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(54) **DEVICE FOR FILLING CIGARETTE TUBES WITH TOBACCO**

VORRICHTUNG ZUM FÜLLEN VON ZIGARETTENHÜLSEN MIT TABAK

DISPOSITIF DE REMPLISSAGE DE TUBES DE CIGARETTES AVEC DU TABAC

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(73) Proprietor: **Philip Morris Products S.A.
2000 Neuchâtel (CH)**

(72) Inventors:
• **ANDERSEN, Julia C.**
82205 Gilching (DE)
• **BUHLMANN, Klaus**
2074 Marin-Epagnier (CH)
• **FELDMANN, Andre**
22395 Hamburg (DE)
• **MEIER, Lucien R.**
CH-2520 La Neuveville (CH)
• **NEUMANN, Manfred**
42477 Radevormwald (DE)

- **SCHULTCHEN, Arne J.**
22359 Hamburg (DE)
- **SCHWUB-GWINNER, Gudrun**
82335 Berg (DE)
- **TILING, Stephanie I. P.**
82152 Krailling (DE)
- **VAN RIJSSEL, Marcel**
CH-2023 Gorgier (CH)
- **COLLET, Guylann**
1439 Rances (VD) (CH)

(74) Representative: **Morf, Jan Stefan et al**
Abitz & Partner
Patentanwälte
Hörselbergstrasse 5
81677 München (DE)

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Description

[0001] The present invention relates to a device for filling cigarette tubes with tobacco.

[0002] A device for filling cigarette tubes with tobacco is known for example from European patent application EP 399 143 A1. This is a device in which loose tobacco which is transferred in through a fill opening is compressed into a tobacco rod by means of a compression head. In addition, the device has a pusher to push the tobacco rod into the cigarette paper tube and a means for attaching the cigarette paper tube. In an embodiment of this device, the tobacco fill opening is allocated above the compression heads a blade or similar separating element the separating movement of which is preferably in advance of the movement of the compression head. A disadvantage of this device is that only loose tobacco can be processed. In addition, it is disadvantageous that the quantity of loose tobacco that is used to fill a cigarette paper tube is not specified.

[0003] A further device for filling cigarette tubes with tobacco is disclosed in, document WO 2004/047569. A further device for filling cigarette tubes with tobacco is disclosed in European patent application EP 584 805 A1. This differs from the device known from EP 399 143 A1 merely by virtue of a magazine for the housing and introduction in part-quantities of pre-portioned tobacco portions. A disadvantage of this device is that pre-portioned tobacco is used. However, it would be desirable if cigarette tubes could also be filled starting from non-pre-portioned tobacco material. It would be particularly desirable if cigarette tubes could be filled with a substantially identical quantity of tobacco.

[0004] The object of the present invention is to provide such a device. This object is achieved according to the invention by a device for filling cigarette tubes with tobacco, wherein the device comprises at least one suitable separating means by means of which tobacco, preferably a tobacco portion, can be detached from a tobacco block, and also at least one suitable filling means with which the cigarette, tubes can be filled with the tobacco, preferably the tobacco portion, at least one suitable portioning means for the portioning of a tobacco block and at least one suitable transport means by means of which the tobacco block can be transported.

[0005] In the context of the present invention, the term "tobacco portion" denotes the quantity of tobacco that is used to fill a cigarette tube. The term "tobacco block" denotes a unit of compressed tobacco the quantity of tobacco of which exceeds that contained in a tobacco portion and advantageously represents a multiple thereof. The tobacco block can be portioned or unportioned, an unportioned tobacco block being preferred. If a portioned tobacco block is used, its portioning unit must not correspond to the tobacco portion which is specified by the portioning means according to the invention. A portioning means according to the invention is a means which allows the operator of the device to detach in a

targeted manner from a tobacco block the quantity of tobacco which corresponds to one tobacco portion.

[0006] Such a portioning means can be for example one or more signalers which give the operator an appropriate signal, for example an acoustic, visual or tactile signal, when the tobacco block is in a specific spatial relationship to the device and a tobacco portion can be detached from the tobacco block, or when the tobacco portion is detached from the tobacco block. Portioning means which comprise one, two or three signalers are preferred. Also preferred are signalers that transmit several signals, for example an acoustic and a tactile, or a tactile and a visual signal. The acoustic signal can be for example a noise which is produced when a catch is engaged, an electrically generated beep or a noise produced when a snap disk ("clicker frog") is bent. The visual signal can be for example a pointer and an allocated marker which act together to display the tobacco portion to the operator. For example, the marker can be a row of numbers, and the pointer can indicate on this row of numbers the number which corresponds to the number of tobacco portions still remaining in the tobacco block or the number of detached tobacco portions. Either the marker or the pointer, or marker and pointer are fixed to the device say on a wheel or other means. The part not fixed to the device can for example be provided on a covering of the tobacco block. If desired, it is also possible to specify in a targeted manner different sizes of tobacco portions by corresponding markers with the portioning means, say to produce cigarettes of different densities if required. Alternatively, the visual signal is for example an electrically generated light signal or a display on a graphic user interface. A further visual signal can be represented for example by the return of a button, a switch or a lever to its starting position. The tactile signal is for example a perceptible resistance which the operator senses when he has brought the tobacco block into a specific spatial relationship to the device.

[0007] The suitable separating means is for example one or more blades, rasps, screws, worms or wheels, into the sphere of action of which the tobacco block can be introduced in order to separate the tobacco portion all at once, in part-quantities or continuously. The one-off separation takes place for example with a blade, wherein the cohesion inside the separated tobacco portion is advantageously not loosened. The tobacco portion is present substantially in one piece, wherein this piece already substantially has the shape of a tobacco rod. The separation of the tobacco portion in part-quantities is carried out with several cuts of the same blade or different blades. The continuous separation can be carried out for example with a rasp or other rotary element.

[0008] The at least one filling means is for example a pusher which pushes the tobacco portion into the cigarette tube. A tongue on which the tobacco portion is located can be used for this purpose. A driver for the tobacco portion can be attached to the end of the pusher or tongue which is not pushed into the cigarette tube.

[0009] In an advantageous embodiment of the device according to the invention, the at least one suitable portioning means specifies a portion length unit with the result that one tobacco block per portion length unit contains the quantity of tobacco that corresponds to the tobacco portion. This is particularly advantageous if the tobacco block is a body with a uniform cross-section along one axis, say with a cylindrical or prismatic, in particular cubic body, wherein the portion length unit can be measured along this axis of the body. A tobacco block particularly advantageously has the shape of a flat, cubic body with a short side the dimensions of which correspond substantially to the diameter of the tobacco rod which is transferred into the cigarette tube, and a mid-length side the dimensions of which correspond substantially to the length of the tobacco rod which is transferred into the cigarette tube, and a long side. The portion length unit can be measured along this long side of the tobacco block.

[0010] In an advantageous embodiment, the device according to the invention comprises at least one suitable transport means by means of which the tobacco block can be transported. This at least one suitable transport means serves in particular to transport the tobacco block in the direction of the separating means. The transport means can be pushers, in particular pushers, tooth racks, wedge bars, screws, shafts, wheels that can be pre-tensioned with a spring, for example friction wheels or toothed wheels, pulling means, for example chains, cable pulls or webs of material. Transportation can be continuous or stepwise, automatic, semi-automatic or manual, for example by moving a lever, pusher, button or wheel. This facilitates the operation of the device, as the operator must not advance the tobacco block with his fingers, and thus also increases the precision of the portioning. The specified portion length unit advantageously corresponds to the distance traveled by the tobacco block to separate a tobacco portion. Furthermore, a transport means advantageously also has at least one suitable guide for the tobacco block. The guide can be the opening of the shaping chamber. Alternatively, lateral guides are attached to the device which guide the tobacco block during transportation. Depending on the embodiment, the tobacco block can be guided on two sides, for example on the narrow sides of the tobacco block, on three sides or on four sides. A covering of the tobacco block can also be part of the guide for the tobacco block.

[0011] In an advantageous embodiment of the device according to the invention, two lateral guides guiding the tobacco block on its narrow sides during transportation are present. The inner width of these lateral guides is smaller than the width of the tobacco block including a possible covering. Preferably, the distance between the inner surfaces of the two lateral guides ranges from 95 percent to less than 100 percent, more preferably from 97 percent to less than 100 percent and most preferred from 99 percent to less than 100 percent of the width of the tobacco block including its possible coverings. This

difference in width results in a convex shape of the walls of the covering not in contact with the lateral guides, that is the top or bottom walls. As a consequence, these walls of the covering are not in full contact with the corresponding surfaces of the tobacco block. Thus, an air-filled space is created between the top or bottom surface of the tobacco block and the top or bottom wall of the covering, respectively. This embodiment reduces friction between the corresponding surfaces of the tobacco block and the covering.

[0012] In an advantageous embodiment of the device according to the invention, the device comprises at least one suitable shaping means by means of which the separated tobacco can be shaped into a form in which the tobacco portion can be introduced into the cigarette tube by the filling means. This is for example one or more plungers, toothed wheels or other mechanisms used to bring the tobacco portion into a substantially cylindrical shape. The tobacco of the tobacco portion can advantageously be compacted somewhat more tightly during shaping than the tobacco is later in the cigarette tube. This facilitates the transfer of the shaped tobacco portion into the cigarette tube.

[0013] In one embodiment of the device the movement of the at least one suitable shaping means is coupled with the movement of the separating means. For example the separating means and the shaping means are attached to a common lever. In another embodiment of the device, only one means is provided which both separates and shapes. In a further embodiment, the movement of the shaping means is superimposed on the movement of the separating means. This means that the separating means is moved for example with a lever in a separating movement, wherein the shaping means is moved along during this movement. Following the separating movement, the shaping means performs a further shaping movement independent of the movement of the separating means in order to shape the detached tobacco. The separating means then moves into the starting position and in the process likewise takes the shaping means with it into its starting position.

[0014] In an advantageous embodiment of the device according to the invention, the device has at least one suitable fixing means for the tobacco block. For example, the tobacco block can be covered with a suitable covering, wherein the covering is detachably fixable to the device by means of the at least one suitable fixing means. Thus a fixed spatial relationship between the tobacco block and the device can advantageously be created. Guides for the tobacco block or its covering can thereby be dispensed with inside the device, which results in a more compact structure of the device.

[0015] Further details, features and advantages of the invention follow from the following description in conjunction with the embodiments shown in the Figures. There are shown in:

Fig. 1a an embodiment of the device according to

the invention with a spindle-like transport means and a visual signaler;

Fig. 1b a diagrammatic detail side view of the embodiment with filling means;

Fig. 2 a further embodiment of the device according to the invention with a pusher-like transport means, a transport lever, a shaping lever and a tactile signaler,

Fig. 3 a further embodiment of the device according to the invention with a pusher-like transport means with catch, with a tactile, a visual and an acoustic signaler,

Fig. 4 a further embodiment of the device according to the invention with a roller-like transport means and acoustic and visual signalers,

Fig. 5 a further embodiment of the device according to the invention with a toothed-wheel-like shaping means which is simultaneously a transport means, and also a visual signaler,

Fig. 6 a further embodiment of the device according to the invention with a web-like transport means and a visual signaler,

Fig. 7a a further embodiment of the device according to the invention with a pusher-like transport means with transport lever and tactile and acoustic signalers,

Fig. 7b a detail view of a further embodiment of a transport means and a portioning means;

Fig. 8 a detail of an embodiment of the device with fixing means for covering the tobacco block;

Fig. 9 a detail of an alternative embodiment of the device with fixing means for the covering of the tobacco block.

Fig. 10a a further embodiment of the device according to the invention with a pusher-like transport means;

Fig. 10b a detail view of the further embodiment of a transport means and a portioning means of Fig. 10a.

[0016] The figures diagrammatically show embodiments of the device according to the invention. For simplicity's sake, elements of generic devices known from the state of the art have been omitted, for example fixing means, guides, sliding blocks, control systems, drives, bearings, openings, bushes and similar. Recurring elements such as the separating means, the shaping means, shaping chamber and similar are likewise omitted from some figures as they result from the state of the art or can be transferred without difficulty from other embodiments. Although not shown or described, each embodiment comprises all the elements necessary to fill cigarette tubes with tobacco.

[0017] In principle, according to the invention the different portioning means can be combined with different transport means, different shaping means, different separating means and different fixing means to encase the tobacco block in different ways in order to arrive at dif-

ferent embodiments. Eight of the large number of possible combinations are described below by way of example. The same elements are given the same reference numbers. Generically identical elements, for example the portioning means 190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893, the separating means 130, 230, 530, 830 or the transport means 140, 141, 142, 240, 241, 242, 243, 244, 245, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 743, 840, 842, 845, 846, 847 have comparable reference numbers.

[0018] Fig. 1 a shows a device for filling cigarette tubes 100, with a shaping block 110 which is fixed to a base plate 180. Attached to the base plate is a table 181 onto which the tobacco block 1 is placed or pushed. For this, the table can have for example lateral guides. The shaping block 110 comprises a shaping chamber 150 in which a tobacco portion can be made into a substantially cylindrical shape with a shaping means 120. The shaping means 120 is a plunger 120 which has at the bottom end a semicircular recess which extends over the whole length of the plunger 120. The length of the plunger 120 corresponds substantially to the length of the tobacco rod inside the cigarette tube of a finished cigarette. Formed underneath the plunger 120 in the shaping chamber 110 is a tongue 160 with a semicircular cross section on which the tobacco rod 12 is shaped. The tobacco portion 10 is compacted to a smaller volume than the capacity of the empty cigarette tube 11. As shown in Fig. 1b, an empty cigarette tube 11 is attached by means of fixing means 13 to the device, for example fitted to a bush. The cigarette tube 11 can also have a filter 11a. The tobacco rod 12 formed on the tongue 160 is pushed into the cigarette tube 11 by means of the pusher 161. For this, the tongue 160 has a driver 162 at the end. Once the cigarette tube 11 is filled with the tobacco portion 10, the pusher 161 returns the tongue 160 to its original position inside the shaping chamber 150. The tobacco portion 10 remains substantially completely in the cigarette tube 11. A separating means 130 is arranged alongside the plunger 120. The separating means 130 is for example a blade 130 with a grip 131. The blade can have different cutting geometries, for example straight, curved, round, diagonal, or wedge-shaped. The separating means 130 can be guided in different ways, for example linear, arcuate or scissor-like. The movement of the separating means 130 can be coupled with the movement of the shaping means 120, for example in advance of it. In another embodiment, the movement of the blade 130 is superimposed on the movement of the plunger 120. In other words, the blade 130 is moved for example with a lever, not shown, in a separating movement, wherein the plunger 120 is moved along with it during this movement. Following on from the separating movement, the plunger 120 performs a further shaping movement independent of the movement of the blade in order to shape a tobacco rod 12 from the detached tobacco portion 10. The blade then moves into the starting position and likewise takes the plunger with it into its starting position.

[0019] The shaping chamber 150 has an opening through which the tobacco block 1 can be pushed by a transport means 140. In this case, the transport means is a pusher 140 which can be moved inside the covering 2 of the tobacco block 1 by turning a spindle 142. Before operating the device, the spindle 142 is pushed into the tobacco block 1 as far as a stop, for example the edge of the covering 2. The spindle 142 has at its free end a wheel 141, say a knurling wheel. The wheel 141 has a visual portioning means 190, for example a pointer 190, which can be brought into line with a marker. For example, beside the pointer there is a scale which, in co-operation with the pointer 190, shows how far the pusher 140 has advanced the tobacco block 1. If the pointer 190 and the marker agree, the operator knows that the tobacco block 1 has been advanced by one portion length unit, and he can then activate the separating means 130 and the shaping means 120 in order to fill a cigarette tube with the tobacco portion 10. If the markers differ, it is also possible to specify different sizes of tobacco portions 10 with the portioning means 190, for example to produce different cigarettes if required using the same or different cigarette tubes.

[0020] The device shown in Fig. 2 for filling cigarette tubes 200 has a shaping block 210 in which shaping means 220 and separating means 230 are arranged, and also a tongue 260. Here, the shaping means and the separating means can be moved by a common lever 221 in order to more easily apply greater cutting and shaping forces. The transport means 240 of this embodiment is a pusher 240 which is driven by a slide rod 242. This is achieved by an active connection 244, not shown in more detail known to a person skilled in the art, between a lever 243 and the slide rod 242 which, depending on the direction of movement, clamps the slide rod 242 or slides along it. In this case, the portioning means 290 is the stop 290 which together with the lever 243 is used as a grip to move the slide rod and limits the movement of the lever. The portioning thus takes place through the preset stroke of the lever 243.

[0021] Fig. 3 shows a further device for filling cigarette tubes 300. Here, only the shaping block 310 is shown, which contains the necessary separating, shaping and filling means, not shown in more detail. The transport means 340 of this embodiment is a pusher 340 which is driven by a slide rod 342. In this case, the portioning means 390 is a ball 390, pre-tensioned with a spring 391, which engages in recesses 344 on the slide rod 342. In the process, the ball 390 firstly generates an acoustic signal upon engagement. Through the engagement of the ball 390 in the recess 344, a tactile signal is also generated, as a result of the increase in the necessary pressure required to push the slide rod 342 further against the resistance of the ball 390. This shows the operator that the tobacco block 1 has been transported further by a portion length unit. In an alternative embodiment, markers are applied to the slide rod which are covered by the covering 2 of the tobacco block 1 when

the pusher 340 is pushed into the covering 2 in order to display to the operator the advance of the tobacco block by a portioning length unit. Alternatively, the covering can also comprise transparent surfaces which have markers that co-operate with markers on the slide rod in order to display to the operator the advance of the tobacco block 1 by a portion. In addition, the device has fixing means 370 which are suitable to fix encased segments 3, 4 of the covering 2 of the tobacco block 1 to the device 300. Additional supporting elements for the tobacco block 1 are thereby dispensed with.

[0022] Fig. 4 shows a further device for filling cigarette tubes 400. Here, the transport means is formed by two rollers 444 and 445 which convey the tobacco block 1 out of the covering 2 and into the shaping chamber 450. The upper roller 445 is pre-tensioned with a spring 447 in order to create the necessary friction for transport. The spring strength can also be set for example by an adjusting screw, not shown. The lower roller 444 has a marker 491 which interacts with a pointer, not shown, fixed to the device for the portioning, comparable with the embodiment example from Fig. 1. Moreover, a further portioning means 490 is arranged in the shaping chamber 450, namely a monostably fitted plastic or metal sheet which, given sufficient pressure resulting from the advance of the tobacco block 1, folds into an unstable second bending state and in the process, like a snap disk ("clicker frog"), generates an acoustic signal in order to show the operator that portioning has finished.

[0023] Fig. 5 shows a further device for filling cigarette tubes 500. Here, the transport means is formed by two rollers 540 and 541 which convey the tobacco block 1 out of the covering 2 and simultaneously separate and shape a tobacco portion 10. In this embodiment, the upper toothed wheel is driven by a crank 543 via a belt 542. The portioning means 590 is a pointer 590 which shows the position of the crank at which the tobacco block 1 is moved on through the rollers 540, 541 by a portion length unit, advantageously a complete revolution of the crank 543. Further separating means or shaping means are dispensed with in this embodiment.

[0024] Fig. 6 shows a further device for filling cigarette tubes 600. Here, the transport means is formed by a roller 640 and a web of material 641, for example a film 641. In a first embodiment, the web of material 641 is located in a pocket 642 for the tobacco block or it is pushed into the pocket 642 by insertion of the tobacco block 1. For this, the pocket 642 is removed from the device, for example folded away or unscrewed. In a second embodiment, the web of material 641 is part of the covering 2 of the tobacco block 1. For transportation, the web of material 641 is attached, for example below the tobacco block 1, by a first end 643 to the device 600, for example screwed, clamped, glued or otherwise detachably fixed. The other end of the web of material 641 is clamped into the roller 640. If the roller 640 is now turned, the free web of material 641 contracts and in the process presses the tobacco block 1 into the shaping chamber 650. In this

case, a first portioning means 690 is a pointer 690 which interacts with a scale 691 on the roller 640 in order to generate a visual signal.

[0025] Alternatively, markers can also be applied to the web of material 641 which can be brought in line with the pointer 690 in order to show the operator the portioning length unit. The device 600 also has a second portioning means 692 which is arranged in the shaping chamber 650. This is an optical sensor, say a light barrier or a coverage sensor, which shows whether a complete tobacco portion 10 is in the shaping chamber 650. This information is output for example via a display, a light signal or an acoustic signal.

[0026] Fig. 7a shows a further device for filling cigarette tubes 700. The transport means 740 of this embodiment is a pusher 740 which is driven by a slide rod 742. In this case, the portioning means 790 is a catch 790 which is pivotally attached to a lever 743 and which engages in a sawtooth-like segment of the slide rod 742, and also a stop 791 to limit the lever movement of the lever 743. During the advance, the catch 790 pushes against the steep face of the sawtooth and thus pushes the tobacco block 1 further. Stop 791 gives the operator a tactile signal when the advance movement ends. During a rearward movement, the catch 790 pre-tensioned by a spring 744 against the slide rod 742 slides on the flat face of the sawtooth until an acoustic signal is generated when the catch strikes the face of the next sawtooth. This shows the operator that the rearward movement of the lever 743 has ended

[0027] Alternatively, instead of a lever a button can also be used which ensures the step-wise advance of the slide rod. In such an embodiment, two opposite, offset tooth racks are used. The pusher 740 is then pre-tensioned by a tension spring against the end of the slide rod 742 in the direction of the shaping chamber. If the button is pressed, the catch firstly switches from the first tooth rack to the second tooth rack and the slide rod 742 is pushed further by the spring force by a distance corresponding to half a pitch. If the button is returned to its original position, say by a return spring, the catch switches back to the first tooth rack, but into the next pitch, with the result that the slide rod 742 is advanced a further half pitch by the spring force of the tension spring. By pressing the button, the tobacco block 1 is thus advanced a full pitch. The tension spring is pre-tensioned by the operator, for example when inserting the tobacco block. The pitch corresponds either to the portion length unit or a fraction thereof, with the result that the button is pressed several times to travel a portion length unit.

[0028] A further alternative embodiment of such a button is shown in Fig. 7b. Here, two opposite, offset toothed or wedge bars 745, 746 are attached to the slide rod 742a. Here, the button represents the portioning means which simultaneously acts together with the slide rod 742a as transport means. The button interacts with a first contact element 792 and a second contact element 793 with the toothed or wedge bars 745, 746. Here, the two

contact elements 792, 793 have a fixed spatial relationship to each other and can be moved up and down together. The contact elements have for example a round or wedge-shaped cross-section. The middle position of the contact elements 792, 793 is shown in the detail 794a. In this middle position, the slide rod 742a can be moved, say in order to introduce a new tobacco block 1. If the button is now pressed, both contact elements 792, 793 drop. Here, the first contact element 792 interacts with the face of a tooth or wedge of the upper toothed or wedge bar 745 and as a result of the pressure applied by the operator pushes the slide rod 742a in the direction indicated by the arrow by a first part of the portion length unit. If the button is then released, the contact elements 792, 793 are moved upwards above the middle position for example by the spring force of a return spring, not shown, with the result that the second contact element 793 now strikes the face of the next tooth or wedge of the lower toothed or wedge bar 745. As a result of the spring force of the return spring, the contact element 793 pushes the slide rod 742a further by the remaining part of the portion length unit in the direction indicated by the arrow. Depending on the embodiment of the device, the first part of the advance and the second part of the advance correspond to each other. The variously available force, applied once by the operator and once by the return spring, favours different part-advances.

[0029] Fig. 10a shows a further device for filling cigarette tubes 800. The transport means 840 of this embodiment is a pusher 840 which is advanced by a slide rod 842. The portioning means is a button 891 which interacts by means of two wedge-shaped contact elements 892, 893 with a double tooth rack 845, 846. The double tooth rack 845, 846 is part of the slide rod 842 and has a toothing on the top side and on the underside. The tooth racks 845, 846 are advantageously vertically offset relative to each other. Depending on the embodiment, the toothing of the tooth racks 845, 846 can be even or uneven. For example, it can be advantageous to choose a distance between the teeth at the end of the tooth racks 845, 846 that is greater than the distance between the teeth in the middle of the tooth racks 845, 846. This has the effect that the tobacco is more strongly compressed at the beginning and at the end of the processing of the tobacco block 1 than in the middle of the tobacco block 1. The advance of the slide rod 842 is effected by a readjusting spring 847 of the button 891. In this connection, the readjusting spring 847 pushes the wedge-shaped contact element 893 against the lower tooth rack 845, with the result that the flank of the tooth rack 845 slides along the flank of the lower contact element 893, with the result that the pusher 840 is advanced in the direction of the shaping chamber 850. The button 891 can be moved into a middle position in which none of contact elements 892, 893 engages with the tooth racks 845, 846. In this middle position, the slide rod 842 can be pulled out until a filled tobacco block 1 can be deposited on the table 881 or an emptied tobacco block 1 removed from it. Fitted in front

of the shaping chamber 850 is a protective flap 851 which prevents fingers from inadvertently being able to be inserted into the shaping chamber 850 when there is no tobacco block 1 resting on the table 881.

[0030] The device for filling cigarette tubes 800 furthermore has a lever 821 which moves the shaping means 820 and the separating means 830, and also a housing 850 and a pusher 861 for filling the cigarette tube 11.

[0031] In Figs. 8 and 9, fixing means 70 are shown for fixing the coverings 2 of the tobacco block 1 to the device 100, 200, 300, 400, 500, 600, 700, 800. The tobacco block advantageously has two coverings 2, a first covering which completely and advantageously hermetically encloses the tobacco block, and an inner covering which encases the tobacco block 1 but leaves an end face and advantageously also a bottom side free. The opening on the bottom side serves for example for the introduction of a pusher to push the tobacco block 1 through the end face out of the covering. In the embodiments of the device according to Fig. 4 and Fig. 5, an opening on the bottom side of the covering is not necessary. The other sides of the inner casing 2 of the tobacco block 1 serve as additional stabilizing elements for the tobacco block 1. The inner covering is made for example of cardboard or plastic. In the embodiment in Fig. 8, the end face of the covering of the tobacco block 1 is broken apart at two tear lines in order to gain access to the tobacco block. Three surfaces 3, 4 thereby, results at the front. In this case, the middle surface 3 is folded upwards (shown by dotted lines) and the lower surface 4 folded downwards (shown by dotted lines), introduced into corresponding flaps 70 and thus fixed to the device 100, 200, 300, 400, 500, 600, 700, 800. The surfaces 3, 4 can have tabs 3a, 4a to enable them to be broken apart more easily.

[0032] In the alternative embodiment, not only is the end face of the covering folded over, but in addition also a part of the top 5 and bottom 6 of the covering as well as optionally also lateral surfaces 7 which in turn can be inserted foldable (shown by dotted lines) into fixing means 70 provided for this and can thus be fixed to the device. Further supporting means for the tobacco block 1 can then be dispensed with.

[0033] The tobacco block 1 was moved in a horizontal plane in the shown devices 100, 200, 300, 400, 500, 600, 700, 800. However, it is clear that a diagonal or vertical movement of the tobacco block can be carried out, as the mechanisms shown are substantially independent of gravitation.

Claims

1. Device (100, 200, 300, 400, 500, 600, 700, 800) for filling cigarette tubes (11) with tobacco, wherein the device (100, 200, 300, 400, 500, 600, 700, 800) comprises at least one separating means (130, 230, 530, 830), by means of which a tobacco portion (10) can be detached from a tobacco block (1), as well as at

least one filling means (160, 161, 162, 861) with which the cigarette tube (11) can be filled with the tobacco,

wherein a tobacco portion (10) denotes the quantity of tobacco that is used to fill a cigarette tube (11) and wherein a tobacco block (1) denotes a unit of compressed tobacco the quantity of tobacco of which exceeds that contained in a tobacco portion (10) and advantageously represents a multiple thereof,

characterized in that,

the device (100, 200, 300, 400, 500, 600, 700, 800) comprises at least one portioning means (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) for the portioning of the tobacco block (1) and at least one transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) by means of which the tobacco block (1) can be transported.

2. Device according to claim 1,

characterized in that

the at least one portioning means (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) specifies a portion length unit with the result that the tobacco block (1) per portion length unit contains the quantity of tobacco that corresponds to the tobacco portion (10) needed to fill one cigarette tube (11).

3. Device according to claim 2,

characterized in that

the portioning length unit of the at least one portioning means (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) corresponds to the distance traveled by the tobacco block (1) to detach a tobacco portion (10).

4. Device according to any of the preceding claims,

characterized in that

the at least one transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) comprises at least one of the following elements:

a pusher (140, 240, 340, 740, 840), a lever (243, 743), a crank (543), a slide rod (242, 342, 842), a tooth rack (742, 742a, 845, 846), a wedge bar (742, 742a), a screw (142), a shaft (640), a wheel (141), a friction wheel (444, 445), a toothed wheel (540, 541), a chain, a cable pull, a web of material (641) or a spring (847).

5. Device according to one of the preceding claims,

characterized in that

the at least one transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541,

542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transports the tobacco block (1) continuously by one portion length unit.

6. Device according to one of claims 1 to 4,
characterized in that

the at least one transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transports the tobacco block (1) step-wise by one portion length unit.

7. Device according to one of the preceding claims,
characterized in that

the at least one transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transports the tobacco block (1) automatically or semi-automatically by one portion length unit.

8. Device according to one of the preceding claims,
characterized in that

the device (100, 200, 300, 400, 500, 600, 700, 800) comprises at least one shaping means (120, 220, 520, 820) by means of which the detached tobacco can be shaped into a form in which the tobacco can be introduced into the cigarette tube (11) by means of the filling means (15).

9. Device according to claim 8,
characterized in that

the at least one shaping means (120, 220, 520, 820) can be moved jointly with the at least one suitable transport means (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847).

10. Device according to one of the preceding claims,
characterized in that

the device (100, 200, 300, 400, 500, 600, 700, 800) has at least one shaping chamber (150, 250, 450, 650, 850), with an opening for the introduction of the tobacco portion (10) into the shaping chamber (150, 250, 450, 650, 850) and a discharge opening to discharge the tobacco portion 10 out of the shaping chamber (150, 250, 450, 650, 850) into the cigarettes-tube (11).

11. Device according to one of the preceding claims,
characterized in that

the at least one separating means (130, 230, 530, 830) comprises at least one of the following: a blade (130, 230, 530, 830), a rasp, a screw, a worm or a wheel.

12. Device according to one of the preceding claims,
characterized in that

the at least one separating means (130, 230, 530, 830) is designed such that the separating means (130, 230, 530, 830) detaches the tobacco portion (10) from the tobacco block (1) with one separating step.

13. Device according to one of claims 1 to 11,
characterized in that

the at least one separating means (130, 230, 530, 830) is designed such that the separating means (130, 230, 530, 830) detaches the tobacco portion (10) from the tobacco block (1) in part-quantities.

14. Device according to one of the preceding claims,
characterized in that

the at least one portioning means (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) comprises at least one of the following elements:

an acoustic signaler, (390, 391, 490, 790), a visual signaler (190, 390, 391, 491, 590, 690, 691, 692), or a tactile signaler (290, 390, 391, 791).

15. Device according to one of the preceding claims,
characterized in that

the device (100, 200, 300, 400, 500, 600, 700, 800) has two lateral guides guiding the tobacco block (1) on its narrow sides during transportation whereas the inner width of said lateral guides is smaller than the width of the tobacco block including a possible covering, preferably said inner width ranges from 95 percent to less than 100 percent of the width of the tobacco block (1) including said possible covering.

16. Use of the device (100, 200, 300, 400, 500, 600, 700, 800) for filling cigarette tubes (11) with tobacco according to one of claims 1 to 15

characterized in that,

the tobacco is provided to the device (100, 200, 300, 400, 500, 600, 700, 800) in the form of a tobacco block (1) which is a unit of compressed tobacco.

Patentansprüche

1. Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) zum Befüllen von Zigarettenhülsen (11) mit Tabak, wobei die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) wenigstens ein Trennmittel (130, 230, 530, 830) umfasst, vermittels dem eine Tabakportion (10) von einem Tabakblock (1) lösbar ist, sowie wenigstens ein Füllmittel (160, 161, 162, 861), mit dem die Zigarettenhülse (11) mit dem Tabak befüllbar ist, wobei Tabakportion (10) die Tabakmenge bezeichnet, die zum Befüllen einer Zigarettenhülse (11) verwendet wird, und wobei ein Tabakblock (1) eine Einheit von komprimiertem Tabak ist.

miertem Tabak bezeichnet, deren Tabakmenge die in einer Tabakportion (10) enthaltene Tabakmenge übersteigt und vorteilhafterweise ein Vielfaches davon darstellt,

dadurch gekennzeichnet,

dass die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) wenigstens ein Portionierungsmittel (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) zur Portionierung des Tabakblocks (1) umfasst und wenigstens ein Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847), vermittels dem der Tabakblock (1) transportierbar ist.

2. Vorrichtung nach Anspruch 1,

dadurch gekennzeichnet, dass

das wenigstens eine Portionierungsmittel (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) eine Portionslängeneinheit festlegt, so dass der Tabakblock (1) je Portionslängeneinheit die Tabakmenge enthält, die der Tabakportion (10) zur einer Füllung einer Zigarettenhülse (11) entspricht.

3. Vorrichtung nach Anspruch 2,

dadurch gekennzeichnet, dass

die Portionierungslängeneinheit des wenigstens einen geeigneten Portionierungsmittels (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) dem Transportweg des Tabakblocks (1) zum Ablösen einer Tabakportion (10) entspricht.

4. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

das wenigstens eine Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) wenigstens eines der folgenden Elemente umfasst:

einen Schieber (140, 240, 340, 740, 840), einen Hebel (243, 743), eine Kurbel (543), eine Schubstange (242, 342, 842), eine Zahnstange (742, 742a, 845, 846), eine Keilstange (742, 742a), eine Schraube (142), eine Welle (640), eine Rad (141 ein Reibrad (444, 445), ein Zahnrad (540, 541), eine Kette, einen Seilzug, eine Materialbahn (641) oder eine Feder (847).

5. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

das wenigstens eine Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) den Tabakblock (1) kontinuier-

lich um eine Portionslängeneinheit transportiert.

6. Vorrichtung nach einem der Ansprüche 1 bis 4,

dadurch gekennzeichnet, dass

das wenigstens eine Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) den Tabakblock (1) schrittweise um eine Portionslängeneinheit transportiert.

7. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

das wenigstens eine Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) den Tabakblock (1) automatisch oder halbautomatisch um eine Portionslängeneinheit transportiert.

8. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) wenigstens ein Formmittel (120, 220, 520, 820) umfasst, vermittels dem der abgelöste Tabak in eine Form formbar ist, in der der Tabak vermittels des Füllmittels (15) in die Zigarettenhülse (11) einbringbar ist

9. Vorrichtung nach Anspruch 8,

dadurch gekennzeichnet, dass

das wenigstens eine Formmittel (120, 220, 520, 820) gemeinsam mit dem wenigstens einen Transportmittel (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) bewegbar ist.

10. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) wenigstens eine Formkammer (150, 250, 450, 650, 850) aufweist, mit einer Aufnahmeöffnung für das Einbringen der Tabakportion (10) in die Formkammer (150, 250, 450, 650, 850) sowie einer Abgabeöffnung zum Abgeben der Tabakportion (10) aus der Formkammer (150, 250, 450, 650, 850) in die Zigarettenhülse (11).

11. Vorrichtung nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet, dass

das wenigstens eine Trennmittel (130, 230, 530, 830) wenigstens eines der folgenden umfasst: ein Messer (130, 230, 530, 830), eine Raspel, eine Schraube, eine Schnecke oder ein Rad.

12. Vorrichtung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
 das wenigstens eine Trennmittel (130, 230, 530, 830) derart beschaffen ist, dass das Trennmittel (130, 230, 530, 830) die Tabakportion (10) mit einem Trennschritt von dem Tabakblock (1) löst. 5
13. Vorrichtung nach einem der Ansprüche 1 bis 11,
dadurch gekennzeichnet, dass
 das wenigstens eine geeignete Trennmittel (130, 230, 530, 830) derart beschaffen ist, dass das Trennmittel (130, 230, 530, 830) die Tabakportion (10) teil-
 mengenweise von dem Tabakblock (1) löst. 10
14. Vorrichtung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
 das wenigstens eine Portionierungsmittel (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) wenigstens eines der folgenden Elemente umfasst: 15
- einen akustischen Signalgeber (390, 391, 490, 790), einen optischen Signalgeber (190, 390, 391, 491, 590, 690, 691, 692), oder einen taktilen Signalgeber (290, 390, 391, 791). 20
15. Vorrichtung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
 die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) zwei seitliche Führungen aufweist, die den Tabakblock (1) an seinen Schmalseiten beim Transport führen, wobei die innere Breite der seitlichen Führungen kleiner ist als die Breite des Tabakblocks (1) einschließlich einer möglichen Umhüllung, vorzugsweise beträgt die besagte innere Breite zwischen 95% und 100% der Breite des Tabakblocks (1) einschließlich der besagten möglichen Umhüllung. 30
16. Verwendung der Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) zum Befüllen von Zigarettenhülsen (11) mit Tabak gemäß einem der Ansprüche 1 bis 15,
dadurch gekennzeichnet, dass
 der Tabak in Form eines Tabakblocks (1), der eine Einheit von komprimiertem Tabak ist, in die Vorrichtung (100, 200, 300, 400, 500, 600, 700, 800) eingebracht wird. 40

Revendications

1. Dispositif (100, 200, 300, 400, 500, 600, 700, 800) de remplissage de tubes de cigarette (11) avec du tabac, le dispositif (100, 200, 300, 400, 500, 600, 700, 800) comprenant au moins un moyen de sépa- 55

ration (130, 230, 530, 830) au moyen duquel une dose de tabac (10) peut être détachée d'un bloc de tabac (1), ainsi qu'au moins un moyen de remplissage (160, 161, 162, 861) avec lequel le tube de cigarette (11) peut être rempli de tabac, une dose de tabac (10) désignant la quantité de tabac utilisée pour remplir un tube de cigarette (11) et un bloc de tabac (1) désignant une unité de tabac compressée dont la quantité de tabac dépasse celle contenue dans une dose de tabac (10) et représentant avantageusement un multiple de celle-ci,
caractérisé en ce que
 le dispositif (100, 200, 300, 400, 500, 600, 700, 800) comprend au moins un moyen de dosage (190, 290, 390, 391, 490, 491, 590, 690, 691, 692, 790, 791, 891, 892, 893) pour le dosage du bloc de tabac (1) et au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) au moyen duquel le bloc de tabac (1) peut être transporté.

2. Dispositif selon la revendication 1,
caractérisé en ce que
 l'au moins un moyen de dosage (190, 290, 390, 391, 490, 491, 590, 690, 691, 392, 790, 791, 891, 892, 893) spécifie une unité de longueur de dosage faisant que le bloc de tabac (1) par unité de longueur de dose contient la quantité de tabac qui correspond à la dose de tabac (10) nécessaire pour remplir un tube de cigarette (11). 25
3. Dispositif selon la revendication 2,
caractérisé en ce que
 l'unité de longueur de dose de l'au moins un moyen de dosage (190, 290, 390, 391, 490, 491, 590, 690, 691, 392, 790, 791, 891, 892, 893) correspond à la distance parcourue par le bloc de tabac (1) pour détacher une dose de tabac (10). 30
4. Dispositif selon l'une quelconque des revendications,
caractérisé en ce que
 l'au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) comprend au moins l'un des éléments suivants : 35

un poussoir (140, 240, 340, 740, 840), un levier (243, 743), une manivelle (543), une tige coulissante (242, 342, 842), une crémaillère (742, 742a, 845, 846), une barre crantée (742, 742a), une vis (142), un arbre (640), une roue (141), une roue de friction (444, 445), une roue dentée (540, 541), une chaîne, un poulie à câble, une bande de tissu (641) ou un ressort (847). 40

5. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
l'au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transporte le bloc de tabac (1) continûment par une unité de longueur de dose. 5
6. Dispositif selon l'une quelconque des revendications 1 à 4,
caractérisé en ce que
l'au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transporte le bloc de tabac (1) pas à pas par une unité de longueur de dose. 10
7. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
l'au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) transporte le bloc de tabac (1) automatiquement ou semi-automatiquement par une unité de longueur de dose. 15
8. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
le dispositif (100, 200, 300, 400, 500, 600, 700, 800) comprend au moins un moyen de mise en forme (120, 220, 520, 820) au moyen duquel le tabac détaché peut être conformé dans une forme dans laquelle le tabac peut être introduit dans le tube de cigarette (11) au moyen du moyen de remplissage (15). 20
9. Dispositif selon la revendication 8,
caractérisé en ce que
l'au moins un moyen de mise en forme (120, 220, 520, 820) peut être déplacé conjointement avec l'au moins un moyen de transport (140, 141, 142, 240, 242, 243, 244, 340, 342, 444, 445, 446, 540, 541, 542, 543, 640, 641, 740, 742, 742a, 743, 840, 842, 845, 846, 847) convenable. 25
10. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
le dispositif (100, 200, 300, 400, 500, 600, 700, 800) comporte au moins une chambre de mise en forme (150, 250, 450, 650, 850) comportant une ouverture pour l'introduction de la dose de tabac (10) dans la chambre de mise en forme (150, 250, 450, 650, 850) et une ouverture de décharge de la dose de tabac 10 hors de la chambre de mise en forme (150, 250, 450, 650, 850) dans le tube de cigarette (11). 30
11. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
l'au moins un moyen de séparation (130, 230, 530, 830) comprend au moins l'un des éléments suivants : une lame (130, 230, 530, 830), une racle, une vis, un vis sans fin ou une roue. 35
12. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
l'au moins un moyen de séparation (130, 230, 530, 830) est conçu de telle sorte que le moyen de séparation (130, 230, 530, 830) détache la dose de tabac (10) du bloc de tabac (1) en une seule étape de séparation. 40
13. Dispositif selon l'une quelconque des revendications 1 à 11,
caractérisé en ce que
l'au moins un moyen de séparation (130, 230, 530, 830) est conçu de telle sorte que le moyen de séparation (130, 230, 530, 830) détache la dose de tabac (10) du bloc de tabac (1) en quantités partielles. 45
14. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
l'au moins un moyen de dosage (190, 290, 390, 391, 490, 491, 590, 690, 691, 392, 790, 791, 891, 892, 893) comprend au moins l'un des éléments suivants :
un indicateur sonore (390, 391, 490, 790), un indicateur visuel (190, 390, 391, 491, 590, 690, 691, 692), ou un indicateur tactile (290, 390, 391, 791). 50
15. Dispositif selon l'une quelconque des revendications précédentes,
caractérisé en ce que
le dispositif (100, 200, 300, 400, 500, 600, 700, 800) comporte deux guides latéraux qui guident le bloc de tabac (1) sur ses côtés étroits durant le transport tandis que la largeur interne desdits guides latéraux est inférieure à la largeur du bloc de tabac comportant une éventuelle enveloppe, de préférence ladite enveloppe interne allant de 95 pour cent à moins de 100 pour cent de la largeur du bloc de tabac (1) comportant ladite éventuelle enveloppe. 55
16. Utilisation du dispositif (100, 200, 300, 400, 500, 600, 700, 800) de remplissage de tubes de cigarette (11) avec du tabac selon l'une quelconque des revendications 1 à 15,
caractérisé en ce que

le tabac est fourni au dispositif (100, 200, 300, 400, 500, 600, 700, 800) sous forme de bloc de tabac (1) qui est une unité de tabac compressée.

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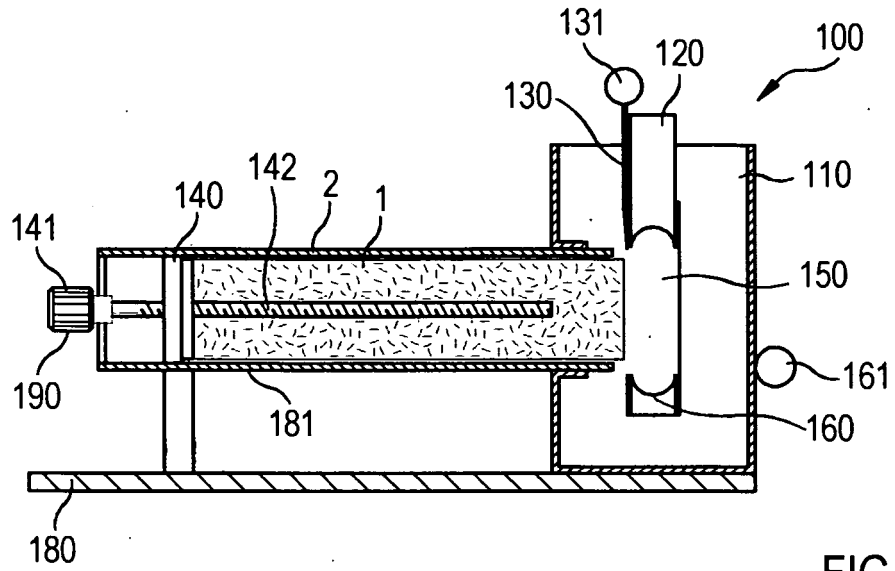


FIG. 1a

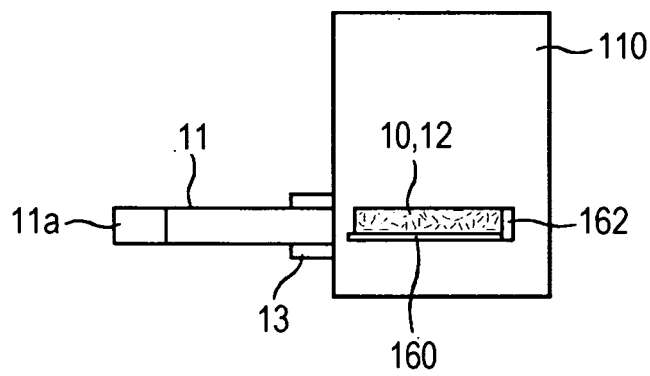


FIG. 1b

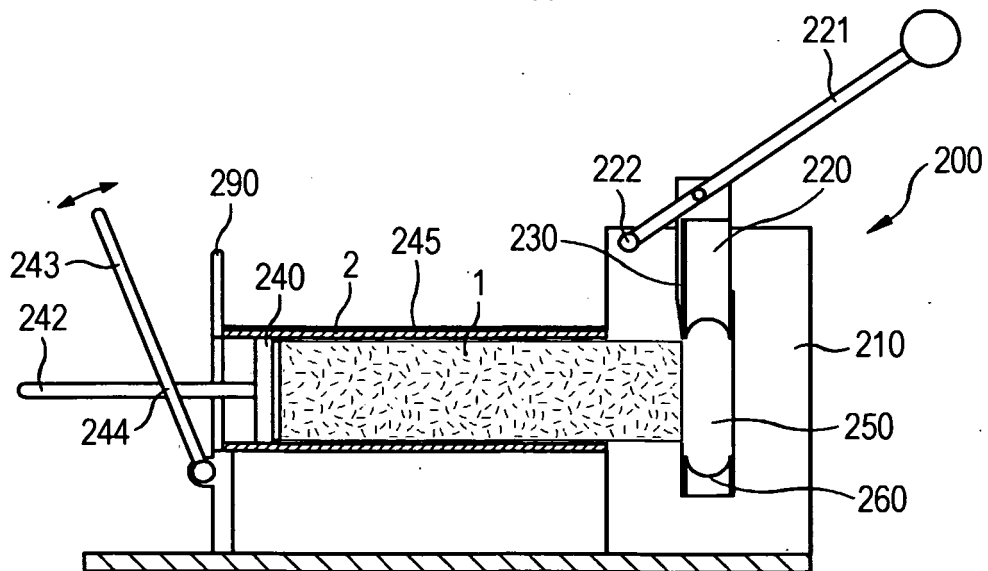


FIG. 2

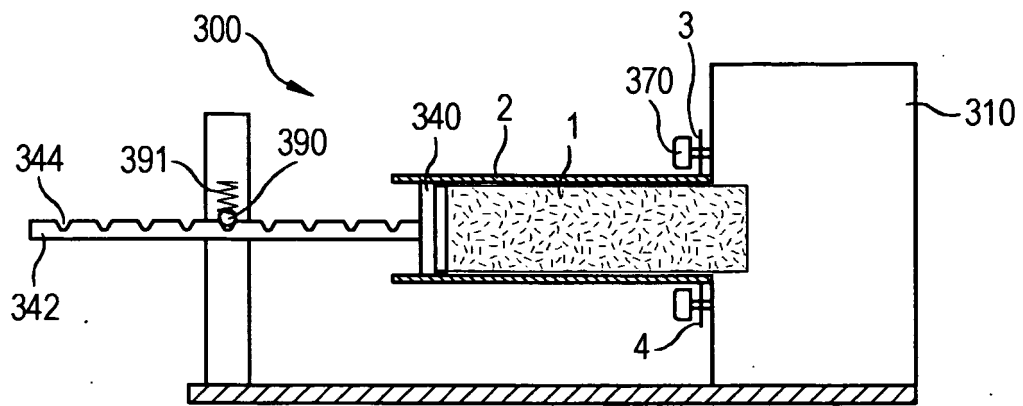


FIG. 3

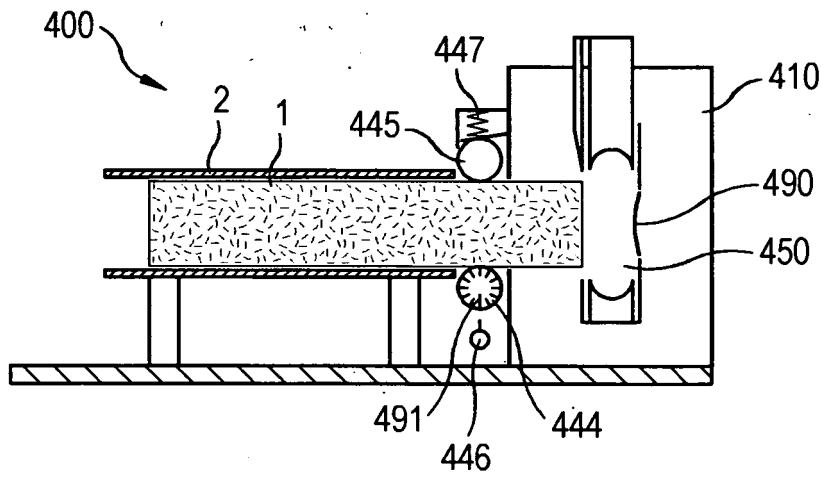


FIG. 4

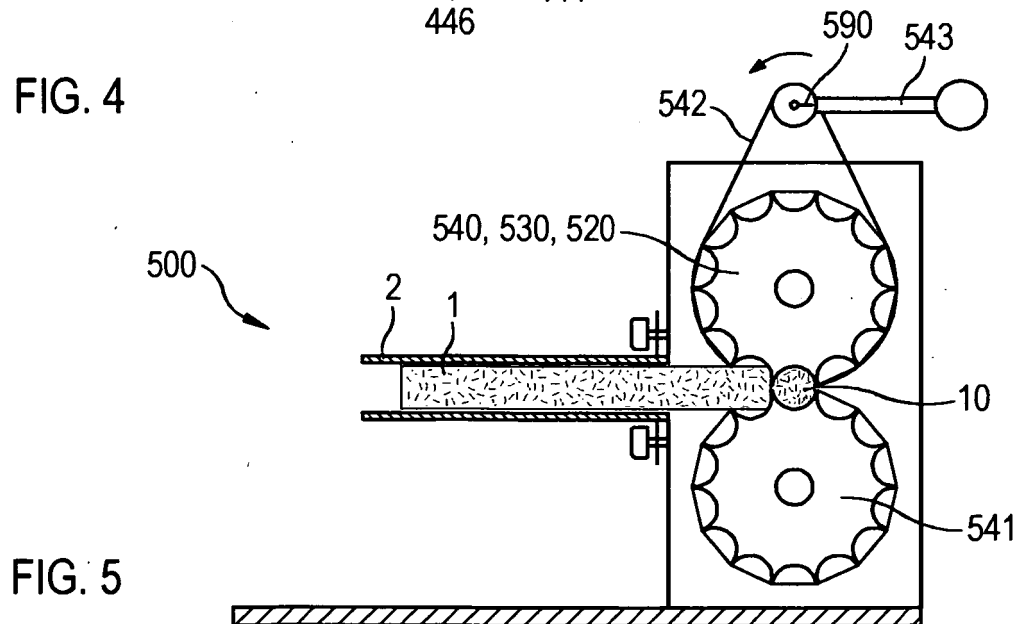


FIG. 5

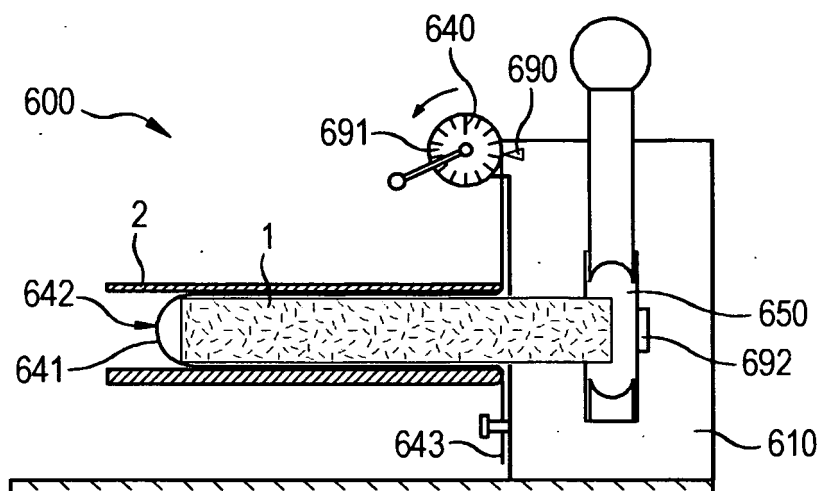


FIG. 6

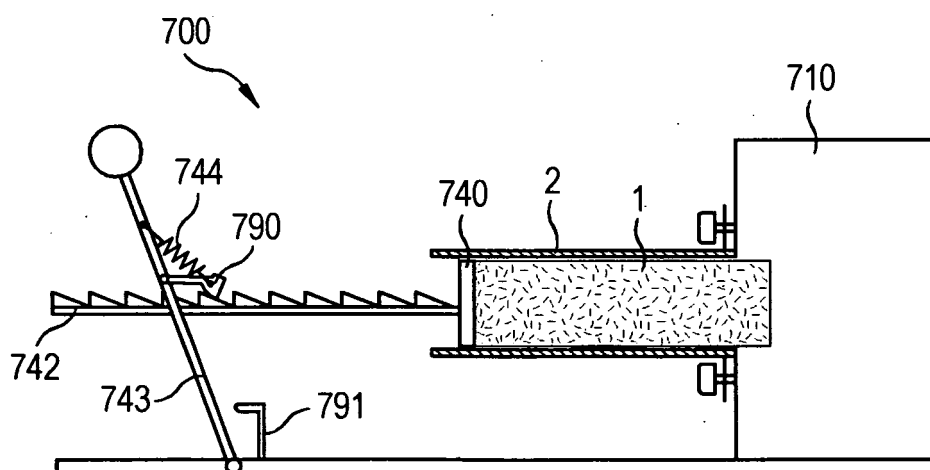


FIG. 7a

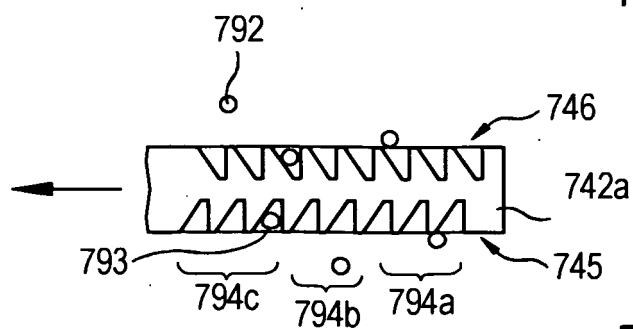


FIG. 7b

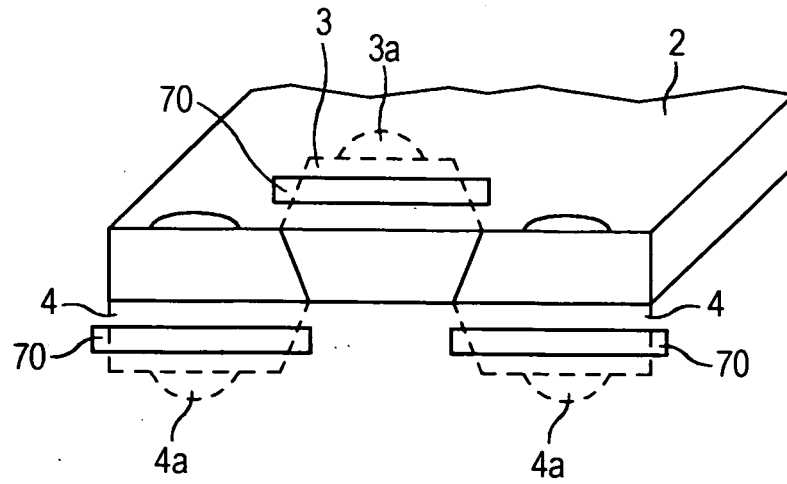


FIG. 8

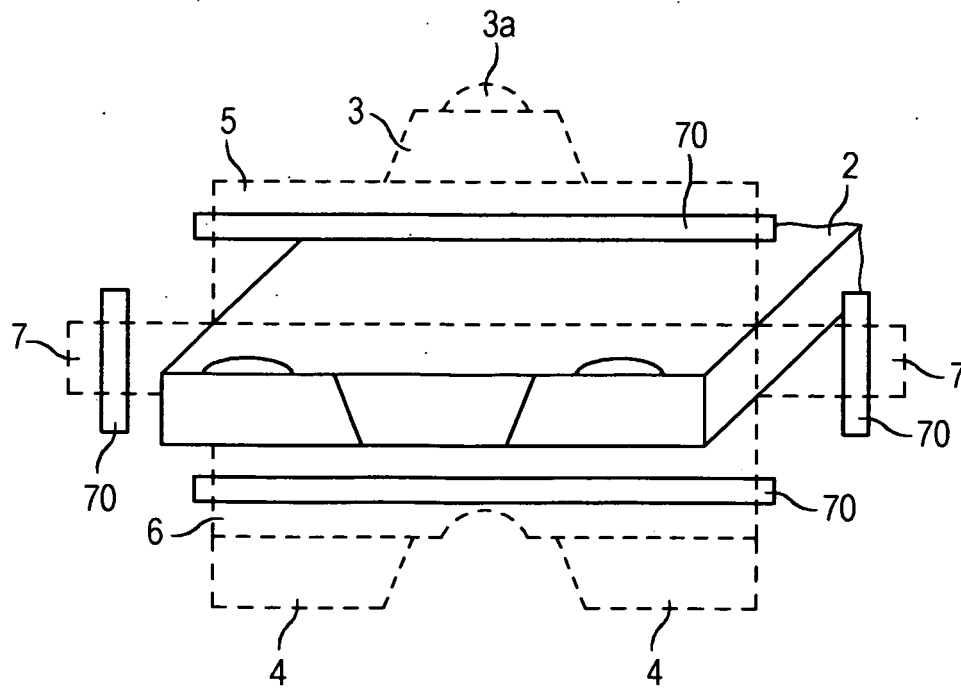


FIG. 9

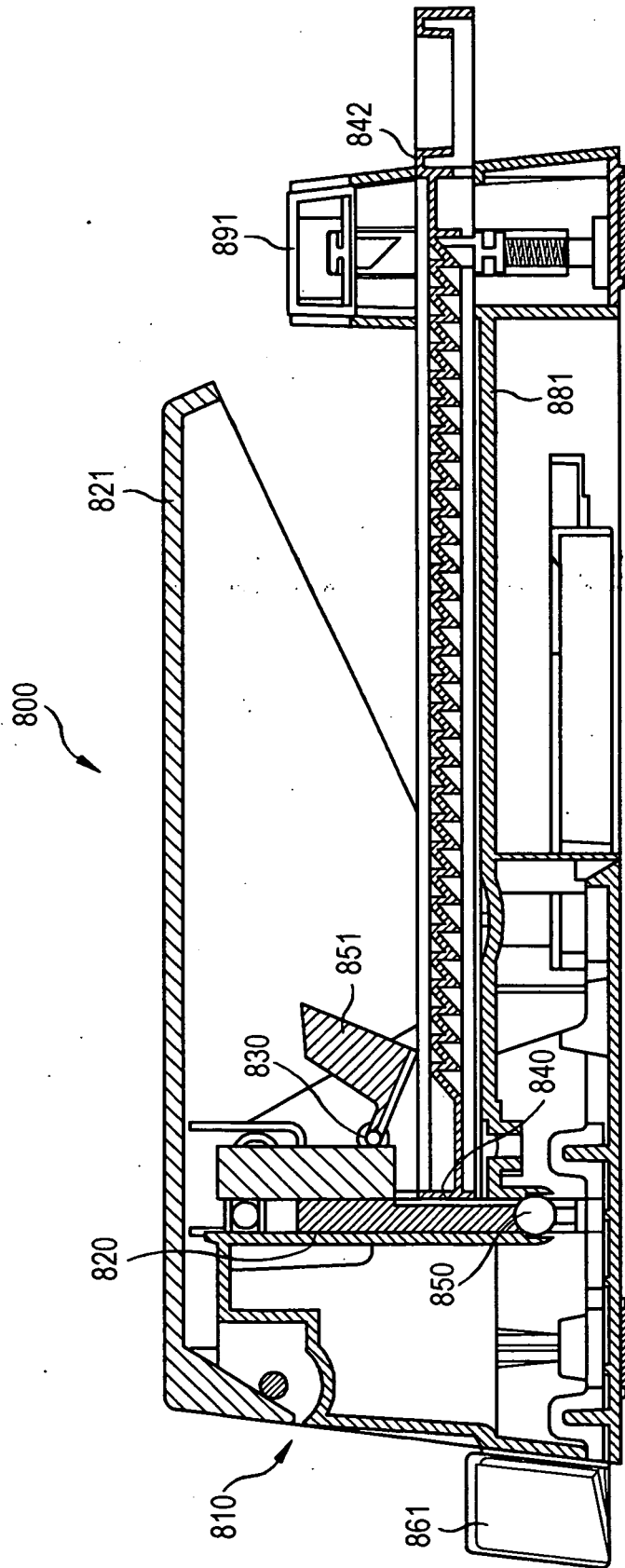


FIG. 10a

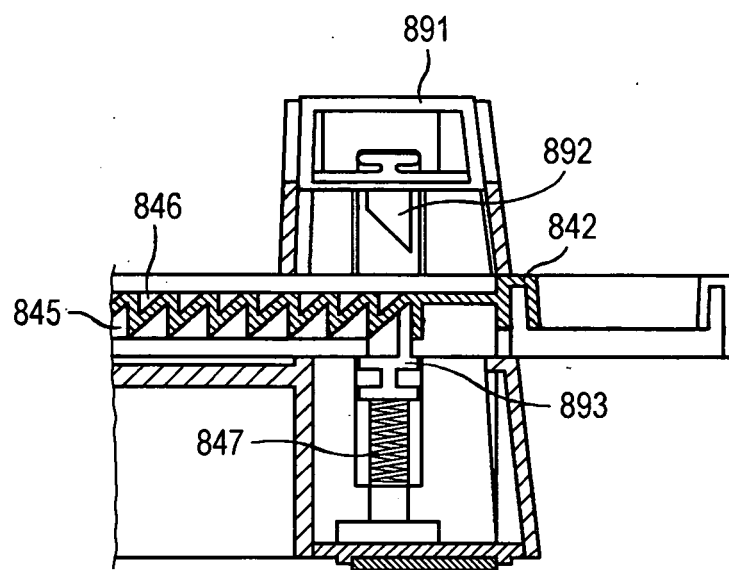


FIG. 10b

REFERENCES CITED IN THE DESCRIPTION

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