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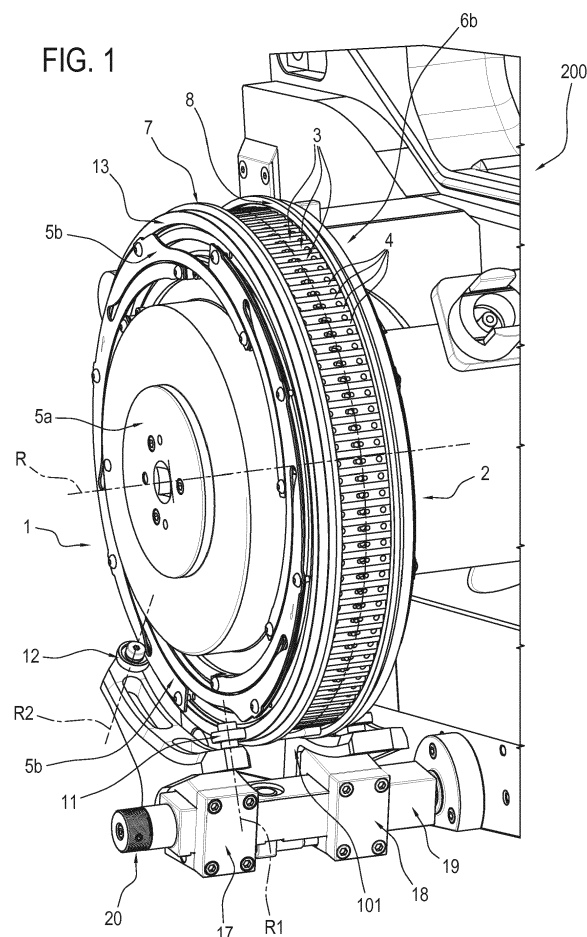
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ABUTMENT UNIT FOR PIECES OF SMOKERS' ARTICLES

(57)

An abutment unit (1) for pieces (100a, 100b, 100c) of smokers' articles, comprises: an abutment drum (2) rotatable about an axis of rotation (R) and comprising a plurality of suction flutes (3) arranged on its outside surface, extending parallel to the axis of rotation (R) and delimited by corresponding flanks (4), a pusher system (5, 6, 7, 8, 11, 12, 13, 17, 18, 19, 20) for pushing at least a first and a second piece of smokers' article, located in a corresponding flute (3) and aligned along a respective main axis, towards each other along the flute (3); the pusher system (5, 6, 7, 8, 11, 12, 13, 17, 18, 19, 20) comprising engagement means (7, 8) by which the first and second pieces of smokers' articles are engaged and which are at least partly movable along an abutment direction parallel to the axis of rotation (R) between an away position spaced from the abutment drum (2) and a near position close to the abutment drum (2) and actuating means (11, 12, 17, 18, 19, 20) for actuating the engagement means (7, 8) for engaging the pieces of smokers' articles; the engagement means (7, 8), especially when at the near position, project at least partly towards the drum (2) beyond an axial dimension of the flanks (4) of the flutes (3). [Figure 1]



Description

[0001] This invention relates to an abutment unit for pieces of smokers' articles, usable preferably in machines used for making composite filters and commonly known as *combiners*.

[0002] Combiners of known type comprise one or more abutment units for pieces of smokers' articles, in particular pieces of filter, which this specification expressly refers to but without losing in generality, and which essentially comprise a rotary abutment drum equipped on its outer surface with a plurality of suction flutes extending along an axis parallel to the axis of rotation of the drum.

[0003] Separate pieces - for example three - of filter material or the like are placed in the flutes with their axis parallel to the axis of the flute in such a way as to form what is known as a filter plug, substantially cylindrical in shape.

[0004] More specifically, in a prior art embodiment, a filter plug consisting of three pieces is made from a first piece which is cut into two parts which are in turn spaced from each other in an axial direction, generally by movement of respective flutes in which they are held. The two parts or pieces thus obtained and spaced from each other are transferred into the flutes of the abutment drum and a third piece is placed between the preceding two.

[0005] The three pieces thus positioned are brought into abutment along an axial direction as the abutment drum rotates and are then joined to each other, for example by means of an outer wrap. The plugs thus obtained are then used in subsequent conventional processing steps. The flutes on the drum may be continuous or discrete, that is, divided into a succession of separate parts, in some cases, separated by empty spaces, each preferably intended to receive a corresponding piece of the plug.

[0006] Usually, the separate pieces are brought into abutment by means of pushing systems which push the free axial ends of the plugs located at the ends of the respective flutes and protruding axially therefrom. These pushing systems comprise, for example, pushing discs positioned at the bases of the drum and suitably shaped in such a way that a respective outer circular crown strikes corresponding ends of the plugs as the drum rotates so as to push the pieces towards each other.

[0007] An example of a solution of this kind is described in document EP1033083, where the pushing discs or rings are, in particular, made at least partly of silicone.

[0008] Another solution is described in document US2821201 A, where the pushing discs are connected to the drum hub by means of springs which allow movement towards and away from the drum.

[0009] A further solution is described in document EP0577061, where the pushing system comprises drums which act on the end pieces with a part of their pushing surface.

[0010] The separate pieces which make up each filter plug may differ in length according to the final filter to be

made.

[0011] Generally speaking, the size of the filter plugs, in particular their axial length, is variable between a maximum value and a minimum value based on the type of filter to be made.

[0012] The length of the filters and hence of the filter plug is usually adjusted by modifying the length of the first piece which is divided in two.

[0013] Varying the length of this piece creates the drawback of having to substitute the abutment drum so that the total axial length of the flutes is always considerably less than that of the plugs so the pushing systems can bring the separate pieces into abutment and reach, as their maximum limit, the axial ends of the flutes.

[0014] Varying the size of the filters being made also creates the drawback of having to substitute the movement system - for example, a cam - which widens the flutes for receiving the two distinct parts into which the first piece is divided, since the distance between these parts must allow the third piece to be placed between them.

[0015] In this context, the main purpose of this invention is to propose an abutment unit for pieces of smokers' articles to overcome the above mentioned drawbacks.

[0016] This invention has for an aim to provide an abutment unit for pieces of smokers' articles which is more versatile than prior art solutions and which allows changeovers to be managed more easily without shutting down the machine in which the unit is installed or considerably reducing the down times.

[0017] The technical purpose and aims specified are achieved by an abutment unit for pieces of smokers' articles according to claim 1.

[0018] Further features of the invention and its advantages are more apparent in the non-limiting description below, with reference to a preferred but non-exclusive embodiment of an abutment unit for pieces of smokers' articles, as illustrated in the accompanying drawings, in which:

- Figure 1 illustrates an abutment unit for pieces of smokers' articles according to this invention in a schematic perspective view;
- Figure 2 illustrates the abutment unit of Figure 1 in a schematic side view, partly in cross section and with some parts cut away for greater clarity;
- Figure 3 illustrates a detail of the abutment unit of Figure 1 in a schematic perspective view;
- Figure 4 is a schematic perspective view of a detail of a second embodiment of an abutment unit for pieces of smokers' articles.

[0019] With reference to the accompanying drawings, the numeral 1 denotes an abutment unit for pieces 100a, 100b, 100c of smokers' articles which, for simplicity, are shown only in Figure 2.

[0020] The pieces 100a, 100b, 100c, each of which has a main axis, are usually cylindrical in shape and,

hereinafter, preferred reference is made to pieces of filter or of filter material.

[0021] The unit 1 is intended for the tobacco industry and, preferably, is intended for a machine which makes composite filters, also known as "*combiner*" and schematically indicated by the reference numeral 200. The machine 200 is of substantially known type and is not described in detail.

[0022] The unit 1 comprises an abutment drum 2 rotatable about an axis of rotation R.

[0023] Hereinafter, the term "axial" is used to denote directions parallel to the axis of rotation R, whilst "radial" is used to denote directions parallel to a radius of the drum 2.

[0024] The drum 2 comprises, on its outside cylindrical surface, a plurality of suction flutes 3 for holding down the pieces of smokers' articles and extending mainly in a direction parallel to the axis of rotation R.

[0025] Each flute 3 has a first end 3a and a second end 3b.

[0026] Each flute 3, preferably defined as a portion of a cylindrical surface whose axis is parallel to the axis of rotation R of the drum, is shaped to match a portion of the outside cylindrical surface of the pieces of smokers' article and is delimited by respective flanks 4.

[0027] Each flank 4 delimits, in a substantially known manner, two consecutive flutes 3 along the outside cylindrical surface of the drum 2.

[0028] Each flank 4 has an outside radial profile. A succession of outside profiles of the flanks 4 defines an outside cylindrical surface having an axis R.

[0029] The unit 1 comprises pusher means (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) operating at the abutment drum 2 to push the pieces 100a, 100b, 100c towards each other from a spaced-apart position to a close-together position.

[0030] In the close-together position, the pieces 100a, 100b, 100c are abutted end to end along a longitudinal direction to form a plug 101, shown in Figure 2.

[0031] In known manner, the pieces 100a, 100b, 100c are movable in the respective flute 3 along an abutment direction parallel to the axis of rotation R and substantially parallel to the main axis of the pieces 100a, 100b, 100c themselves.

[0032] The pusher means comprise engagement means 7, 8, 9, 10 by which the pieces fed into the flutes 3 of the drum 2 are engaged.

[0033] In the example illustrated, three pieces of filter are fed into each flute 3 and the engagement means are used to engage the outer pieces 100a, 100c considering the abutment direction and are positioned at the ends of the 3a, 3b of the flutes 3.

[0034] The engagement means 7, 8, 9, 10 by which the pieces 100a, 100c are engaged are at least partly movable along the abutment direction between an away position spaced from the abutment drum 2, shown at the top of Figure 2, substantially at a station 300 where the pieces are loaded, and a near position close to the abut-

ment drum 2, shown in Figure 2.

[0035] As illustrated, the engagement means 7, 8, 9, 10 project at least partly beyond a radial dimension of the flanks 4.

[0036] In other words, as explained in more detail below, the engagement means 7, 8, 9, 10 are shaped to be able to act on the pieces by projecting beyond the radial dimension of the flanks 4.

[0037] Advantageously, as will become clearer as this description continues, the engagement means project towards the drum 2 beyond an axial dimension of the flanks 4, in particular considering the near position of the engagement means.

[0038] The pusher means comprise actuating means 11, 12, 14, 15, 16, 17, 18, 19, 20 for moving the engagement means between the aforementioned near and away positions.

[0039] More specifically, as will become clearer as this description continues, the actuating means act on the pusher means in such a way that as the drum 2 rotates the engagement means move the pieces axially along the flute in order to bring them into abutment.

[0040] In the embodiments illustrated by way of example, the pusher means comprise a first and a second disc-shaped element 5, 6.

[0041] The disc-shaped elements 5, 6 are coaxial with the drum 2 and integral therewith.

[0042] With reference in particular to Figure 2, it may be noted that the disc-shaped element 6 is located on the side of the drum 2 opposite the disc-shaped element 5.

[0043] The disc-shaped elements 5 and 6 have the same radial extension and each of them comprises a central hub 5a, 6a connecting it to the drum 2 and a respective elastically compliant, external, annular portion 5b, 6b extending from the corresponding hub 5a, 6a.

[0044] More specifically, the portions 5b, 6b are configured to be deformed along the abutment direction parallel to the axis R so as to allow the engagement means to move between the near position and the away position.

[0045] The actuating means operate on the first disc-shaped element 5 - in particular on the annular portion 5b thereof - and on the second disc-shaped element 6 - in particular on the annular portion 6b thereof - in order to move the engagement means between the near position and the away position by elastically deforming the disc-shaped elements 5 and 6.

[0046] The positions near the drum 2 and away from the drum 2 of the engagement means correspond to a position where the portions 5b, 6b are close together and a position where the portions 5b, 6b are spaced apart.

[0047] With reference to the embodiment illustrated in Figures 1, 2 and 3, the engagement means for engaging the pieces 100a, 100b, 100c comprise a first annular tooth 7 and a second annular tooth 8.

[0048] The tooth 7 extends from the external annular portion 5b of the element 5 towards the drum 2.

[0049] The tooth 7 projects preferably beyond a radial

dimension of the flanks 4, especially considering the near position of the engagement means.

[0050] In other words, the tooth 7 is preferably located at a distance from the axis of rotation R of the drum 2 which is greater than the distance of the radial profile of the flanks 4 from the axis R.

[0051] The tooth 8 extends preferably from the external annular portion 6b of the element 6 towards the drum 2.

[0052] The tooth 8 projects preferably beyond a radial dimension of the flanks 4, especially considering the near position of the engagement means.

[0053] In other words, the tooth 8 is preferably located at a distance from the axis of rotation R of the drum 2 which is greater than the distance of the radial profile of the flanks 4 from the axis R.

[0054] With reference to Figure 2 in particular, looking more closely at the engagement means, in particular at the external annular portions 5b, 6b at the position near the drum 2, that is, close together, it may be noted that the tooth 7 projects axially towards the drum 2 above the flanks 4.

[0055] In other words, the tooth 7 projects beyond an axial dimension of the flanks 4 towards the drum 2, considering in particular the near position of the engagement means, that is, of the annular portions 5b, 6b.

[0056] Similarly, the tooth 8 projects axially towards the drum 2 above the flanks 4.

[0057] In other words, the tooth 8 projects beyond an axial dimension of the flanks 4 towards the drum 2, considering in particular the near position of the engagement means, that is, of the annular portions 5b, 6b.

[0058] The teeth 7, 8 each have a respective face 7a, 8a for engaging the pieces being processed.

[0059] The faces 7a, 8a extend radially and are shaped to engage part of one end of the corresponding piece.

[0060] The teeth 7, 8, in particular the faces 7a, 8a thereof, face each other along the abutment direction in such a way as to bring the pieces 100a, 100b, 100c into abutment as the drum 2 rotates.

[0061] The teeth 7, 8 act on a radially outer portion of the pieces 100a, 100c, in particular, the portion of the pieces which extends radially beyond the dimensions of the flanks 4.

[0062] In practice, considering at least the near position of the portions 5b, 6b, the faces 7a and 8a of the teeth 7, 8 are positioned at an axial distance which is smaller than the maximum axial dimension of the drum 2 and in particular than a maximum axial dimension of the flanks 4.

[0063] With reference to Figure 4, in the embodiment illustrated, the engagement means for engaging the pieces 100a, 100c comprise a plurality of pusher means 9, 10 for pushing corresponding pieces, each located at a respective flute 3 of the abutment drum 2.

[0064] The means 9 extend from the external annular portion 5b of the element 5 towards the drum 2.

[0065] The means 10 extend from the external annular portion 6b of the element 6 towards the drum 2.

[0066] As illustrated, considering the near position of the engagement means, the means 9 extend from the external annular portion 5b of the element 5 towards the drum 2, each preferably inside a corresponding flute 3.

[0067] Similarly, the means 10 extend from the external annular portion 6b of the element 6 towards the drum 2, each preferably inside a corresponding flute 3.

[0068] The teeth 9, 10 each have a respective face 9a, 10a for engaging the pieces being processed.

[0069] The faces 9a, 10a are shaped to engage at least part of an end of the corresponding piece and to be inserted into the flutes 3. Preferably, the faces 9a, 10a are shaped to engage the whole of the end surface of the corresponding piece, that is, they have substantially the same shape as the transversal cross section of the pieces to be moved.

[0070] Advantageously, this solution allows abutting filter pieces 100a, 100b, 100c even if made of delicate material since the pushing pressure is, in use, distributed over the entire base area of each piece.

[0071] Each means 9, in particular the face 9a thereof, faces a corresponding means 10, in particular the face 10a thereof, along the abutment direction in such a way as to bring the pieces 100a, 100b, 100c into abutment as the drum 2 rotates.

[0072] In practice, considering at least the near position of the portions 5b, 6b, the faces 9a and 10a of the pusher means 9, 10 are positioned at an axial distance which is smaller than the maximum axial dimension of the drum 2 and in particular than a maximum axial dimension of the flanks 4.

[0073] With reference to Figure 1 in particular, it may be noted that the aforementioned actuating means comprise a first pair of rollers 11, 12 - for example, ball bearings - having a cylindrical outer surface engaged with an axially outer surface of the annular portion 5b. More specifically, the portion 5b comprises a track 13, preferably substantially circular, on the side of the drum 2 opposite to that on which the rollers 11, 12 roll.

[0074] The rollers 11, 12 have respective axes of rotation R1, R2, preferably transversal to each other and preferably intersecting the axis of rotation R of the drum 2.

[0075] The rollers 11, 12 are spaced from each other along a circular arc so as to maintain the action of the pusher means on the pieces for a predetermined length of time before the plugs 101 are discharged, in substantially known manner.

[0076] The actuating means comprise a second pair of rollers 14, 15 - for example, ball bearings - having a cylindrical outer surface engaged with an axially outer surface of the annular portion 6b.

[0077] More specifically, the portion 6b comprises a track 16, preferably substantially circular, on the side of the drum 2 opposite to that on which the rollers 14, 15 roll.

[0078] The rollers 14, 15 have respective axes of rotation R3, R4, preferably transversal to each other and preferably intersecting the axis of rotation R of the drum 2.

[0079] The rollers 14, 15 are spaced from each other

along a circular arc so as to maintain the action of the pusher means on the pieces for a predetermined length of time before the plugs 101 are discharged, in substantially known manner.

[0080] The actuating means comprise adjustment means 17, 18, 19, 20 for adjusting the position of the engagement means relative to the drum 2.

[0081] More specifically, in the embodiment illustrated by way of example, the adjustment means comprise a carriage 17 for supporting the rollers 11, 12 and movable along the abutment direction.

[0082] The adjustment means comprise a carriage 18 for supporting the rollers 14, 15 and movable along the abutment direction.

[0083] The adjustment means comprise a substantially rectilinear guide 19 extending along the abutment direction and engaged with the carriages 17, 18 movable along it.

[0084] The adjustment means comprise a mechanism 20 for positioning the carriages 17, 18, of substantially known type and not described in detail, for defining the position of the carriages 17, 18 along the guide 19.

[0085] In practice, the position of the carriages 17, 18 along the guide 19 determines the distance, measured along the abutment direction, of the face 7a of the tooth 7 from the face 8a of the tooth 8, or the distance, measured along the abutment direction, of the faces 9a of the pusher means 9 from the faces 10a of the pusher means 10 with the portions 5b, 6b in the near position.

[0086] The distance between the faces 7a and 8a or between the faces 9a and 10a with the portions 5b, 6b in the near position corresponds, in practice, to the length of the plug 101 or to the sum of the lengths of the pieces 100a, 100b and 100c in abutment against each other along the respective flute 3.

[0087] Advantageously, the axial distance between the faces 7a and 8a or between the faces 9a and 10a may be greater than, smaller than or equal to the axial measurement of the drum 2 or, more specifically, of the flanks 4 as a function of the length of the pieces 100a, 100b, 100c being processed.

[0088] In use, the pieces 100a, 100b, 100c are positioned in the flutes 3 spaced from each other at the loading station 300. As the drum 2 rotates, the rotation of the portions 5b and 6b is opposed by the rollers 11, 12 and 14, 15, respectively.

[0089] The action of the rollers 11, 12 and 14, 15 during the rotation of the drum 2 causes bending, substantially along the abutment direction, of the portion 5b and of the portion 6b, respectively.

[0090] The bending of the portions 5b and 6b causes the engagement means to move to the near position, that is to say, the teeth 7, 8 or the pusher means 9, 10 move towards each other, thereby pushing the pieces 100a, and 100c and compacting the plug 101. Advantageously, as already mentioned, the preferred arrangement of the pusher means 9, 10 and/or the preferred shape of the teeth 7, 8 make it possible to compact even plugs 101

whose length, measured along the abutment direction, is less than the length of the flutes 3 or of the flanks 4.

[0091] In effect, if the engagement means lie across the flanks of the flutes or are inserted into the flutes, it is always possible to push the end pieces when the annular portions move into the near configuration. Thus, the combiner 200 equipped with the abutment unit 1 is structured as if it always worked pieces or filters of the largest size. Spacing systems, if any, for the pieces upstream of the abutment unit remain configured to space the end pieces by the maximum distance, irrespective of the axial size of the middle piece interposed between them.

[0092] Similarly, the abutment drum always has flutes of the maximum length because the pusher means are able to compact even plugs whose total length is less than the axial length of the flutes or flute flanks.

[0093] When the total length of the plugs varies, it is possible to operate on the adjustment means, for example with the mechanism 20, to modify the axial distance between the tooth 7 and the tooth 8 or between the pusher means 9 and the pusher means 10 so that, in the near position, they can effectively compact the corresponding plug without, however, damaging it by excessive pressure.

[0094] The abutment unit according to this invention advantageously allows changeovers to be carried out without having to substitute mechanical units since it is sufficient to adjust using the mechanism 20.

[0095] In other words, the abutment unit according to the invention eliminates the need for service or substitution of mechanical parts during changeovers. The abutment drum, or the respective flutes, is of the axial width suitable for plugs of the largest size. Similarly, all the rollers and mechanisms upstream are for plugs of the largest size even when operating on plugs of smaller size.

[0096] Advantageously, therefore the down times of the machine 200 are reduced.

Claims

1. An abutment unit for pieces (100a, 100b, 100c) of smokers' articles, comprising an abutment drum (2) rotatable about an axis of rotation (R) and comprising a plurality of suction flutes (3) arranged on its outside surface, extending parallel to the axis of rotation (R) and delimited by corresponding flanks (4), the abutment unit comprising pusher means (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) operating at the abutment drum (2) to push at least a first and a second piece (100a, 100c) of smokers' article, located in a first flute (3) and aligned along a respective main axis, towards each other along the first flute (3), the pusher means (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) comprising engagement means (7, 8, 9, 10) by which the first and second pieces (100a, 100c) are engaged and which are at least partly movable along an abutment direction

- parallel to the axis of rotation (R) between an away position spaced from the abutment drum (2) and a near position close to the abutment drum (2) and actuating means (11, 12, 14, 15, 16, 17, 18, 19, 20) for actuating the engagement means (7, 8, 9, 10), the abutment unit being **characterized in that** the engagement means (7, 8, 9, 10) project at least partly towards the drum (2) beyond an axial dimension of the flanks (4); it being possible for the engagement means (7, 8, 9, 10), at the near position, to be positioned at an axial distance which is smaller than the maximum axial dimension of the flanks (4).
2. The abutment unit according to claim 1, wherein the engagement means (7, 8, 9, 10) project at least partly beyond a radial dimension of the flanks (4).
 3. The abutment unit according to claim 1 or 2, wherein the engagement means (7, 8, 9, 10) comprise at least one annular tooth (7, 8).
 4. The abutment unit according to any one of the preceding claims, wherein the engagement means (7, 8, 9, 10) comprise a plurality of pusher elements (9, 10), each located at a respective flute (3) of the abutment drum (2).
 5. The abutment unit according to claim 4, wherein the pusher elements (9, 10) each project at least partly into the corresponding flute (3).
 6. The abutment unit according to any one of the preceding claims, wherein the pusher means (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) comprise a first and a second disc-shaped element (5, 6) integral and coaxial with the abutment drum (2) and located on opposite sides thereof, the first disc-shaped element (5) and the second disc-shaped element (6) being at least partly flexible substantially along the abutment direction, the actuating means (11, 12, 14, 15, 16, 17, 18, 19, 20) operating on the first disc-shaped element (5) and on the second disc-shaped element (6) to move the engagement means (7, 8, 9, 10) between the near position and the away position by at least partly elastically deforming the first disc-shaped element (5) and the second disc-shaped element (6).
 7. The abutment unit according to claim 6, wherein the engagement means (7, 8, 9, 10) comprise a first annular tooth (7) projecting from an outer annular portion (5b) of the first disc-shaped element (5) and a second annular tooth (6) projecting from an outer annular portion (6b) of the second disc-shaped element (6), the first and the second tooth (7, 8) projecting towards the abutment drum (2) beyond an axial dimension of the flanks (4), the first and the second tooth (7, 8), at the near position, being positioned at an axial distance which is smaller than the maximum axial dimension of the flanks (4).
 8. The abutment unit according to claim 7, wherein the first tooth (7) faces the second tooth (8) along the abutment direction.
 9. The abutment unit according to any one of claims 6 to 8, wherein the engagement means (7, 8, 9, 10) comprise a plurality of pusher means (9, 10), each located at a respective flute (3) of the abutment drum, first pusher means (9) projecting from an outer annular portion (5b) of the first disc-shaped element (5), each at least partly into a corresponding flute (3), and second pusher means (10) projecting from an outer annular portion (6b) of the second disc-shaped element (6), each at least partly into a corresponding flute (3), the engagement means (7, 8, 9, 10) being preferably at the near position.
 10. The abutment unit according to claim 9, wherein each first pusher element (9) faces a corresponding second pusher element (10) along the abutment direction.
 11. The abutment unit according to any one of the preceding claims, wherein the actuating means (11, 12, 14, 15, 16, 17, 18, 19, 20) comprise adjustment means (17, 18, 19, 20) for adjusting at least one position of the engagement means (7, 8, 9, 10) relative to the abutment drum (2).
 12. The abutment unit according to claim 11, wherein the pusher means (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) comprise a first and a second disc-shaped element (5, 6) integral and coaxial with the abutment drum (2) and located on opposite sides thereof, the first and second disc-shaped elements (5, 6) being at least partly flexible substantially along the abutment direction, the actuating means (11, 12, 14, 15, 16, 17, 18, 19, 20) operating on the first disc-shaped element (5) and on the second disc-shaped element (6) to move the engagement means (7, 8, 9, 10) between the near position and the away position by at least partly elastically deforming the first disc-shaped element (5) and the second disc-shaped element (6), the adjustment means (17, 18, 19, 20) operating on the first and second disc-shaped elements (5, 6).

FIG. 1

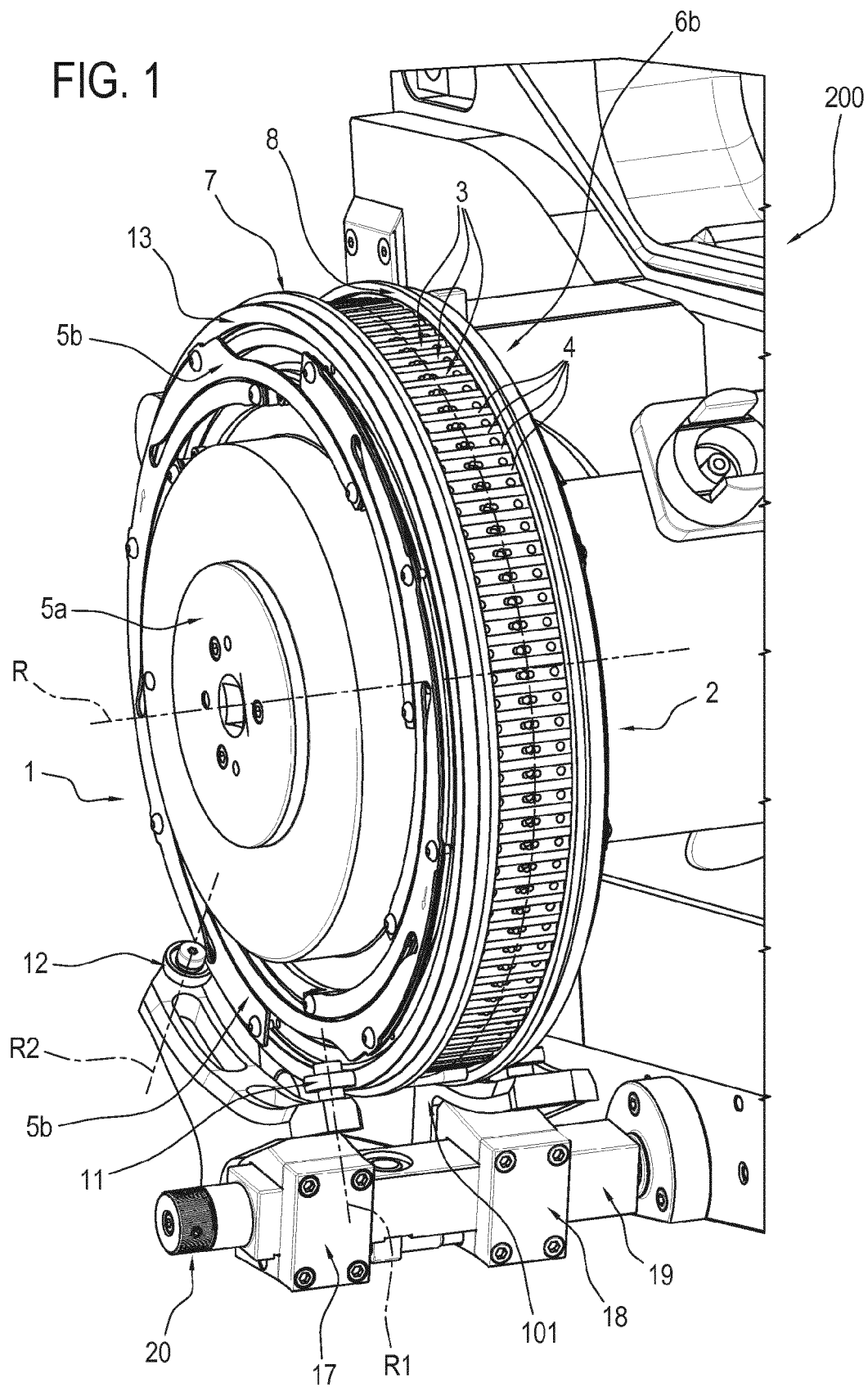
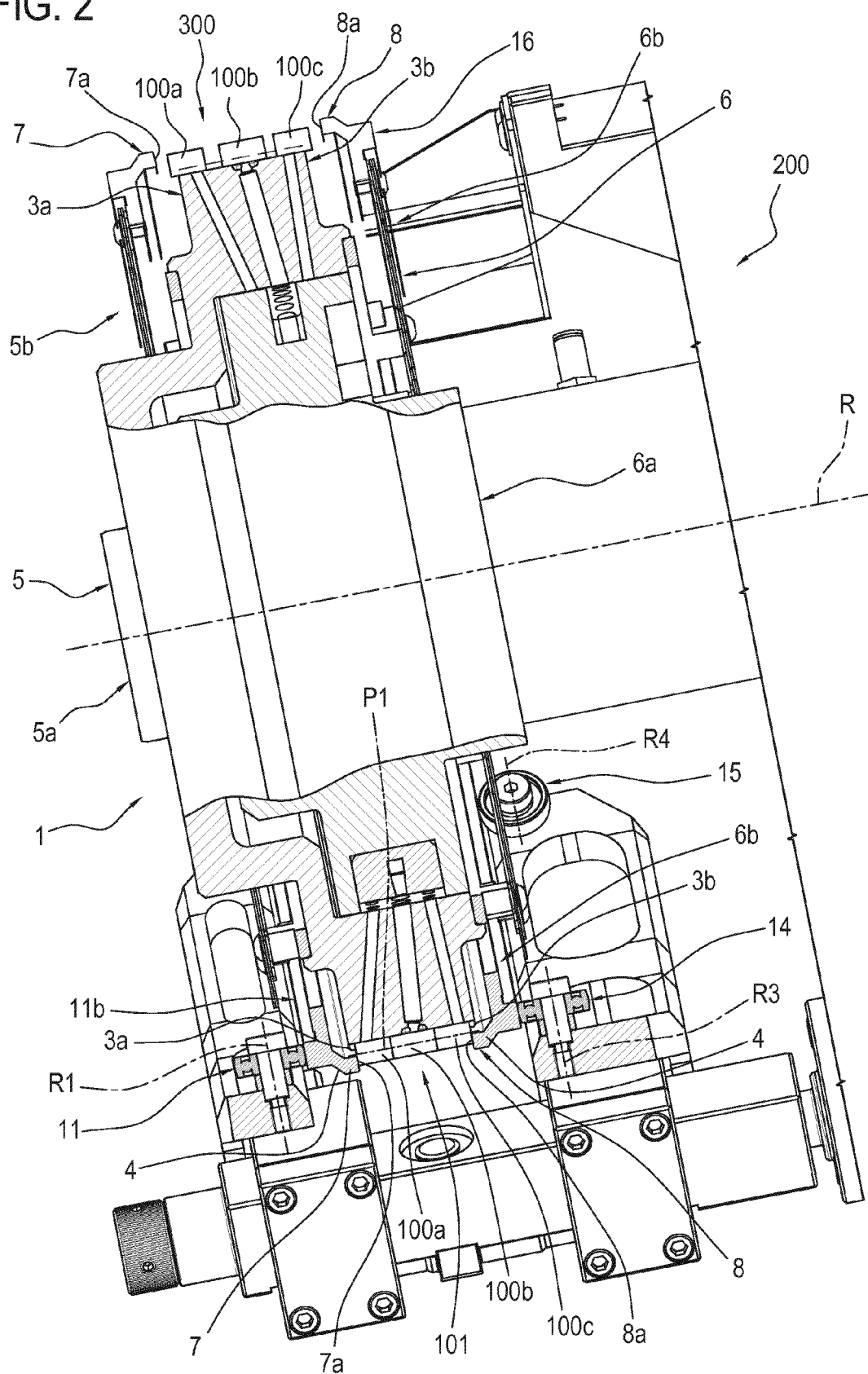


FIG. 2



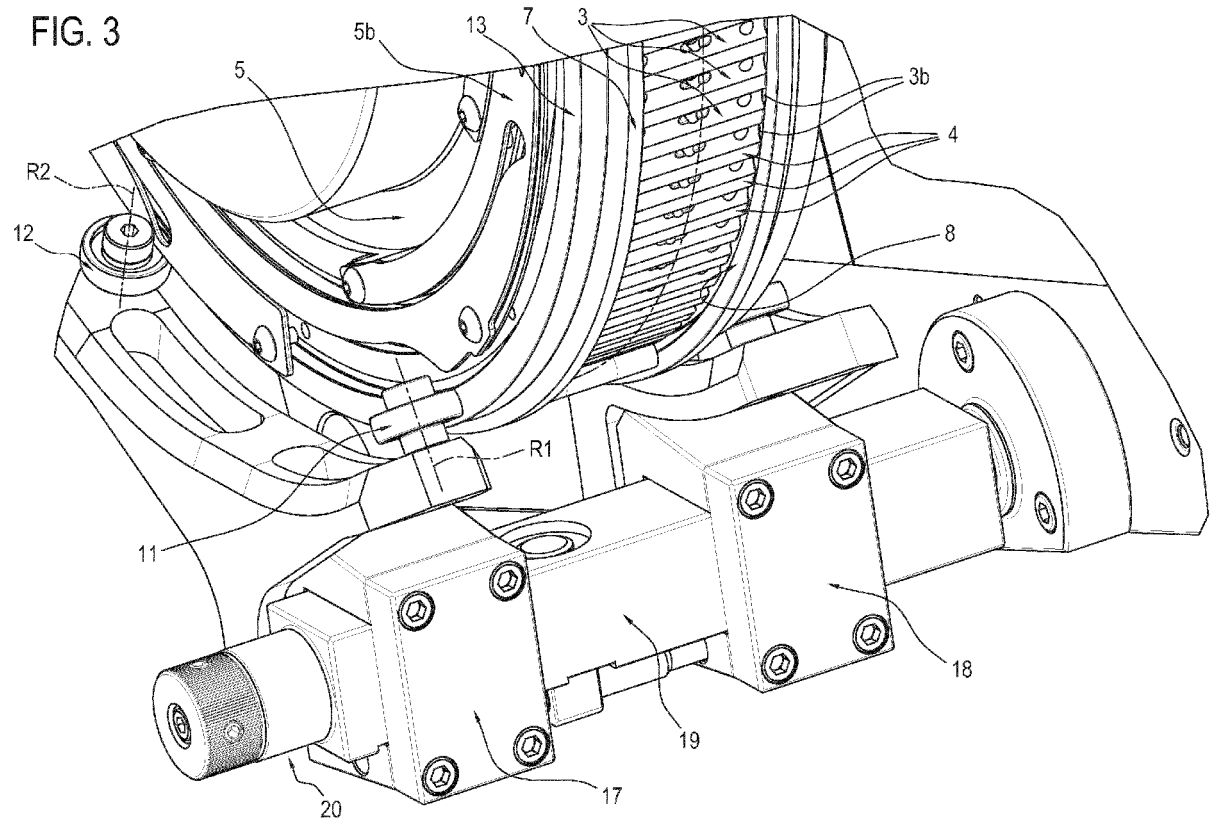
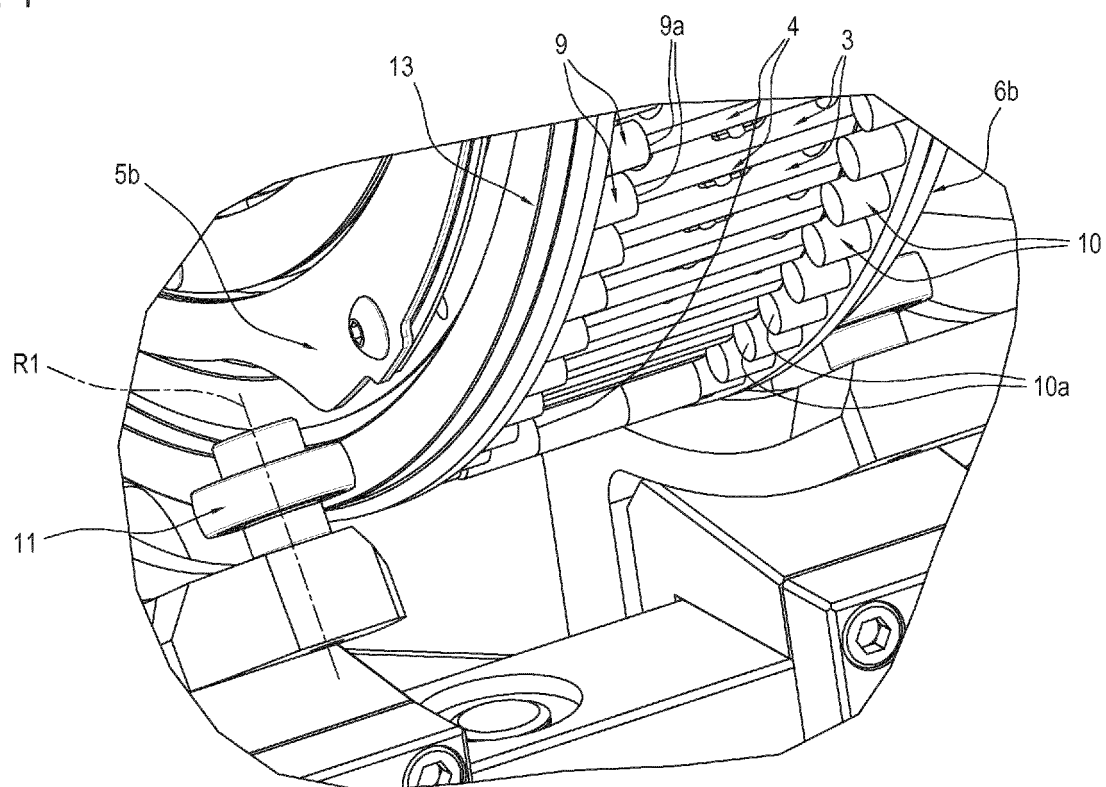


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 15 17 4754

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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