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(54) **AN APPARATUS FOR CUTTING CIGARETTES AND A METHOD OF CUTTING CIGARETTES**

VORRICHTUNG ZUM SCHNEIDEN VON ZIGARETTEN UND VERFAHREN ZUM SCHNEIDEN VON
ZIGARETTEN

APPAREIL DE DÉCOUPE DE CIGARETTES ET PROCÉDÉ DE DÉCOUPE DE CIGARETTES

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Description

[0001] The invention relates to the field of manufacturing cigarettes, in particular the field of recovering tobacco from defective or substandard cigarettes.

[0002] The object of the invention is an apparatus for cutting cigarettes, which may be a subassembly of a machine for recovering tobacco from defective or substandard cigarettes and a method of cutting the cigarettes using this apparatus.

[0003] In machines for recovering tobacco from cigarettes, revolving disc knives are used to cut or perforate a wrapper. After performing cutting, the wrapper and all parts or components of filtering material must be separated from tobacco.

[0004] In case of cutting non-filter cigarettes, a wrapper is cut along the entire length of the cigarette. In case of filter cigarettes, a wrapper should be cut along a tobacco portion, while over a filter portion, a wrapper covering the filter must remain intact. The tobacco recovered from the cigarettes is added to shredded tobacco which is supplied to a cigarette manufacturing machine. The quality of cigarettes will be seriously reduced if tobacco used for manufacturing cigarettes comprises parts of the filtering material, since smoke from burnt filtering material can be harmful to a smoker. Currently there are produced cigarettes provided with multi-segment filters containing filtering materials of various kinds. The filtering materials in the form of granules such as e.g. activated carbon placed in a multi-segment filter between other fragments, such as, e.g. acetate filter forming a chamber for loose material are also used. Cutting such a filter is particularly disadvantageous since separation of granules that are significantly smaller than tobacco shreds requires the application of special purifying assemblies. Considering the above reasons, it is important that wrapper of the recyclable cigarettes, after being cut, can be easily and efficiently separated from the remaining components of the cigarette.

[0005] US 3,665,931 discloses an exemplary device for cutting cigarette wrapper.

[0006] US 3,665,931 discloses a device where cigarettes are supplied by the feeder through a first linear vibrating conveyor and are arranged parallel to the conveying direction, they are transported through a second vibrating conveyor towards a moisturising and cutting unit. A disc knife with a plurality of small blades which cut moisturized cigarettes along their length are placed in a cutting apparatus over each groove. The distance of the knife from the vibrating conveyor is selected such that the tipping material on the mouthpiece is not cut.

[0007] EP 2 364 605 A2 discloses a method and an apparatus for opening a wrapper, i.e. the cigarette covering material. The document provides a method and an apparatus which effectively separate the cut wrappers and all parts and components of the filtering material from the recoverable tobacco. The method of opening the wrapper is disclosed, wherein the cigarette transported

in a groove of the feeder of the machine for recovering tobacco is cut with at least one revolving disc knife located above the feeder, blocking the possibility of rotation of the cigarette around its axis in the groove of the feeder in which the cigarette is guided, what causes that tensile stress is applied to the wrapper facilitating its opening. However, a disadvantage of this solution is that some of the cigarettes are not effectively blocked in the groove during the cutting and rotation. The rotation of the cigarette during cutting causes the formation of a helical cutting line, which does not reach the mouthpiece, which makes recovering the tobacco out from this part of the cigarette difficult. Therefore, in order to effectively take the tobacco out of the cigarettes, the cigarettes must be subjected to vibration for a long time.

[0008] An object of this invention is to improve the earlier solution in order to provide straight cutting line on each cigarette. According to the invention there is provided an apparatus for cutting cigarettes, the cigarettes comprising an axis, wherein the apparatus for cutting cigarettes comprises a feeder adapted to transport the cigarettes, the feeder comprising at least one guiding groove arranged along the feeder, the guiding groove being provided with a first wall, a second wall and a bottom arranged between the first wall and the second wall of the guiding groove, a rotating shaft arranged above the feeder, at least one revolving disc knife for cutting the cigarettes along the axis of said cigarettes, the revolving disc knife being disposed of the rotating shaft, wherein the revolving disc knife is positioned in a plane spaced from the axis of the cigarette to be cut open, a pressing ring for pressing the cigarettes against the first wall and the second wall of the guiding groove, the pressing ring being loosely movable around the rotating shaft, the pressing ring being arranged next to the revolving disc knife, wherein arrangement of the first wall and the second wall of the guiding groove relative to each other enables, before cutting each cigarette, to block the cigarette by means of the pressing ring by pushing the cigarette between the first wall and the second wall of the guiding groove with simultaneous deformation of said cigarette.

[0009] An apparatus according to the invention is characterized in that the first wall of the guiding groove is perpendicular to the bottom of the guiding groove and the second wall of the guiding groove is oriented at an obtuse angle with respect to the bottom of the guiding groove, the revolving disc knife is positioned at the first wall, and the pressing ring and the revolving disc knife are located above a straight section of the feeder.

[0010] Preferably, the guiding groove is provided with walls arranged relative to each other at an angle of 20° to 60°.

[0011] Preferably, said second wall is arranged at an angle of about 110° to about 150° with respect to the bottom.

[0012] The position of the pressing ring related to the shaft of the disc knife can be determined by a limiting element oriented parallel to the axis of the shaft of the

disc knife, and the limiting element being arranged in front of the shaft of the knife viewed in the direction of the movement of the feeder.

[0013] Preferably, the location of the limiting element is adjustable in a direction parallel to the direction of the movement of the feeder.

[0014] The position of the limiting element is preferably such that the distance travelled by the cigarette starting from the point of the cigarette getting in contact with the pressing ring to the point of the cigarette getting in contact with the disc knife is in the range from 0.2 to 5 times of the cigarette diameter, preferably from 0.25 to 1.5 times of the cigarette diameter.

[0015] Preferably, an outside diameter of the pressing ring is larger than a diameter of the disc knife.

[0016] Preferably, a part of peripheral surface of the pressing ring is formed as a truncated cone, the larger base of which faces the disc knife.

[0017] Preferably, a peripheral surface of the pressing ring is formed as a truncated cone, the smaller base of which faces the disc knife.

[0018] According to the invention, there is a method of cutting the cigarettes, the cigarettes comprising an axis, the method comprising transporting the cigarettes by a feeder in at least one guiding groove arranged along the feeder, the guiding groove being provided with a first wall, a second wall and a bottom arranged between the first wall and the second wall of the guiding groove, cutting the cigarettes along the axis of said cigarettes performed by means of a revolving disc knife mounted on a rotating shaft arranged above the guiding groove, wherein the revolving disc knife is positioned in a plane spaced from the axis of the cigarette to be cut open, wherein the cigarette to be cut open is pressed against the first wall and the second wall of the guiding groove by means of a pressing ring, the pressing ring being loosely movable around the rotating shaft, the pressing ring being arranged next to the revolving disc knife, wherein, before cutting, the cigarette to be cut open is blocked by means of the pressing ring by pushing the cigarette between the first wall and the second wall of the guiding groove with simultaneous deformation of said cigarette.

[0019] A method according to the invention is characterized in that the first wall of the guiding groove is perpendicular to the bottom of the guiding groove and the second wall of the guiding groove is oriented at an obtuse angle with respect to the bottom of the guiding groove, the revolving disc knife is positioned at the first wall, and the pressing ring and the revolving disc knife are located above a straight section of the feeder.

[0020] Preferably, the position of the pressing ring related to the shaft of the disc knife is determined by a limiting element arranged parallel to the axis of the shaft of the disc knife and arranged in front of the knife shaft viewed in the direction of the movement of the feeder.

[0021] The position of the limiting element is preferably adjustable in a direction parallel to the direction of the movement of the feeder.

[0022] An advantage of the cutting apparatus according to the invention is that the cigarette is cut open linearly along a generating line of a cylinder which is a cigarette. Due to the cutting provided by means of an apparatus according to the invention, tobacco is recovered in a shorter time, since the portion of the cigarette comprising tobacco is opened along the entire length.

[0023] Advantages of the apparatus of the invention are also apparent in cutting "slim" cigarettes provided with mouthpieces comprising capsules. Cutting of the cigarettes by means of a knife positioned off-center related to the axis of the cigarette eliminates the risk of cutting or crushing the capsule.

[0024] A method and an apparatus according to the invention will be now described in detail with reference to the drawings, in which:

Fig. 1 schematically shows a fragment of a machine for recovering tobacco provided with an apparatus for cutting the cigarettes according to the invention in a perspective view,

Fig. 2 schematically shows a fragment of the machine for recovering tobacco with another embodiment of an apparatus according to the invention,

Fig. 3 is an enlarged an apparatus for cutting the cigarettes in a perspective view,

Fig. 4 is a partially sectional view of an embodiment of an apparatus not according to the invention,

Fig. 5 is a partially sectional view of another embodiment of an apparatus according to the invention,

Fig. 6 is a partially sectional view of yet another embodiment of an apparatus not according to the invention,

Fig. 7 is a side view of an apparatus according to invention, at the time of first contact of the pressing ring with a cigarette,

Fig. 8 is a side view of an apparatus according to invention, when cutting the cigarette by a disc knife has started.

[0025] A machine for recovering tobacco shown in Fig. 1 comprises a supply unit 1 for feeding defective or sub-standard cigarettes to the feeder 2 at the end of which a cutting apparatus 3 for opening the cigarettes 6 is located. Below the cutting apparatus 3 the feeder is arranged, e.g. a drum feeder, below which there is a receiving device 4 for receiving the cut cigarettes 6, whereas the receiving device 4 is shaped in the form of a vibrating conveyor for example, which transports the cigarettes to an apparatus (not shown) for taking tobacco out of the cigarettes or the receiving device can be an apparatus for

taking the tobacco out of the cut cigarettes 6. The feeder 2 is provided with longitudinal grooves 5 arranged in the conveying direction, for orientating the cigarettes 6 so that the axes k of the cigarettes 6 are set in accordance with the conveying direction before feeding them to the cutting apparatus 3. The axes k of the cigarettes 6 moving along the grooves 5, are arranged in a plane A during orienting the cigarettes 6 along the grooves 5, before feeding the cigarettes 6 to the cutting apparatus 3. The opening apparatus 3 may have a set of disc knives 7 mounted on a common axis m lying on a plane B located in parallel to the plane A.

[0026] In an embodiment of the invention shown in fig. 2, the cutting apparatus 3 for cutting the cigarettes 6 is arranged over a linear conveyor belt 12 provided with grooves 5.

[0027] Fig. 3 is a perspective enlarged view of the apparatus for cutting the cigarettes. The revolving disc knife 7 for cutting the cigarettes 6 is mounted on a shaft 8, wherein the rotation axis m of the knife 7 lies in a plane B parallel to the plane A which is a plane in which the axes k of the cigarettes 6 move along the grooves 5. Plane C, perpendicular to the axis m , in which the disc knife 7 lies, is perpendicular to the plane A, wherein the plane C does not pass through the axis k of the cigarette 6 and is spaced from it. The distance e (Fig. 5), over which the plane C is offset, is such that the knife 7 reaches the cigarette 6 in the vicinity of the side wall of the groove 5. A disc knife 7 may be formed as a multi-tooth knife or may have one cutting edge. Parallel to the plane C of the knife 7, loosely mounted rotating pressing ring 10 is located. The axis of rotation of the pressing ring 10 is movable but the axis is always parallel to the axis m of the knife 7. In order to determine a movement of a loosely mounted pressing ring 10, a movement limiter of the ring 10 is provided, the movement limiter is in the form of a limiting rod 18, which position might be adjustable in direction 18B (fig. 7) parallel to the direction of transport of the cigarettes 6. The limiting rod 18 may be formed as rotating or non-rotating. The rolling movement 10D of the ring 10 related to the belt 12 forced by the movement of the belt 12 in the direction T can cause a rotational movement 18A of a limiting rod 18 designed as a rotating element.

[0028] Fig. 4 is a partially sectional view of an embodiment of the apparatus, not according to the invention. A belt 12 used on the feeder 2 is made of elastic material and is shown in cross-section E-E indicated in fig. 7, whereas the disc knife 7 is shown in a view in a direction parallel to the plane of the disc knife 7. The cigarette 6 pressed into the groove 5 is also schematically shown. The groove 5 of the belt 12 is provided with two walls 13 and 14 orientated at an angle α of 20° to 60°, wherein the connection of the walls 13 and 14 provided at the bottom of the groove 5 may be rounded. In this embodiment a pressing ring 10 consists of a thicker cylindrical part 10A, a truncated cone shaped part 10B and a thinner cylindrical part 10C. The ring 10 may consist only of a

cylindrical part 10A and a cone shaped part 10B having the rounded edge at the larger base. The larger base of part 10B is facing the knife 7. The pressing ring 10 may be in contact with the knife 7 or a gap may be provided between the knife 7 and the pressing ring 10.

[0029] Fig. 5 shows a view similar to that of Fig. 4. In this embodiment of the apparatus for cutting the cigarettes according to the invention, the belt 22 is provided with many grooves 25, wherein the groove 25 has one wall 23 arranged vertically, parallel to the plane of the knife 7 and the second wall 24 arranged at an angle α to the wall 23. The connection between the walls 23 and 24 is formed as the bottom 26. In the embodiment shown in Fig. 5 the bottom 26 is perpendicular to the wall 23, that is parallel to the inner surface 27 of the belt 22. The wall 24 is arranged at an angle of 30° to 70° related to the surface 27. Providing the belt 22 with the groove 25 provided with a vertical wall 23 enables positioning of the disc knife 7 very close to the wall 23, which can be used for cutting a "slim" cigarette comprising capsules with an aromatic substance in the mouthpiece of the cigarette. In this embodiment, the pressing ring 20 is made in the form of two cylindrical parts 20A and 20B, the part 20A being a pressing portion, while the part 20B could be used for rolling the pressing ring 20 along the belt 22.

[0030] Fig. 6 shows yet another embodiment of the apparatus, not according to the invention in a partial section view. The belt 32 is provided with many grooves 35, wherein the groove 35 has one wall 33 orientated vertically, parallel to the plane of the knife 7, and the second wall 34 is arc-shaped in cross-section, i.e. viewing on a straight arranged section of the belt, the wall 34 will be a sector of a shaft. Similarly as in the previous embodiment, the connection between the walls 33 and 34 may be formed as a flat or rounded bottom 36, in the embodiment shown in fig. 6, the bottom 36 is flat and perpendicular to the wall 33 and parallel to the surface 37. The pressing ring 30 is provided with a conical peripheral surface 30C for pressing the cigarettes, the smaller base 30B of the cone is facing the knife disc 7.

[0031] The walls of the groove may have any other shape ensuring the locking of the cigarette in the groove by any kind of the pressing member, which may also be made as a sliding member.

[0032] In all embodiments the capsules 11 contained within the mouthpiece of the cigarette 6 were shown. As it can be seen, by offsetting the plane of the knife 7 so that the plane does not pass through the longitudinal axis k of the cigarette 6, the knife 7 does not crush or cut the capsule 11, which would result in a discharge of an aromatic substance from the capsule 11 and pollution of recovered tobacco.

[0033] Figs. 7 and 8 are a side views of an apparatus according to the invention. However, a disc knife 7 and a pressing ring 10 are shown in a view in a direction perpendicular to the plane of the disc knife 7, wherein the disc knife 7 and the pressing ring 10 are located on a straight section of the feeder 2. The disc knife 7 rotates

in the direction indicated 7A, and a rotational movement is forced by the rotation of the shaft 8 in the direction 8A. The pressing ring 10 is loosely mounted and when the ring 10 does not press the cigarette into the groove, it is supported on the edges of the walls 13 and 14 and rolls in the direction indicated 10D with the movement of the belt 12 in the direction T of the feeder 2. In the examples shown in figs. 4 and 5, the movement is conveyed respectively by the surfaces 10A and 20B.

[0034] In the embodiment shown in figs. 7 and 8 the pressing ring 10 has an outer diameter greater than an outer diameter of the disc knife 7, but in each embodiment an inner diameter of the pressing ring 10 is greater than a diameter of the shaft 8. A rotating element 18 for determining the movement of the pressing ring 10 is located in front of the disc knife 7 (viewed in the direction T of cigarettes conveying); the rotating element 18 is used to change the position of the pressing ring 10 against the disc knife 7. The limiting element 18 can be driven or can receive the drive from the rolling pressing ring 10 and rotate in the direction 18A.

[0035] The rotating limiting element 18 is provided with typical position adjustment means for adjustment in the direction 18B (not shown). The operation of the pressing ring 10 is also affected by the angle of inclination of the feeder 2. Tests revealed that the arrangement of the feeder 2 and the cutting apparatus 3 at an angle γ to the horizontal direction in the range of 20° to 50° is particularly advantageous. Apart from the adjustment of the position of the limiting ring 18 in the direction 18B parallel to the direction of the movement of the belt 12 and the cigarettes 6 (fig. 7), it is possible to use an additional limiting element 19 for controlling the force pressing the ring 10 against the cigarettes.

[0036] During the operation of the cutting apparatus, the cigarette 6 is moved in the groove 5. At some point, immediately after getting in contact with the pressing ring 10, the tip of the cigarette 6 is pressed against the walls 13 and 14 of the groove 5. For example, as shown in fig. 4, the cigarette 6 is pressed against a truncated cone shaped part of the periphery of the ring 10B and a cylindrical part 10C. This results first in locking the tip of the cigarette 6 relative to the groove 5. Then, during the further movement, the cigarette 6 is gradually locked over its entire length. The operation of the pressing ring 10 is such that when the conveyor 12 moves, it causes the gradual distortion of the cigarette and pressing it between the walls 13 and 14. The cigarette 6 is moved in the direction T and gradually approaches the disc knife 7. Since the pressing ring 10 is arranged in front of the disc knife 7, the cigarette will get in contact with the disc knife 7 (fig. 7) starting from the part which has already been locked between the walls 13 and 14 of the groove 5. As the cigarette 6 is being moved in the groove 5, further pressing and locking in the groove 5 takes place and then cutting of the cigarette 6 is performed. In other words the cigarette 6 after getting in contact with the pressing ring 10 to getting in contact with the disc knife 7 travels a

certain distance d, and during travelling this distance d the cigarette 6 is locked relative to the walls of the groove 5 over the increasing length. When the cigarette 6 gets in contact with the disc knife 7, the cigarette 6 is locked at a sufficiently long length to be stable hold by the walls of the groove 5 when cutting the wrapper.

[0037] Due to the above-mentioned possibility of adjusting the position of the limiting element 18, the length of the distance d, after travelling of which cutting of the cigarette 6 starts, can be changed (wherein the distance d is measured from the point at which the cigarette 6 locking starts). The distance d travelled by the cigarette 6 from the point of contact of the cigarette 6 with the pressing ring to the point of contact of the cigarette 6 with the disc knife should be within the range from 0.2 to 5 times of the cigarette diameter, preferably within the range from 0.25 to 1.5 times of the cigarette diameter.

Claims

1. An apparatus for cutting cigarettes, the cigarettes (6) comprising an axis (k), wherein the apparatus for cutting cigarettes comprises

a feeder (2) adapted to transport the cigarettes (6), the feeder (2) comprising

at least one guiding groove (5, 25) arranged along the feeder (2), the guiding groove (5, 25) being provided with a first wall (23), a second wall (24) and a bottom (26) arranged between the first wall (23) and the second wall (24) of the guiding groove (5, 25),

a rotating shaft (8) arranged above the feeder (2),

at least one revolving disc knife (7) for cutting the cigarettes (6) along the axis (k) of said cigarettes (6), the revolving disc knife (7) being disposed on the rotating shaft (8), wherein the revolving disc knife (7) is positioned in a plane (C) spaced from the axis (k) of the cigarette (6) to be cut open,

a pressing ring (10, 20) for pressing the cigarettes (6) against the first wall (23) and the second wall (24) of the guiding groove (5, 25), the pressing ring (10, 20) being loosely movable around the rotating shaft (8), the pressing ring (10, 20) being arranged next to the revolving disc knife (7),

wherein arrangement of the first wall (23) and the second wall (24) of the guiding groove (5, 25) relative to each other enables, before cutting each cigarette (6), to block the cigarette (6) by means of the pressing ring (10, 20) by pushing the cigarette (6) between the first wall (23) and the second wall (24) of the guiding groove (5, 25) with simultaneous deformation of said cigarette (6),

characterised in that

the first wall (23) of the guiding groove (5, 25) is perpendicular to the bottom (26) of the guiding groove (5, 25) and the second wall (24) of the guiding groove (5, 25) is oriented at an obtuse angle (β) with respect to the bottom (26) of the guiding groove (5, 25), the revolving disc knife (7) is positioned at the first wall (23), and the pressing ring (10, 20) and the revolving disc knife (7) are located above a straight section of the feeder (2).

2. An apparatus according to claim 1, **characterized in that** the first wall (23) and the second wall (24) of the guiding groove (5, 25) are arranged relative to each other at an angle (α) of 20° to 60°.
3. An apparatus according to claim 1 or 2, **characterized in that** said second wall (24) is arranged at an angle (β) of about 110° to about 150° with respect to the bottom (26) of the guiding groove (5, 25).
4. An apparatus according to claim 1, **characterized in that** the position of the pressing ring (10, 20) related to the rotating shaft (8) of the revolving disc knife (7) is determined by means of a limiting element (18) orientated parallel to the axis (m) of the rotating shaft (8) of the revolving disc knife (7), wherein the limiting element (18) is arranged in front of the rotating shaft (8) of the revolving disc knife (7) viewed in the direction (T) of the movement of the feeder (2).
5. An apparatus according to claim 4, **characterized in that** the position of the limiting element (18) is adjustable in a direction parallel to the direction (T) of the movement of the feeder (2).
6. An apparatus according to claim 4 or 5, **characterized in that** the position of the limiting element (18) is such that the distance (d) travelled by the cigarette (6) starting from the point of the cigarette (6) getting in contact with the pressing ring (10, 20) to the point of the cigarette getting in contact with the revolving disc knife (7) is in the range from 0.2 to 5 times the cigarette diameter, preferably a diameter from 0.25 to 1.5 times of the cigarette diameter.
7. An apparatus according to any one of the preceding claims, **characterized in that** the pressing ring (10, 20) has an outside diameter larger than the diameter of the revolving disc knife (7).
8. An apparatus according to any one of the preceding claims, **characterized in that** the pressing ring (10) has a peripheral truncated cone shaped surface portion, the larger base of which faces the revolving disc knife (7).

9. An apparatus according to any one of the claims 1 to 7, **characterized in that** the pressing ring has a peripheral truncated cone shaped surface portion, the smaller base of which faces the revolving disc knife (7).

10. A method of cutting cigarettes, the cigarettes (6) comprising an axis (k), the method comprising transporting the cigarettes (6) by a feeder (2) in at least one guiding groove (5, 25) arranged along the feeder (2), the guiding groove (5, 25) being provided with a first wall (23), a second wall (24) and a bottom (26) arranged between the first wall (23) and the second wall (24) of the guiding groove (5, 25),

cutting the cigarettes (6) along the axis (k) of said cigarettes (6) by means of a revolving disc knife (7) mounted on a rotating shaft (8) arranged above the guiding groove (5, 25), wherein the revolving disc knife (7) is positioned in a plane (C) spaced from the axis (k) of the cigarette (6) to be cut open,

wherein the cigarette (6) to be cut open is pressed against the first wall (23) and the second wall (24) of the guiding groove (5, 25) by means of a pressing ring (10, 20), the pressing ring (10, 20, 30) being loosely movable around the rotating shaft (8), the pressing ring (10, 20) being arranged next to the revolving disc knife (7),

wherein, before cutting, the cigarette (6) to be cut open is blocked by means of the pressing ring (10, 20) by pushing the cigarette (6) between the first wall (23) and the second wall (24) of the guiding groove (5, 25) with simultaneous deformation of said cigarette (6),

wherein blocking and cutting the cigarette (6) is carried out over a straight section of the feeder (2),

characterized in that

the first wall (23) of the guiding groove (5, 25) is perpendicular to the bottom (26) of the guiding groove (5, 25) and the second wall (24) of the guiding groove (5, 25) is oriented at an obtuse angle (β) with respect to the bottom (26) of the guiding groove (5, 25), the revolving disc knife (7) is positioned at the first wall (23), and the pressing ring (10, 20) and the revolving disc knife (7) are located above a straight section of the feeder (2).

11. A method according to claim 10, **characterized in that** a position of the pressing ring (10, 20) related to the rotating shaft (8) of the revolving disc knife (7) is determined by a limiting element (18) arranged parallel to the axis (m) of the rotating shaft (8) of the revolving disc knife (7) and arranged in front of the rotating shaft (8) viewed in the direction (T) of the

movement of the feeder (2).

12. A method according to claim 10, **characterized in that** a position of the limiting element (18) is adjustable in a direction parallel to the direction (T) of the movement of the feeder (2).

Patentansprüche

1. Vorrichtung zum Zigarettenschneiden, wobei die Zigarettten (6) eine Achse (k) aufweisen, wobei die Vorrichtung zum Zigarettenschneiden folgendes umfasst

eine Zuführung (2), die zum Transportieren der Zigarettten (6) geeignet ist, wobei die Zuführung (2) Folgendes umfasst
 mindestens eine Führungsrille (5, 25), die entlang der Zuführung (2) angeordnet ist, wobei die Führungsrille (5, 25) mit einer ersten Wand (23), einer zweiten Wand (24) und einem Boden (26) versehen ist, der zwischen der ersten Wand (23) und der zweiten Wand (24) der Führungsrille (5, 25) angeordnet ist,
 eine rotierende Welle (8), die oberhalb der Zuführung (2) angeordnet ist,
 mindestens ein rotierendes Scheibenmesser (7) zum Schneiden der Zigarettten (6) entlang der Achse (k) der Zigarettten (6), wobei das rotierende Scheibenmesser (7) auf der rotierenden Welle (8) angeordnet ist, wobei das rotierende Scheibenmesser (7) in einer von der Achse (k) der aufzuschneidenden Zigarette (6) beabstandeten Ebene (C) positioniert ist,
 einen Pressring (10, 20) zum Pressen der Zigarettten (6) gegen die erste Wand (23) und die zweite Wand (24) der Führungsrille (5, 25), wobei der Pressring (10, 20) lose um die rotierende Welle (8) herum bewegbar ist und der Pressring (10, 20) neben dem rotierenden Scheibenmesser (7) angeordnet ist,
 wobei die Anordnung der ersten Wand (23) und der zweiten Wand (24) der Führungsrille (5, 25) relativ zueinander es ermöglicht, vor dem Schneiden jeder Zigarette (6) die Zigarette (6) mit Hilfe des Pressrings (10, 20) zu blockieren, indem die Zigarette (6) zwischen die erste Wand (23) und die zweite Wand (24) der Führungsrille (5, 25) bei gleichzeitiger Verformung der Zigarette (6) geschoben wird,
dadurch gekennzeichnet, dass
 die erste Wand (23) der Führungsrille (5, 25) senkrecht zum Boden (26) der Führungsrille (5, 25) steht und die zweite Wand (24) der Führungsrille (5, 25) in einem stumpfen Winkel (β) zum Boden (26) der Führungsrille (5, 25) ausgerichtet ist, das rotierende Scheibenmesser (7)

ist an der ersten Wand (23) positioniert, und der Pressring (10, 20) und das rotierende Scheibenmesser (7) befinden sich oberhalb eines geraden Abschnitts der Zuführung (2).

2. Eine Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Wand (23) und die zweite Wand (24) der Führungsrille (5, 25) in einem Winkel (α) von 20° bis 60° zueinander angeordnet sind.
3. Eine Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die zweite Wand (24) in einem Winkel (β) von etwa 110° bis etwa 150° in Bezug auf den Boden (26) der Führungsrille (5, 25) angeordnet ist.
4. Eine Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Position des Pressrings (10, 20) in Bezug auf die rotierende Welle (8) des rotierenden Scheibenmessers (7) mittels eines Begrenzungselements (18) bestimmt wird, das parallel zur Achse (m) der rotierenden Welle (8) des rotierenden Scheibenmessers (7) ausgerichtet ist, wobei das Begrenzungselement (18) in Bewegungsrichtung (T) der Zuführung (2) gesehen vor der rotierenden Welle (8) des rotierenden Scheibenmessers (7) angeordnet ist.
5. Eine Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Position des Begrenzungselements (18) in einer Richtung parallel zur Bewegungsrichtung (T) der Zuführung (2) einstellbar ist.
6. Eine Vorrichtung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Position des Begrenzungselements (18) so beschaffen ist, dass die von der Zigarette (6) zurückgelegte Strecke (d) ausgehend von dem Punkt, an dem die Zigarette (6) mit dem Pressring (10, 20) in Berührung kommt, bis zu dem Punkt, an dem die Zigarette mit dem rotierenden Scheibenmesser (7) in Berührung kommt, im Bereich des 0,2- bis 5-fachen des Zigarettendurchmessers liegt, vorzugsweise im Bereich des 0,25- bis 1,5-fachen des Zigarettendurchmessers.
7. Eine Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Pressring (10, 20) einen Außendurchmesser hat, der größer ist als der Durchmesser des rotierenden Scheibenmessers (7).
8. Eine Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Pressring (10) einen peripheren kegelstumpfförmigen Oberflächenteil aufweist, dessen größere Basis dem rotierenden Scheibenmesser (7) zugewandt ist.

9. Eine Vorrichtung nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** der Pressring einen peripheren kegelstumpfförmigen Oberflächenteil aufweist, dessen kleinere Basis dem rotierenden Scheibenmesser (7) zugewandt ist.

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10. Ein Verfahren zum Schneiden von Zigaretten, wobei die Zigaretten (6) eine Achse (k) aufweisen, wobei das Verfahren den Transport der Zigaretten (6) durch eine Zuführung (2) in mindestens eine Führungsrille (5, 25), die entlang der Zuführung (2) angeordnet ist, umfasst, wobei die Führungsrille (5, 25) mit einer ersten Wand (23), einer zweiten Wand (24) und einem Boden (26) versehen ist, der zwischen der ersten Wand (23) und der zweiten Wand (24) der Führungsrille (5, 25) angeordnet ist,

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Schneiden der Zigaretten (6) entlang der Achse (k) der Zigaretten (6) mittels eines rotierenden Scheibenmessers (7), das auf einer oberhalb der Führungsrille (5, 25) angeordneten rotierenden Welle (8) angebracht ist, wobei das rotierende Scheibenmesser (7) in einer von der Achse (k) der aufzuschneidenden Zigarette (6) beabstandeten Ebene (C) angeordnet ist, wobei die aufzuschneidende Zigarette (6) mittels eines Pressrings (10, 20) gegen die erste Wand (23) und die zweite Wand (24) der Führungsrille (5, 25) gepresst wird, wobei der Pressring (10, 20, 30) lose um die rotierende Welle (8) bewegbar ist, wobei der Pressring (10, 20) neben dem rotierenden Scheibenmesser (7) angeordnet ist,

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dadurch gekennzeichnet, dass die erste Wand (23) der Führungsrille (5, 25) senkrecht zum Boden (26) der Führungsrille (5, 25) steht und die zweite Wand (24) der Führungsrille (5, 25) in einem stumpfen Winkel (β) zum Boden (26) der Führungsrille (5, 25) ausgerichtet ist, das rotierende Scheibenmesser (7) ist an der ersten Wand (23) positioniert, und der Pressring (10, 20) und der rotierende Scheibenmesser (7) befinden sich oberhalb eines geraden Abschnitts der Zuführung (2).

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11. Ein Verfahren nach Anspruch 10, **dadurch gekennzeichnet, dass** eine Position des Pressrings (10, 20) in Bezug auf die rotierende Welle (8) des rotierenden Scheibenmessers (7) durch ein Begren-

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zungselement (18) bestimmt wird, das parallel zur Achse (m) der rotierenden Welle (8) des rotierenden Scheibenmessers (7) und in Bewegungsrichtung (T) der Zuführung (2) gesehen vor der rotierenden Welle (8) angeordnet ist.

12. Ein Verfahren nach Anspruch 10, **dadurch gekennzeichnet, dass** eine Position des Begrenzungselements (18) in einer Richtung parallel zur Bewegungsrichtung (T) der Zuführung (2) einstellbar ist.

Revendications

1. Appareil pour couper des cigarettes, les cigarettes (6) comprenant un axe (k), dans lequel l'appareil pour couper des cigarettes comprenant

un dispositif d'alimentation (2) adapté pour transporter les cigarettes (6), le dispositif d'alimentation (2) comprenant

au moins une rainure de guidage (5, 25) disposée le long du dispositif d'alimentation (2), la rainure de guidage (5, 25) étant pourvue d'une première paroi (23), d'une seconde paroi (24) et d'un fond (26) disposé entre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25),

un arbre rotatif (8) disposé au-dessus du dispositif d'alimentation (2),

au moins un couteau à disque tournant (7) pour couper les cigarettes (6) le long de l'axe (k) des dites cigarettes (6), le couteau à disque tournant (7) étant disposé sur l'arbre rotatif (8), dans lequel le couteau à disque tournant (7) étant positionné dans un plan (C) espacé de l'axe (k) de la cigarette (6) à couper,

un anneau de pression (10, 20) pour presser les cigarettes (6) contre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25), l'anneau de pression (10, 20) pouvant se déplacer de manière lâche autour de l'arbre rotatif (8), l'anneau de pression (10, 20) étant disposé à côté du couteau à disque tournant (7), dans lequel la disposition de la première paroi (23) et de la seconde paroi (24) de la rainure de guidage (5, 25) l'une par rapport à l'autre permettant, avant de couper chaque cigarette (6), de bloquer la cigarette (6) au moyen de l'anneau de pression (10, 20) en poussant la cigarette (6) entre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25) avec une déformation simultanée de ladite cigarette (6),

caractérisé en ce que

la première paroi (23) de la rainure de guidage (5, 25) est perpendiculaire au fond (26) de la rainure de guidage (5, 25) et la seconde paroi (24) de la rainure de guidage (5, 25) est orientée

- selon un angle obtus (β) par rapport au fond (26) de la rainure de guidage (5, 25), le couteau à disque tournant (7) étant positionné au niveau de la première paroi (23), et l'anneau de pression (10, 20) et le couteau à disque tournant (7) étant situés au-dessus d'une section droite du dispositif d'alimentation (2).
2. Appareil selon la revendication 1, **caractérisé en ce que** la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25) sont disposées l'une par rapport à l'autre selon un angle (α) de 20° à 60°.
 3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** ladite seconde paroi (24) est disposée selon un angle (β) d'environ 110° à environ 150° par rapport au fond (26) de la rainure de guidage (5, 25).
 4. Appareil selon la revendication 1, **caractérisé en ce que** la position de l'anneau de pression (10, 20) par rapport à l'arbre rotatif (8) du couteau à disque tournant (7) est déterminée au moyen d'un élément de limitation (18) orienté parallèlement à l'axe (m) de l'arbre rotatif (8) du couteau à disque tournant (7), dans lequel l'élément de limitation (18) étant disposé devant l'arbre rotatif (8) du couteau à disque tournant (7) vu dans la direction (T) du mouvement du dispositif d'alimentation (2).
 5. Appareil selon la revendication 4, **caractérisé en ce que** la position de l'élément de limitation (18) est réglable dans une direction parallèle à la direction (T) du mouvement du dispositif d'alimentation (2).
 6. Appareil selon la revendication 4 ou 5, **caractérisé en ce que** la position de l'élément de limitation (18) est telle que la distance (d) parcourue par la cigarette (6) à partir du point où la cigarette (6) entre en contact avec l'anneau de pression (10, 20) jusqu'au point où la cigarette entre en contact avec le couteau à disque tournant (7) est comprise entre 0,2 et 5 fois le diamètre de la cigarette, de préférence un diamètre de 0,25 à 1,5 fois le diamètre de la cigarette.
 7. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'anneau de pression (10, 20) a un diamètre extérieur plus grand que le diamètre du couteau à disque tournant (7).
 8. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'anneau de pression (10) présente une partie de surface périphérique en forme de cône tronqué, dont la base la plus large est orientée vers le couteau à disque tournant (7).
 9. Appareil selon l'une des revendications 1 à 7, **caractérisé en ce que** l'anneau de pression présente une partie de surface périphérique en forme de cône tronqué, dont la base la plus petite est orientée vers le couteau à disque tournant (7).
 10. Procédé pour couper des cigarettes, les cigarettes (6) comprenant un axe (k), le procédé comprenant le transport des cigarettes (6) par un dispositif d'alimentation (2) dans au moins une rainure de guidage (5, 25) disposée le long du dispositif d'alimentation (2), la rainure de guidage (5, 25) étant pourvue d'une première paroi (23), d'une seconde paroi (24) et d'un fond (26) disposé entre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25), la coupe des cigarettes (6) le long de l'axe (k) desdites cigarettes (6) au moyen d'un couteau à disque tournant (7) monté sur un arbre rotatif (8) disposé au-dessus de la rainure de guidage (5, 25), le couteau à disque tournant (7) étant positionné dans un plan (C) éloigné de l'axe (k) de la cigarette (6) à couper, dans lequel la cigarette (6) à couper est pressée contre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25) au moyen d'un anneau de pression (10, 20), l'anneau de pression (10, 20, 30) étant mobile de manière lâche autour de l'arbre rotatif (8), l'anneau de pression (10, 20) étant disposé à côté du couteau à disque tournant (7), dans lequel, avant la coupe, la cigarette (6) à couper étant bloquée au moyen de l'anneau de pression (10, 20) en poussant la cigarette (6) entre la première paroi (23) et la seconde paroi (24) de la rainure de guidage (5, 25) avec une déformation simultanée de ladite cigarette (6), dans lequel le blocage et la coupe de la cigarette (6) étant réalisés sur une section droite du dispositif d'alimentation (2), **caractérisé en ce que** la première paroi (23) de la rainure de guidage (5, 25) est perpendiculaire au fond (26) de la rainure de guidage (5, 25) et la seconde paroi (24) de la rainure de guidage (5, 25) est orientée selon un angle obtus (β) par rapport au fond (26) de la rainure de guidage (5, 25), le couteau à disque tournant (7) étant positionné au niveau de la première paroi (23), et l'anneau de pression (10, 20) et le couteau à disque tournant (7) sont situés au-dessus d'une section droite du dispositif d'alimentation (2).
 11. Procédé selon la revendication 10, **caractérisé en ce qu'une** position de l'anneau de pression (10, 20) par rapport à l'arbre rotatif (8) du couteau à disque tournant (7) est déterminée par un élément de limitation (18) disposé parallèlement à l'axe (m) de l'arbre rotatif (8) du couteau à disque tournant (7) et

disposé devant l'arbre rotatif (8) vu dans la direction (T) du mouvement du dispositif d'alimentation (2).

12. Procédé selon la revendication 10, **caractérisé en ce qu'**une position de l'élément de limitation (18) est réglable dans une direction parallèle à la direction (T) du mouvement du dispositif d'alimentation (2).

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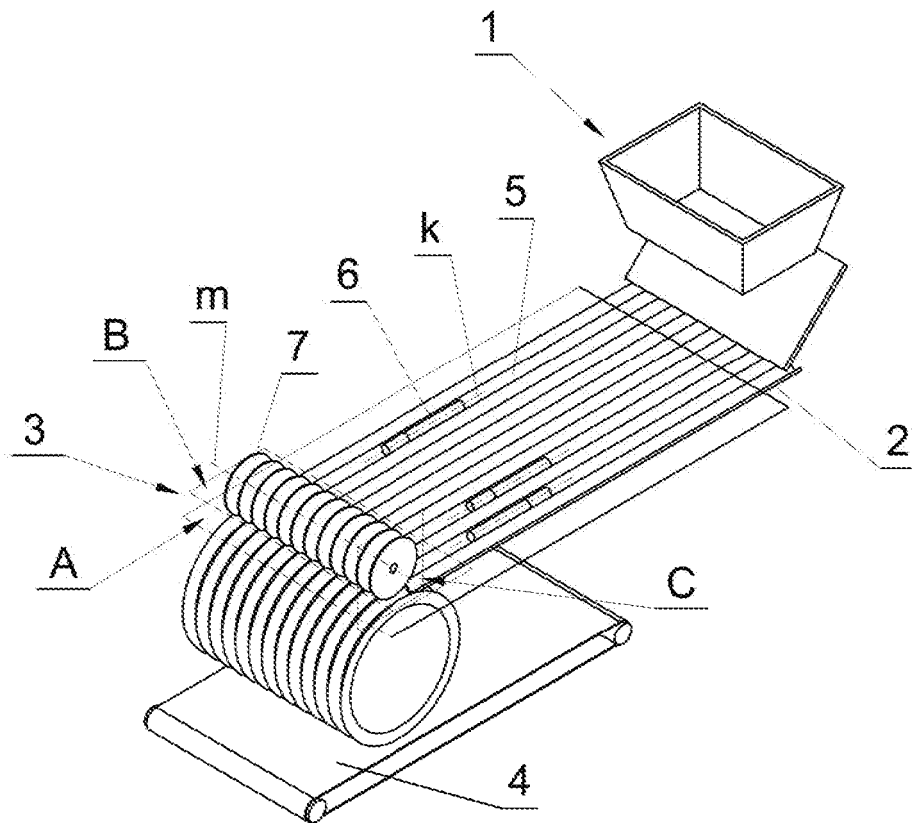


Fig. 1

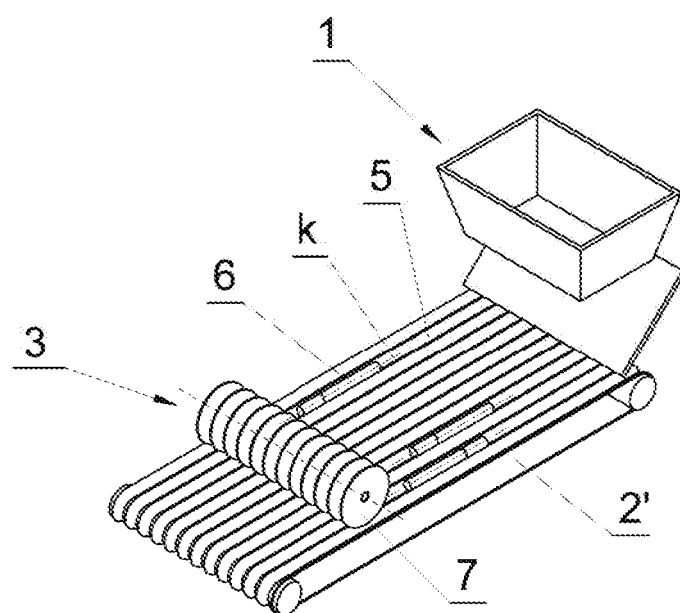


Fig. 2

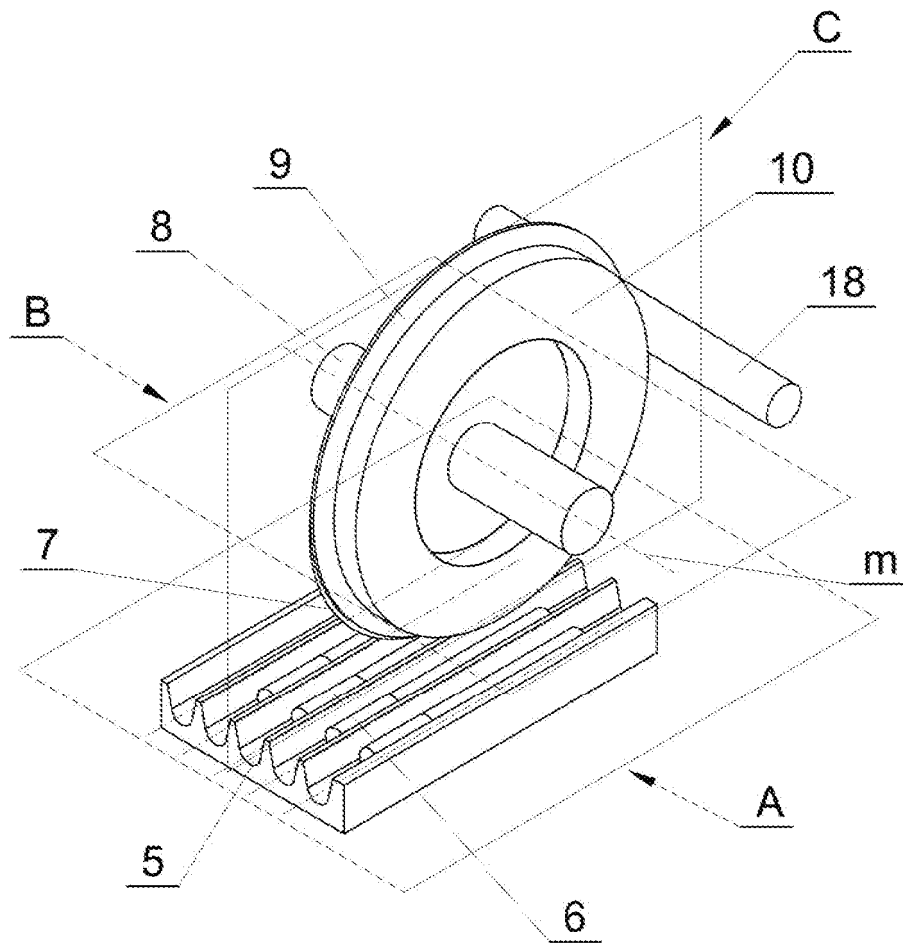


Fig. 3

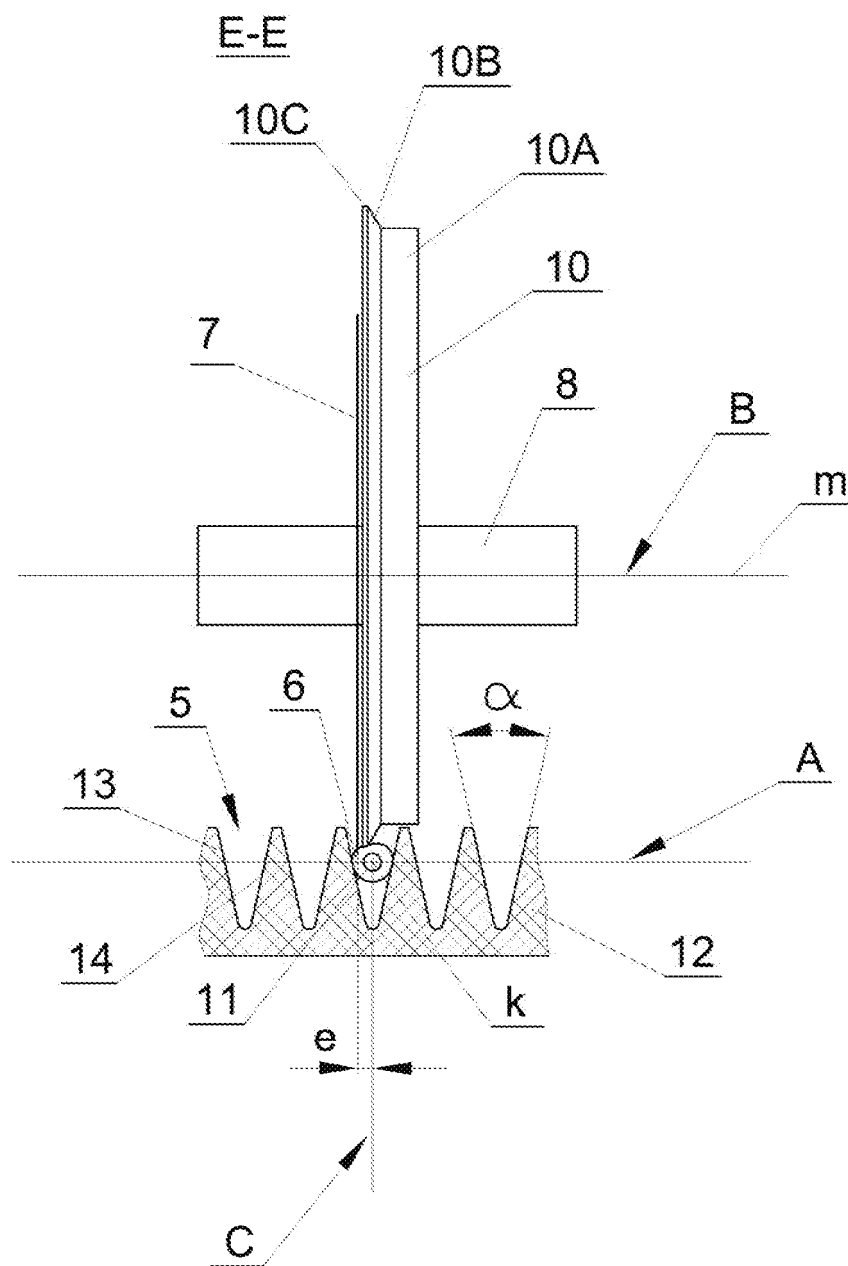


Fig. 4

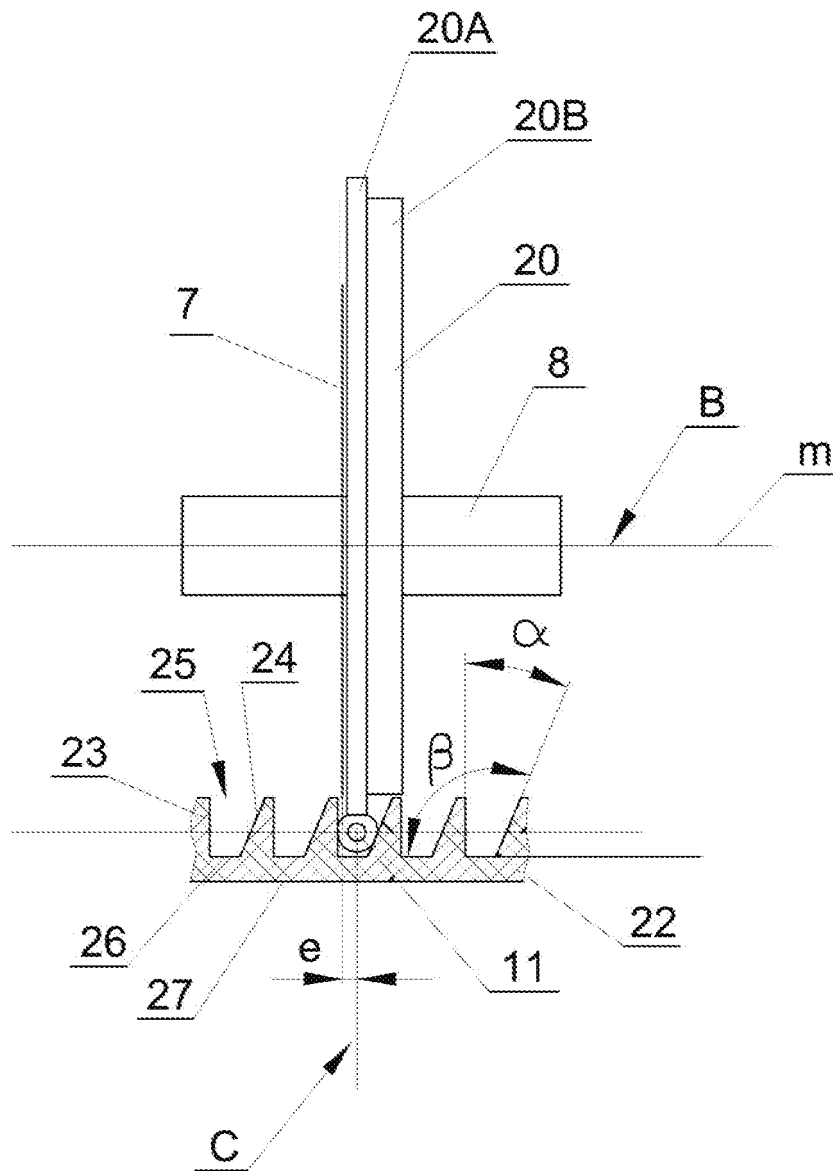


Fig. 5

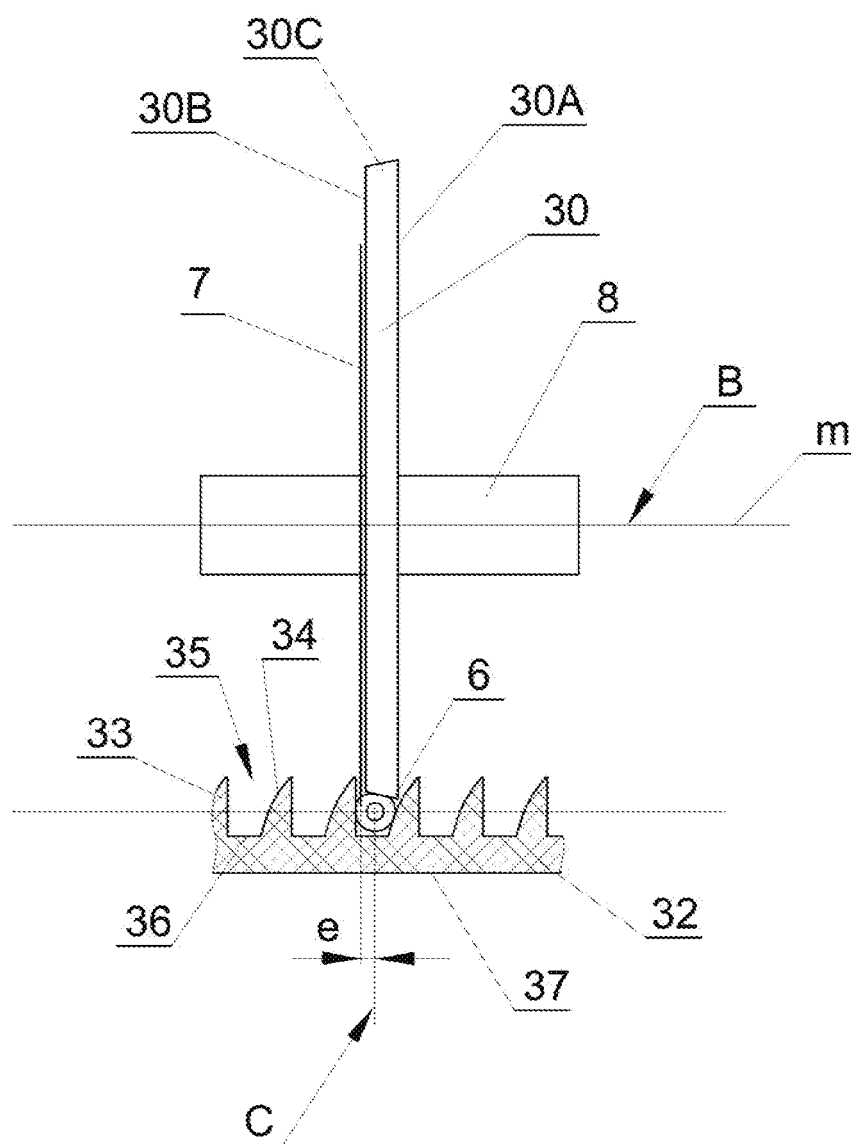


Fig. 6

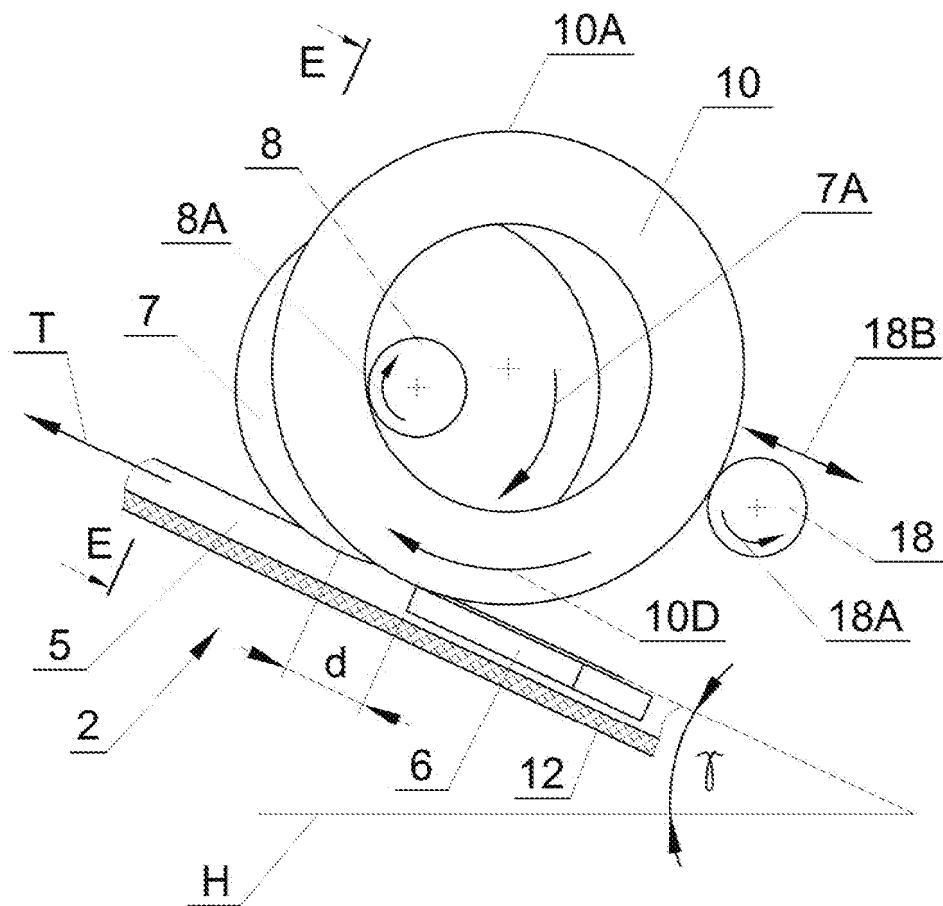


Fig. 7

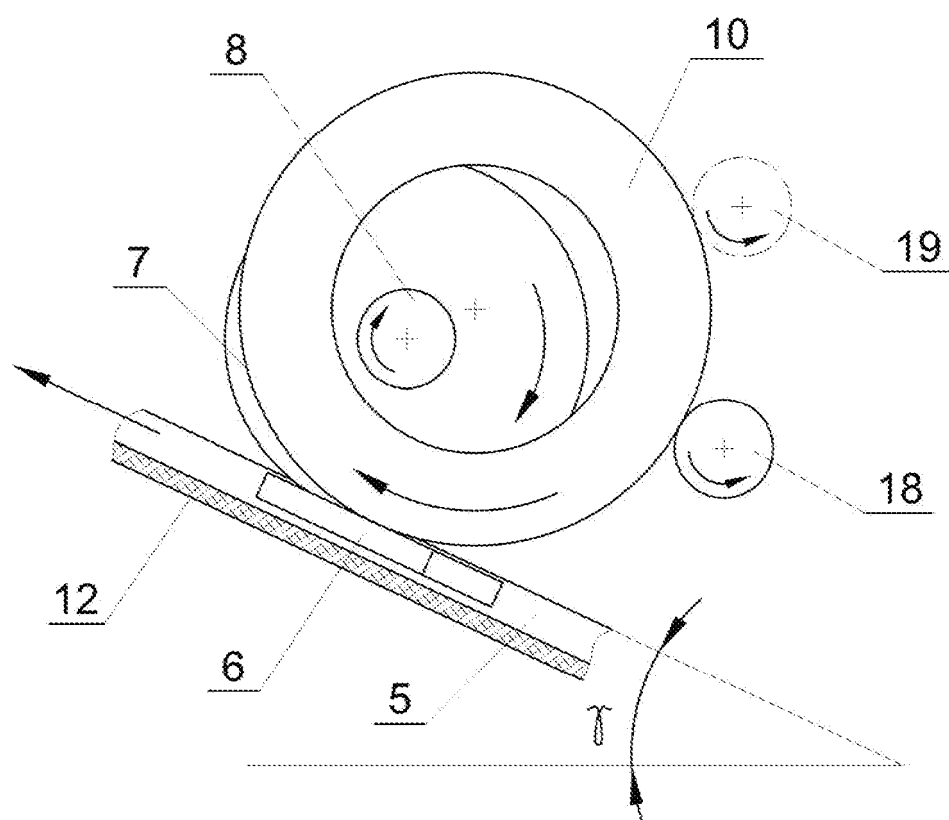


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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