predetermined glue application pattern. The first zones and the second zones define in

the rolling channel differentiated compression sections by which the patches are pressed on the respective groups to different degrees.

[0022] The above mentioned aims are also fully achieved by a method according to the invention, for rolling filter-tipped cigarettes comprising the steps of partly superposing groups, each consisting of two axially aligned cigarette sticks and a double filter plug interposed between the two cigarette sticks, with a respective patch by which each cigarette stick is connected to the filter plug and which has glue spread on it according to a predetermined pattern; feeding the groups and the patches to a rolling channel for rolling the groups on the patches and defined by a first surface and a second surface mutually opposed and movable relative to each other; rolling the groups in the patches and causing each group to be compressed by the action of first zones which are recessed relative to second zones, these being distributed according to a pattern that reflects the glue application pattern; applying, during the rolling step, a different compression on the zones of the patch provided with glue according to the predetermined application pattern.

[0023] These and other features of the invention will become more apparent from the following detailed description of a preferred, non-limiting embodiment of it, with reference to the accompanying drawings, in which:

- Figure 1 is a schematic side view of a device according to the invention;
- Figure 2 is a scaled-up side view of a first detail of the device according to the invention;
- Figure 3 is a perspective view of a second detail of the device according to the invention;
- Figure 4 shows an enlarged detail from Figure 3. With reference to Figure 1, the numeral 1 denotes in its entirety a device for rolling filter-tipped cigarettes according to the invention.

[0024] The device 1 comprises a rolling channel 30 where paper patches 10 are rolled round respective groups 4, each defined by two cigarette sticks 6 axially aligned with each other, and a double filter plug 8 interposed between the two cigarette sticks 6.

[0025] The channel 30 comprises an infeed station I where the groups 4 and the respective patches 10 are fed in, and is defined by a first surface 38 and a second surface 40 mutually opposed and movable relative to each other.

[0026] Further, the patches 10 have glue spread on them according to a predetermined application pattern 32.

[0027] At the infeed station I to the rolling channel 30 there is a conveyor for the groups 4 and the patches 10.

[0028] In the preferred embodiment, the conveyor consists of a rotary drum 2 which transports the groups 4. More specifically, the drum 2 transports the groups 4 to which respective connecting patches 10 have been applied.

[0029] To fix each patch 10 to the cigarette sticks 6 and to the filter plug 8, the patch 10 has glue previously applied to it by a gluing device 12, for example as described in patent EP766928B1, whose description is totally incorporated herein by reference.

[0030] More specifically, the gluing device 12 applies a uniform layer of glue according to a predetermined pattern on a continuous web 14 from which the patches 10 are obtained in succession.

[0031] The glue application pattern 32 comprises glued areas, that is, areas with glue uniformly spread on them, and unglued areas, that is, without any glue on them.

[0032] The glued areas allow the patch 10 to stick to the double filter plug 8 and to the cigarette sticks 6 in such a way as to join them firmly together, whilst the unglued areas correspond to the ventilation zones or windows 20 by which the smoke breathed in by the smoker is diluted and cooled. As is known, ventilation is guaranteed by a plurality of micro-perforations.

[0033] If the continuous web 14 is already provided with the ventilation perforations, made by the supplier of the web 14, or inline, just before gluing, by a known device, for example of the laser type, the unglued areas are of a size such as to surround the perforation sequences. Indeed, the glue would otherwise block the perforations and prevent the required ventilation of the smoke.

[0034] If the laser beam is activated after the cigarettes have been made (that is, when the filter-tipped cigarette is finished), its action would burn both the paper and the glue, thus altering cigarette flavour.

[0035] The web 14 is unwound from a roll 16 and, after glue has been applied to it, is cut into individual patches 10.

[0036] To enable the web 14 to be cut in such a way that each patch 10 corresponds to a correct glue application pattern 32, the web 14 is tensioned. Tensioning is effected by known means, not further described, which are denoted by the reference numeral 18 in the drawings and which allow the position of the web 14 at moment of cutting to be adjusted so as to obtain individual patches 10 characterized by correct ventilation areas 20. Cutting is effected by means of known type represented in the drawings by way of an example by a cutting roller 22 equipped with cutter blades. In the preferred embodiment, the cutting roller rotates about its axis A in anticlockwise direction.

[0037] Downstream of the cutting roller 22, the individual patches 10 are carried to the conveyor drum 2 by a suction roller 24. The peripheral speed of the roller 24 is preferably greater than the speed of the web 14 so that the patches 10 cut off are spaced at a constant spacing. Also, in the embodiment illustrated in the drawings, the suction roller 24 rotates about its axis B clockwise.

[0038] The spacing of the patches 10 coincides with the spacing of the groups 4 feeding into the conveyor drum 2, so that each patch 10 is applied correctly to the respective group 4.

[0039] More specifically, the suction roller 24 holds each patch 10 by the unglued part. Thus, once each patch 10 reaches a respective group 4, the patch 10 is applied to the group 4 in "flag-like manner".

[0040] The expression "flag-like manner" means that the patch 10 adheres to the group 4 only by a reduced portion of it, more specifically, as shown in the drawings, by its front edge 26. The rest of the patch 10 remains lifted by known means not illustrated, which prevent the patch 10 from drooping and sticking to the outer cylindrical surface 2a of the conveyor drum 2.

[0041] In the rolling channel 30, the groups 4 are wrapped in the patches 10 as they advance in a longitudinal direction of travel D of the channel 30 itself.

[0042] At the outfeed of the rolling channel 30, the device produces double cigarettes 34 joined to each other by the patches 10 fully wrapped round the groups 4.

[0043] At a station U at the outfeed end of the rolling channel 30, the double cigarettes 34 are first cut into single cigarettes by cutting means of known type, not illustrated, and then subjected to further processing and operations of known type performed in cigarette making machines and not described here since they are outside the scope of this invention.

[0044] The device 1 comprises a rotary rolling drum 42 and a fixed tile or rolling bed 44.

[0045] In the preferred embodiment, the rolling drum 42 has an outer cylindrical surface 42a, which defines the first surface 38 of the rolling channel 30.

[0046] The tile 44 has a wall 46, facing the outer cylindrical surface 42a of the rolling drum 42 and defining the second surface 40 of the rolling channel 30.

[0047] Thus, in this preferred embodiment, the rolling channel 30 is defined by a movable first surface 38 and a fixed second surface 40.

[0048] Also, in this case, the surfaces 38,40 are curved and the rolling channel 30 has a substantially curvilinear shape.

[0049] In an alternative embodiment, not illustrated, the first surface 38 and the second surface 40 are both movable, at different peripheral speeds, so as to allow the groups 4 to be rolled.

[0050] The rolling channel 30 might also be defined by surfaces 38,40 of substantially rectilinear shape relative to each other.

[0051] Looking in more detail, the conveyor drum 2 and the rolling drum 42 have respective suction flutes 48,50 for receiving and withholding the groups 4 being transported. In the case of the rolling drum 42, the flutes 50 partially define the first surface 38 of the channel 30, since the groups 4 are wrapped in the patches 10 by rolling in the flutes 48.

[0052] More precisely, the conveyor drum 2 and the rolling drum 42 revolve about respective axes C,F, in opposite directions of rotation, as shown by the arrows in the drawings. More precisely, in the embodiment illustrated, the conveyor drum 2 revolves anticlockwise, while the rolling drum 42 revolves clockwise.

[0053] The rolling movement of the groups 4 relative to the patches 10 is facilitated by the fact that the passage section of the rolling channel 30 is, substantially, smaller than the diameter of the groups 4. This produces friction between the groups 4 and the surfaces 38,40 of the rolling channel 30, which facilitates the rolling action between the groups 4 and the patches 10.

[0054] To facilitate starting of the rotation of each group 4, the tile 44 is provided with suitable rotation start means 52.

[0055] In the preferred embodiment, the tile 44 has, at the infeed to the rolling channel 30, a step 54 which starts the rotation of the group 4. More specifically, the step 54 intercepts the trajectory of the group 4 and causes the latter to start rotating.

[0056] At least one of the surfaces 38,40 of the rolling channel 30 has first zones 56 which are recessed relative to second zones 58, the latter being distributed according to a pattern reflecting the predetermined glue application pattern 32.

[0057] The depth of the first recessed zones 56 relative to the second zones 58 is preferably between 1 and 3 tenths of a millimetre. More specifically, the optimum value of this depth is preferably 2 tenths of a millimetre.

[0058] The first zones 56 and the second zones 58 define in the rolling channel 30 differentiated compression sections by which the patch 10 is pressed on the respective group 4 to different degrees, according to the predetermined glue application pattern 32.

[0059] To obtain cigarettes characterized by a high degree of ventilation, it is necessary to make ventilation windows 20 which are as large as possible, compatibly with a minimum amount of glue, according to the predetermined glue application pattern 32, sufficient to guarantee that the patch 10 adheres well to the group 4.

[0060] By reducing the size of the glued areas, however, it is necessary for the patch 10 to be applied to the group 4 with greater compressive force. The risk of this, however, is that the ventilation perforations will be closed, resulting in less ventilation than required.

[0061] It has been found, therefore, that it is possible to make the ventilation windows 20 as large as possible, reducing the amount of glue applied to the patch 10, and at the time, guarantee adequate adherence of the patch 10 to the group 4 by compressing only the zones where glue has been applied.

[0062] This is possible thanks to the first zones 56 and, more specifically, thanks to the second zones 58. In effect, the latter further reduce the passage section of the channel 30, so that greater pressure is applied to the patches 10 and groups 4.

[0063] More specifically, the first zones 56 and the second zones 58 are made on at least one of either the first surface 38 or the second surface 40, according to a pattern that reproduces the glue application pattern 32 on the patches 10.

[0064] In the preferred embodiment, the first zones 56 and the second zones 58 are made on the rolling bed

44. In alternative embodiments, the zones 56,58 might be made only on the outer cylindrical surface 42a of the rolling drum 42 or on both the surfaces 38,40 of the rolling channel 30.

[0065] On the patch, the glue application pattern 32 defines portions characterized by the specific need to guarantee adequate adherence of the patches 10 to the groups 4 during and after rolling.

[0066] More precisely, the gluing device 12 applies the glue on a front portion 60 of the patch 10, at the front edge 26 and running across the full width of the patch 10; on a rear portion 62 of the patch 10, at the rear edge 72 and also running across the full width of the patch 10; on a first lateral portion 64, on a second lateral portion 66 and on a longitudinal central portion 68 of the patch 10 running parallel to each other, between the front edge 26 and the rear edge 72, at a respective lateral edge 74,76 and along the centre line of the patch 10; and on a transversal central portion 70 running parallel to the front portion 60 and to the rear portion 62, between the first lateral portion 64 and the second lateral portion 66.

[0067] The term "longitudinal" means a direction parallel to the direction of travel D of the rolling channel 30; while the term "transversal" means a direction at right angles to the direction D.

[0068] Consequently, as stated above, the zones of the patch where no glue is applied and which are delimited by the portions 60,62,64,66,68,70 of the application pattern 32, define ventilation windows 20.

[0069] It is at these portions 60,62,64,66,68,70 that it is advantageous to apply more compression on the patch 10, thus obtaining ventilations windows 20 which are as large as possible, minimizing the amount of glue used.

[0070] More specifically, the greater compression on the front portion 60 is necessary mainly to avoid possible detachment of the patch 10 from the group 4 when the group 4 enters the rolling channel 30; the greater compression on the rear portion 62 and on the transversal central portion 70 is necessary to guarantee adequate adherence of the rear edge 72 of the patch 10; the greater compression on the first lateral portion 64 and on the second lateral portion 66 is necessary to avoid possible detachment of the filter plug 8 from the cigarette sticks 6; while the greater compression on the longitudinal central portion 68 guarantee the adherence of the patch 10 even after the double cigarette 34 is cut into two after rolling.

[0071] As stated above, the second zones 58 reproduce the glue application pattern 32 on the patch 10. More specifically, the second zones 58 are defined by a first portion 94 for rolling the front portion 60 of the patch 10, running along a direction transversal to the direction of travel D; a second portion 96, a third portion 98, and a fourth portion 100 for rolling the first lateral portion 64, the longitudinal central portion 68 and the second lateral portion 66 of the patch 10, respectively; the second portion 96, third portion 98 and fourth portion 100 running parallel to, and spaced from, each other, substantially from the infeed station I to the outfeed station U of the rolling channel 30; a fifth portion 102 for rolling the transversal central portion 70 of the patch 10, running parallel to the first portion 94, between the second portion 96 and the fourth portion 100. Further, the transversal extension of the second zones 58 is greater than the width of the patch 10. Moreover, the first portion 94 is located on the infeed side of the rolling channel 30 and extends along the direction of travel D for a longitudinal dimension substantially equal to the longitudinal dimension of the front portion 60 of the patch 10 and along a direction transversal to the direction of travel D for a transversal dimension substantially equal to the width of the patch 10; the second portion 96 and the fourth portion 100 extend from respective ends 104a, 104b of the first portion 94, while the third portion 98 extends from the centre line of the first portion 94; the second portion 96, third portion 98 and fourth portion 100 extend for a transversal dimension substantially equal, respectively, to the transversal dimension of the first lateral portion 94, of the longitudinal central portion 98 and of the second lateral portion 66 of the patch 10; the fifth portion 102 extends for a longitudinal dimension substantially equal to the longitudinal dimension of the transversal central portion 70 of the patch 10.

[0072] The term "transversal dimension" means the dimension measured along a direction at right angles to the direction of travel D of the rolling channel 30, while the term "longitudinal dimension" means the dimension measured along a direction parallel to the direction of travel D.

[0073] Further, in this embodiment, the portions 94,96,98,100,102 of the second zones 58 have a substantially quadrangular shape.

[0074] In connection with the above, the first zones 56 define the compression of the zones of the patch 10 without any glue on them.

[0075] More specifically, with reference to Figure 3, the first zones 56 are defined by a first recessed portion 106 and a second recessed portion 108 located laterally of the second portion 96 and fourth portion 100 of the second zones 58, respectively; a third recessed portion 110 extending between the first portion 94, the second portion 96, the third portion 98 and the fifth portion 102 of the second zones 58; a fourth recessed portion 112 extending between the first portion 94, the third portion 98, the fourth portion 100 and the fifth portion 102 of the second zones 58; a fifth recessed portion 114 extending between the second portion 96, the third portion 98, the fifth portion 102 and the outfeed end of the rolling channel 30; a sixth recessed portion 116 extending between the third portion 98, the fourth portion 100, the fifth portion 102 and the outfeed end of the rolling channel 30.

[0076] Still with reference to Figure 3, the tile 44 also comprises a plurality of fingers 82, projecting from one end 84, on the outfeed side of the rolling channel 30.

[0077] The fingers 82 extend substantially along the direction of travel D of the channel 30.

[0078] The function of the fingers 82 is to facilitate transfer of the rolled groups 4 from the outfeed station U for example to transfer means represented in the drawing, purely by way of an example, by a transfer wheel 86. More specifically, in this solution, the wheel 86 comprises guide protrusions 88 which engage the empty spaces between the fingers 82 of the tile 44 and urge the rolled groups 4 forward, for example towards the device which cuts them into single cigarettes.

[0079] Each finger 82 also has a wall 90 which is aligned with the wall 46 of the tile 44.

[0080] This wall 90 defines, together with the top wall 46 of the tile 44, the second surface 40 of the rolling channel 30.

[0081] Further, in the preferred embodiment, the second portion 96, the third portion 98 and the fourth portion 100 of the second zones 58 each have a respective extension at the walls 90 of the fingers 82, as may be inferred from Figure 3.

[0082] The first surface 38 and/or the second surface 40 are high-friction grip surfaces.

[0083] In other words, these surfaces increase the friction with the group 4 and facilitate rolling. More specifically, in the preferred embodiment only the second surface 40 is a high-friction grip surface.

[0084] Moreover, in an alternative embodiment, only or also the outer cylindrical surface 42a of the rolling drum 42 might be made as a grip surface. The grip surface has a plurality of knurls 92.

[0085] In the preferred embodiment, the knurls 92 are parallel to each other and transversal to the direction of travel D of the rolling channel 30. More precisely, the knurls 92 are formed on the first zones 56 and second zones 58.

[0086] Alternatively, the knurls 92 might be made only on the first zones 56 or only on the second zones 58. The method for rolling filter-tipped cigarettes is also an object of this invention.

[0087] The method comprises the steps of partly superposing groups 4, each consisting of two axially aligned cigarette sticks 6 and a double filter plug 8 interposed between the two cigarette sticks 6, with a respective patch 10 by which each cigarette stick 6 is connected to the filter plug 8 and which has glue applied to it according to a predetermined pattern 32; feeding the groups 4 and the patches 10 to a rolling channel 30 for rolling the groups 4 in the patches 10 and defined by a first surface 38 and a second surface 40 mutually opposed and movable relative to each other; rolling the groups 4 in the patches 10 and causing each group 4 to be compressed by the action of first zones 56 which are recessed relative to second zones 58, these being distributed according to a pattern that reflects the glue application pattern 32; applying, during the rolling step, a different compression on the zones of the patch 10 provided with glue according to the predetermined application pattern 32.

[0088] The device 1 and the method described offers numerous advantages.

[0089] A first advantage is the possibility of obtaining single cigarettes characterized by a high degree of ventilation. As stated above, it is possible to make the ventilation windows 20 as large as possible, minimizing the amount of glue applied to the patch 10, while at the same time guaranteeing that the patches 10 adhere properly and securely to the groups 4.

[0090] It is also possible to adapt existing cigarette making machines without making substantial changes to them.

[0091] It is therefore possible to operate on the machine quickly, greatly reducing maintenance times and costs.

[0092] Furthermore, the device 1 is advantageous because it allows cigarettes of a high-quality standard to be made, considering also the high operating speeds at which the device 1 is required to work. Similarly, the method allows cigarettes with a high degree of ventilation to be made without requiring any special, new or additional operations to be carried out during the rolling process.

[0093] The method, too, can be implemented in an existing cigarette making machine, which need not be reconfigured for the groups 4 to be rolled in the manner just described.

[0094] The invention described above is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A filter-tipped cigarette rolling device comprising a rolling channel (30) where paper patches (10) are rolled round respective groups (4), each defined by two cigarette sticks (6) axially aligned with each other, and a double filter plug (8) interposed between the two cigarette sticks (6); the channel (30) having an infeed station (I) where the groups (4) and the respective patches (10) are fed in, and being defined by a first surface (38) and a second surface (40) mutually opposed and movable relative to each other; the patches (10) having glue spread on them according to a predetermined application pattern (32), the device being **characterized in that** at least one of the surfaces (38,40) has first zones (56) which are recessed relative to second zones (58), the latter being distributed according to a pattern reflecting the predetermined glue application pattern (32); the first zones (56) and the second zones (58) defining in the rolling channel (30) differentiated compression sections by which the patches (10) are pressed on the respective groups (4) to different degrees.

2. The device according to claim 1, **characterized in that** the second zones (58) are defined by a first

compression rolling portion (94) for a front portion (60) of the patch (10), extending along a direction transversal to the direction of travel (D) of the channel (30); a second (96), third (98) and fourth (100) rolling portions allowing compression, respectively, of a first lateral portion (64), a longitudinal central portion (68) and a second lateral portion (66) of the patch (10); the second (96), third (98) and fourth (100) portions extending parallel to and spaced from each other; a fifth rolling portion (102) parallel to the first (94) and located between the second portion (96) and the fourth (100), allowing compression of a transversal central portion (70) of the patch (10).

3. The device according to claim 2, **characterized in that** the first portion (94) is located on the infeed side of the rolling channel (30) and extends along the direction of travel (D) for a longitudinal dimension substantially equal to the longitudinal dimension of the front portion (60) of the patch (10) and along a direction transversal to the direction of travel (D) for a transversal dimension substantially equal to the width of the patch (10); the second portion (96) and the fourth portion (100) extend from respective ends (104a, 104b) of the first portion (94), while the third portion (98) extends from the centre line of the first portion (94); the second (96), third (98) and fourth (100) portions extend for a transversal dimension substantially equal, respectively, to the transversal dimension of the first lateral portion (64), of the longitudinal central portion (68) and of the second lateral portion (66) of the patch (10); the fifth portion (102) extends for a longitudinal dimension substantially equal to the longitudinal dimension of the transversal central portion (70) of the patch (10).

4. The device according to any of the preceding claims, **characterized in that** the first zones (56) are defined as zones of the first surface (38) or of the second surface (40) included between, and/or on the sides of, the portions (94,96,98,100,102) of the second zones (58).

5. The device according to any of the preceding claims, **characterized in that** the portions (94,96,98, 100,102) of the second zones (58) are substantially rectangular in shape.

6. The device according to any of the preceding claims, **characterized in that** the first surface (38) is substantially defined by the outside cylindrical surface (42a) of a rotary rolling drum (42).

7. The device according to any of the preceding claims, **characterized in that** it comprises a tile (44) having a wall (46); the wall (46) of the tile (44) defining the second surface (40) of the rolling channel (30).

8. The device according to any of the preceding claims, where the tile (44) has a plurality of fingers (82), projecting from one end (84), on the outfeed side of the rolling channel (30) and each having a respective wall (90) aligned with the wall (46) of the tile (44); the walls (90) of the fingers (82) defining, together with the wall (46) of the tile (44), the second surface (40) of the rolling channel (30); the device being **characterized in that** the second (96), third (98) and fourth (100) portions of the second zones (58) each have a respective extension at the walls (90) of the fingers (82).

9. The device according to any of the preceding claims, **characterized in that** the first surface (38) and/or the second surface (40) are high-friction, grip surfaces.

10. The device according to claim 9, **characterized in that** each grip surface has a plurality of knurls (92) formed on the first zones (56) and/or on the second zones (58).

11. The device according to any of the preceding claims, **characterized in that** the depth of the first recessed zones (56) relative to the second zones (58) is preferably between 1 and 3 tenths of a millimetre.

12. The device according to any of the preceding claims, **characterized in that** the depth of the first recessed zones (56) relative to the second zones (58) is substantially equal to 2 tenths of a millimetre.

13. A method for rolling filter-tipped cigarettes comprising the steps of:

partly superposing groups (4), each consisting of two axially aligned cigarette sticks (6) and a double filter plug (8) interposed between the two cigarette sticks (6), with a respective patch (10) by which each cigarette stick (6) is connected to the filter plug (8) and which has glue spread on it according to a predetermined pattern (32);
feeding the groups (4) and the patches (10) to a rolling channel (30) for rolling the groups (4) onto the patches (10) and defined by a first surface (38) and a second surface (40) mutually opposed and
movable relative to each other;
rolling the groups (4) in the patches (10) and causing each group (4) to be compressed by the action of first zones (56) which are recessed relative to second zones (58), these being distributed according to a pattern that reflects the glue application pattern (32);
applying, during the rolling step, a different compression on the zones of the patch (10) provided with glue according to the predetermined appli-

cation pattern (32).

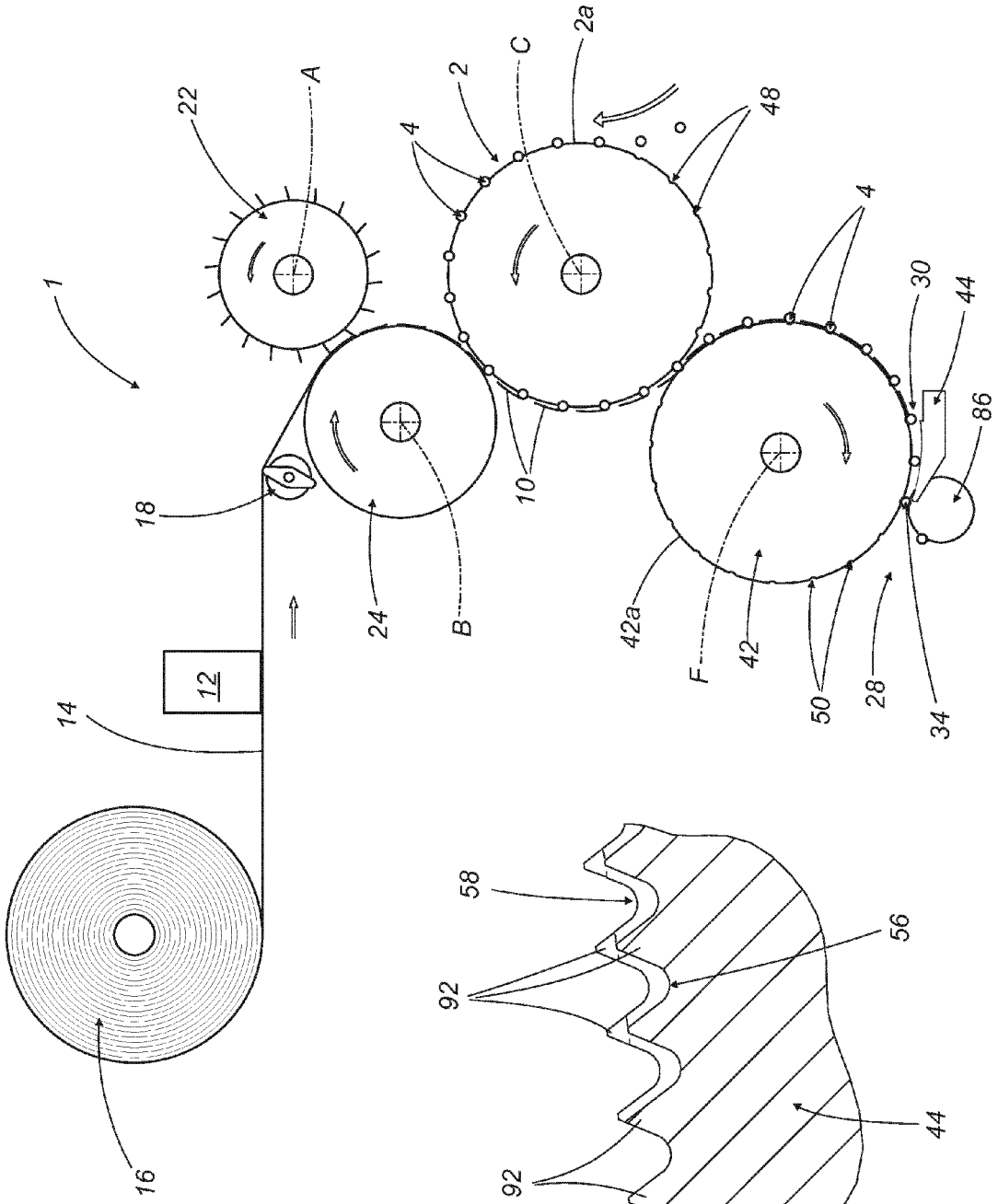

1
22
A
2
C
2a
4
48
4
30
44
86
18
10
24
B
42a
F
42
50
28
34
12
14
16

FIG.1

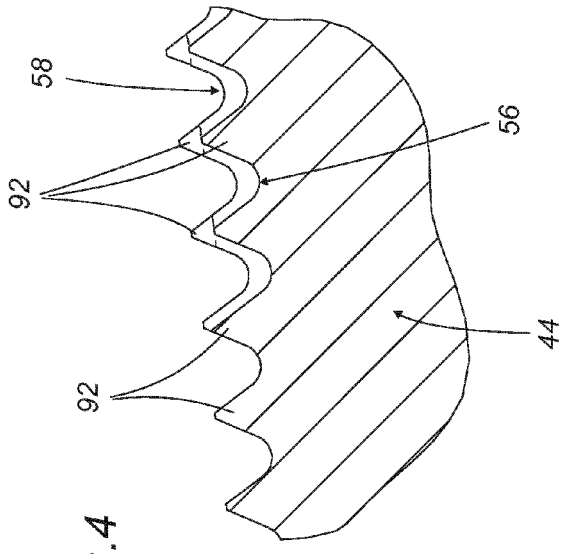
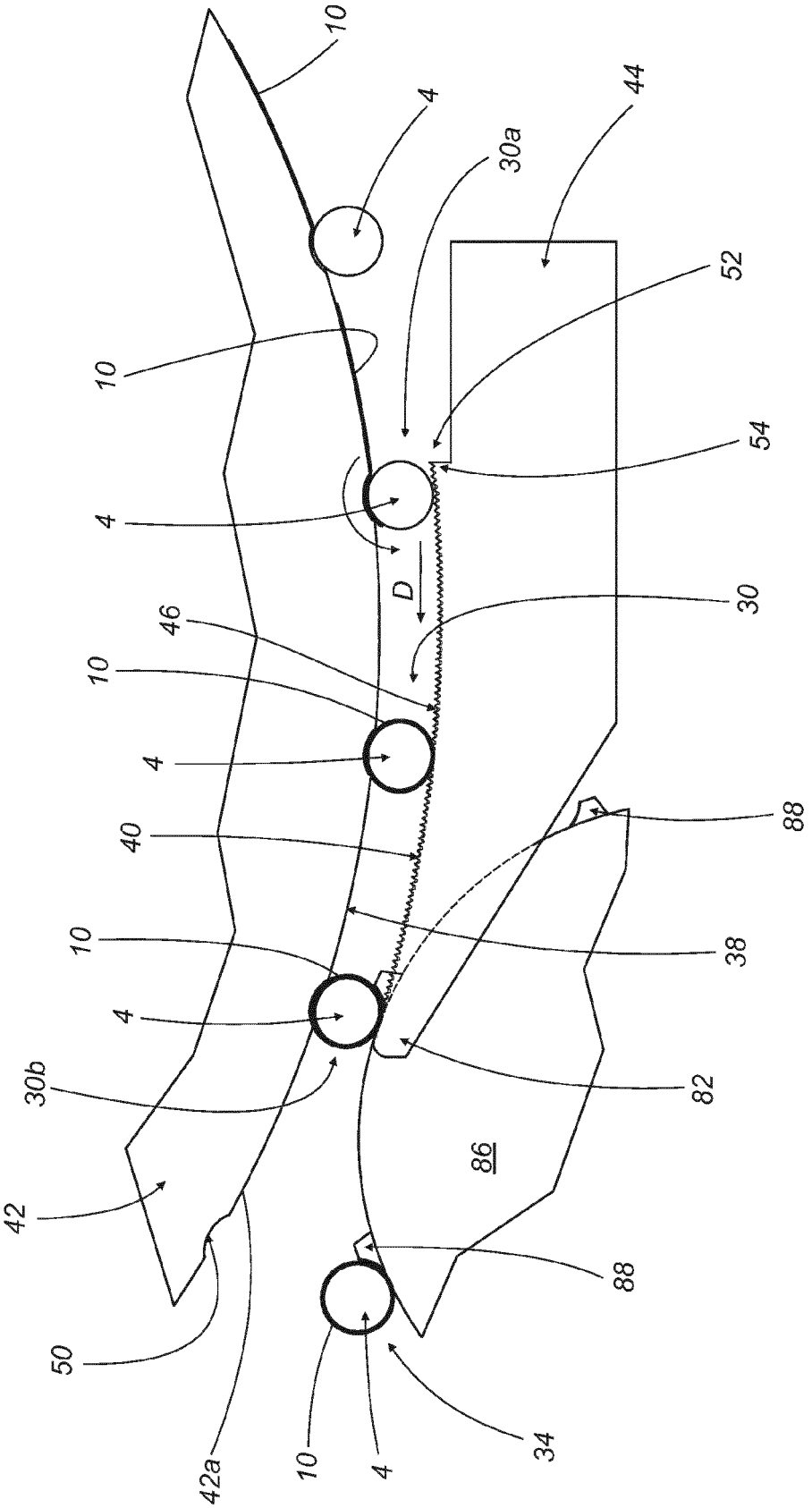

58
56
92
44
92

FIG.4

FIG.2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30a
52
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54
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D
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4
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30b
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42a
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4
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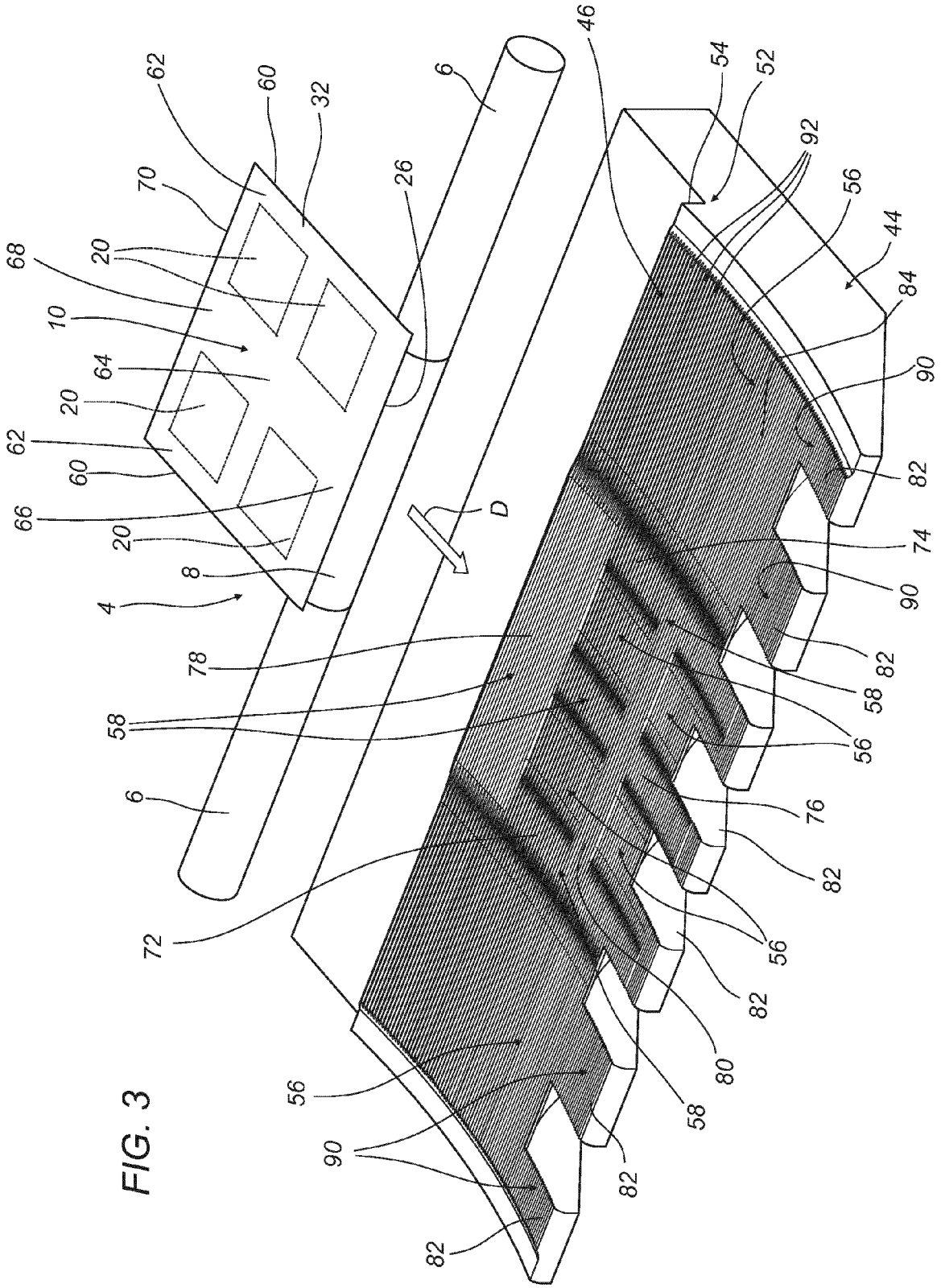
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32
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60
66
D
20
74
8
90
4
82
78
58
58
56
6
76
72
82
56
82
80
58
56
82
90
82

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
Munich	22 October 2012	Marzano Monterosso

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22-10-2012

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