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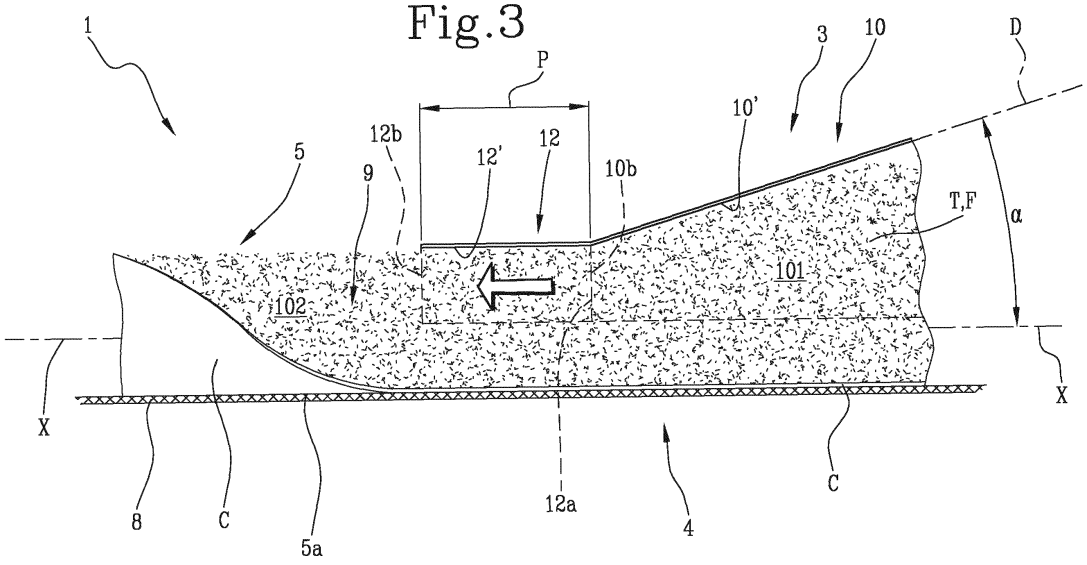
(54) **MACHINE FOR MAKING AT LEAST ONE CONTINUOUS ROD OF FILTER MATERIAL OR TOBACCO**

(57) This invention relates to a machine (1) for making at least one continuous rod (100) of filter material (F) or tobacco (T), comprising a pre-forming device (3) adapted to receive at least one semi-finished, continuous stream (101) in order to make at least one continuous stream (102). The pre-forming device 3 comprises:
- at least one oblong tile-shaped member (10) having an inside surface (10') which is configured to progressively reduce the transverse cross section of the semi-finished, continuous stream (101) feeding along it and to channel it into a forming channel (5) of a garniture tongue (4) along which the at least one continuous rod (100) is progressively formed; and
- at least one connecting member (12) blending the tile-shaped member (10) with the forming channel (5) and having an inside surface (12') which blends smoothly with the inside surface (10') of the tile-shaped member (10) in such a way as to allow the semi-finished, continuous stream (101) to be progressively compacted.

Fig.3



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Description

[0001] This invention relates to a machine for making at least one continuous rod of filter material or tobacco.

[0002] In other words, the object of this invention is applicable both to cigarette making machines and filter making machines.

[0003] Machines for making continuous rods of tobacco generally involve the use of a substantially vertical duct which is fed from below with a continuous flow of tobacco particles and at the top end of which there is a suction conveyor belt on which a semi-finished, continuous stream of tobacco is formed.

[0004] The suction belt is adapted to feed the semi-finished, continuous stream of tobacco along a predetermined path defined by the conveyor itself to a preforming device, which produces a continuous stream, and then to a station for forming a continuous tobacco rod where a web of paper is wrapped around the continuous tobacco rod to form a continuous cigarette rod or cylinder which is then cut into individual cigarettes by a cutting device.

[0005] More specifically, before being sent into the forming channel of the garniture tongue, the semi-finished, continuous stream is suitably preformed and progressively compacted by the preforming device comprising a tile-shaped member which gives the advancing semi-finished, continuous stream the correct transverse dimension.

[0006] In other words, while the semi-finished, continuous stream is being transferred to the forming channel of the garniture tongue, the tile-shaped member controls and guides the semi-finished, continuous stream, compressing it after it has been deposited on the web of paper with which the continuous tobacco rod will be made.

[0007] As is known, the production of cigarette filters, on the other hand, involves processing a continuous strip of filter material, for example cellulose acetate, obtained from a bale of compressed filter material.

[0008] The strip is made to advance along a predetermined path through processing stations where it is stretched lengthways and crossways and then sprayed with chemical additives such as, for example, triacetin.

[0009] Preforming devices located at a specific station then preform the semi-finished, cylindrical streams of filter material to make continuous streams of filter material.

[0010] In known solutions, each preforming device comprises a substantially funnel shaped duct with an end portion having the shape of an oblong tile into which the semi-finished, continuous stream is fed. The tile-shaped end portion progressively reduces the transverse cross section of the stream until it becomes a continuous stream of predetermined diameter.

[0011] Downstream of the funnel-shaped element, the continuous stream is channelled into the respective forming channel of a garniture tongue where the continuous streams advance in defined, parallel directions in such a way as to form continuous rods of filter material which a rotary cutting device then cuts into separate filter sticks.

[0012] Each filter stick may have the length of one or more filter tips, depending on requirements, which will be applied to the cigarettes in the filter tip attachment machine.

[0013] It should be noted therefore that both in the case of machines for making continuous rods of tobacco and in the case of machines for making continuous rods of filter material, the device which preforms semi-finished, continuous stream comprises an oblong tile-shaped member in which the semi-finished, continuous stream is channelled in order to progressively reduce the size of its transverse cross section until obtaining a continuous stream whose transverse cross section is substantially equal in diameter to the cigarettes or filters to be made.

[0014] In other words, the two machines have in common the fact of having a tile-shaped member designed to constrain and simultaneously compress the material (whether tobacco or filter material in the form of a semi-finished, continuous stream) into a forming channel of the garniture tongue so as to give it the transverse cross section of the size it needs to have in the garniture tongue.

[0015] The Applicant has observed that the continuous stream of filter material or tobacco feeding out of the tile-shaped members tends to loosen up and come apart and scattered. The Applicant has observed that this is due to the sharp edge at the top of the outfeed section of the tile-shaped member.

[0016] In effect, considering the high speed at which these machine operate, the more the transverse cross section of the semi-finished, continuous stream is reduced in size, the more the density per unit area of the filter material or tobacco increases and the sudden interruption of this behaviour (diminishing cross section size accompanied by increasing density) at the end of the tile-shaped member means that the continuous stream tends to instantaneously recover its shape and to expand as it leaves the tile-shaped member.

[0017] Thus, the progressive compression inside the tile-shaped member creates a state of tension in the filter material or tobacco, which causes the material to expand suddenly and instantaneously when it leaves the outfeed section, thus tending to loosen up and come apart.

[0018] In particular, it has been observed, especially in the case of filters made entirely of ground charcoal or filters with charcoal particles dispersed in the filter material, that the continuous stream leaving the tile-shaped member after being compressed inside it tends to return elastically to its originally shape and to disintegrate, or even "explode" (a phenomenon whereby random particles are expelled in sudden and uncontrolled manner from the continuous stream).

[0019] Similarly, it has been observed that in machines for making continuous rods of tobacco, the sharp edge at the end of the tile-shaped member has the effect of scraping the semi-finished, continuous stream of tobacco. Thus, the continuous stream of tobacco feeding out is frayed and not as compact as required, with tobacco particles being scattered around as it moves.

[0020] The drawbacks described above, besides negatively affecting the quality of the continuous rods of tobacco or filter material, can lead to interruptions and shutdowns in the production process.

[0021] In this context, the technical purpose which forms the basis of this invention is to propose a machine for making at least one continuous rod of filter material or tobacco to overcome the above mentioned drawbacks of the prior art.

[0022] More specifically, this invention has for an aim to provide a machine for making at least one continuous rod of filter material or tobacco and which allows making a continuous stream of filter material or tobacco which keeps its shape and correct transverse cross section size.

[0023] Another aim of this invention is to provide a machine for making at least one continuous rod of filter material or tobacco and which allows increasing the efficiency of the rod production process and preventing particles of filter material or tobacco from being scattered and lost.

[0024] The technical purpose indicated and the aims specified are substantially achieved by a machine for making at least one continuous rod of filter material or tobacco comprising the technical features set out in one or more of the accompanying claims.

[0025] The dependent claims, which are incorporated herein by reference, correspond to different embodiments of the invention.

[0026] Further features and advantages of this invention are more apparent in the non-limiting description of a preferred but non-exclusive embodiment of a machine for making at least one continuous rod of filter material or tobacco, as illustrated in the accompanying drawings, in which:

- Figure 1 is a functional diagram of a machine for making at least one continuous rod of filter material or tobacco according to this invention;
- Figure 2 is a schematic perspective view of an oblong tile-shaped member according to this invention;
- Figure 3 is a schematic cross section of a portion of a first embodiment of the machine according to this invention;
- Figure 4 is a schematic cross section of a portion of a second embodiment of the machine according to this invention;
- Figure 5 is a schematic cross section of a portion of a third embodiment of the machine according to this invention; and
- Figure 6 is a schematic cross section of a portion of an alternative embodiment of the machine according to this invention.

[0027] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a machine for making at least one continuous rod of filter material or tobacco made according to the teachings of this invention and hereinafter referred to simply as machine 1.

[0028] In other words, the machine 1 is configured to make continuous rods 100 of filter material "F" or continuous rods 100 of tobacco "T", both suitable for use in making cigarettes.

[0029] The term "cigarette" is used to generally denote a plurality of products or smoking articles such as, for example, cigarettes, cigars, cigarillos and the like.

[0030] With reference to Figure 1, the machine 1 comprises a process station 2 for processing filter material "F" or tobacco "T" to make at least one semi-finished, continuous stream 101 of filter material "F" or tobacco "T". More specifically, the process station 2 is adapted to receive the filter material "F" or the tobacco "T" to be processed.

[0031] Preferably, in a first variant embodiment not illustrated in the accompanying drawings, the process station 2 for processing filter material "F" is configured to process the filter material "F" along a predetermined path along which the filter material "F" is processed to make at least one semi-finished, continuous stream 101 of filter material "F". More specifically, the process station 2 for processing filter material "F" comprises forming means used to obtain at least one continuous strip of filter material "F" which is in turn fed to longitudinal and transverse stretching means. Downstream of the stretching means, the process station 2 comprises a chemical unit for chemically treating at least one continuous strip of filter material "F", where the at least one strip is sprayed with chemical additives such as, for example, triacetin.

[0032] Downstream of the chemical unit, the at least one strip is fed by a plurality of transfer rollers to pneumatic suction devices which transform the strip into a semi-finished, continuous stream 101 of filter material "F".

[0033] Preferably, in a second variant embodiment not illustrated in the accompanying drawings, the process station 2 for processing tobacco "T" comprises, instead, a suction conveyor belt which is looped around end rollers, rotatable about parallel axes, and which has a lower section adapted to use suction to hold down particles of tobacco "T" coming from a vertical duct which is not illustrated and which is mounted under the lower section of the conveyor, to form a semi-finished, continuous stream 101 of tobacco "T". The semi-finished, continuous stream 101 of tobacco "T" is suitable for being fed continuously by the lower section of the conveyor belt along a feed direction transverse to the axes of rotation of the end rollers.

[0034] According to this invention, the machine 1 comprises a pre-forming device 3 located downstream of the process station 2 and adapted to receive at least one semi-finished continuous stream 101 of filter material "F" or tobacco "T" in order to make at least one continuous stream 102 of filter material "F" or tobacco "T", as will become clearer as this description continues.

[0035] Downstream of the preforming device 3, the machine 1 then comprises a garniture tongue 4 adapted to receive the at least one continuous stream 102 of filter

material "F" or tobacco and configured to form at least one continuous rod 100 of filter material "F" or tobacco "T".

[0036] The garniture tongue 4 has a forming channel 5 along which the at least one continuous rod 100 is progressively formed as it feeds along a forming feed direction "X".

[0037] Preferably, the machine 1 comprises a wrapping station 6 configured to feed into the forming channel 5 a continuous strip of paper "C" which is progressively wrapped by the garniture tongue 4 around the continuous stream 102 of filter material "F" or tobacco "T" to make the continuous rod of filter material "F" or tobacco "T".

[0038] At the outfeed end of the forming channel 5, the machine 1 preferably also comprises a cutting device 7 - a rotary cutting device, for example - configured to cut the continuous rod 100 into individual segments, not illustrated.

[0039] Preferably, the garniture tongue 4 for forming the continuous rod 100 has an infeed station with an endless conveyor 8, one portion of which extends under the conveyor belt of the process station 2 for processing the tobacco "T" or under the outfeed station of the pneumatic suction devices of the strip of filter material "F".

[0040] The endless conveyor 8 of the garniture tongue 4 is adapted to run along a feed direction parallel to the forming feed direction "X", at least partly inside a groove 9 of the garniture tongue 4 defining the bottom surface 5a of the forming channel 5. The endless conveyor 8 forces the continuous strip of paper "C", if present, to be wrapped progressively round the continuous stream 102 of filter material "F" or tobacco "T".

[0041] The continuous stream 102 is fed to the garniture tongue 4 by the preforming device 3 which is interposed between the feed station 2 and the garniture tongue 4 itself.

[0042] With reference to Figure 2, the preforming device 3 comprises at least one oblong tile-shaped member 10, hereinafter referred to simply as tile 10, having a directrix "D" which makes a first defined angle "α" with the forming feed direction "X".

[0043] In other words, the first defined angle "α" defines the inclination of the tile 10 relative to the forming feed direction "X".

[0044] Preferably, the first defined angle "α" between the directrix "D" of the tile 10 and the forming feed direction is between 0° and 2°, and still more preferably, 0.5°.

[0045] It should be noted that in Figures 2-5, the proportion between the length and height of the tile 10 has been increased for graphical purposes in order to make the inventive concept of the invention clearer and the drawings more legible. Thus, in the drawings, the first defined angle "α" looks larger than it actually is without thereby causing the invention to become meaningless.

[0046] It should be noted that the term "directrix" is used herein to denote the axis tangent to the surface of revolution of the ideal cylinder or frustum that determines the development of a component.

[0047] The tile 10 has an inside surface 10' which is configured to progressively reduce the transverse cross section of the semi-finished, continuous stream 101 feeding along it between an infeed portion 10a and an outfeed portion 10b of the tile 10 itself and to channel the stream into the forming channel 3.

[0048] Advantageously according to this invention, the preforming device 3 also comprises a connecting member 12 which blends the tile 10 with the forming channel 3 of the garniture tongue 4 and which is configured in such a way as to allow the semi-finished, continuous stream 101 to be progressively compacted.

[0049] In effect, the connecting member 12 has an inside surface 12' which blends smoothly with the inside surface 10' of the tile to define an intermediate connecting feed path P.

[0050] In other words, after being progressively compressed along the inside surface 10' of the tile 10, the semi-finished, continuous stream 101 of filter material "F" or tobacco undergoes a step of compacting along the intermediate connecting feed path P which prevents an abrupt passage between the end portion 10b of the tile 10 and the forming channel 5. Thus, the end portion 10b of the tile 10 corresponds to an infeed portion 12a of the connecting member 12.

[0051] In other words, the connecting member 12 allows the semi-finished, continuous stream 101 to be gradually compacted before it leaves the forming channel 3 and enters the forming channel 5 as continuous stream 102 so that its newly-formed transverse cross section remains unchanged in size as far as possible.

[0052] Advantageously, the connecting member 12 accompanies the semi-finished, continuous stream 101, which is progressively transformed into continuous stream 102, towards the forming channel 5 more smoothly and less abruptly compared to the sharp edge formed by the end portion 10b of the tile 10, thus preventing the compressed particles of filter material "F" or tobacco "T" from instantaneously expanding and scattering into the environment and causing the newly-formed continuous stream 102 to lose its shape.

[0053] Preferably, the connecting member 12 has an outfeed portion 12b defining with the groove 9 the transverse cross section of the continuous rod 100 of filter material "F" or tobacco to be made.

[0054] The connecting member 12 thus allows stabilizing the shape and transverse cross section of the continuous stream 102 before the continuous stream is formed in the garniture tongue 4 to obtain a continuous rod 100 of excellent quality.

[0055] Advantageously, the connecting member 12 allows preventing loss of particles of filter material "F" or tobacco "T" and, in particular, prevents the filter material "F" from "exploding" (especially if the filter material "F" comprises charcoal) and prevents the particles of tobacco "T" from scattering. In effect, the continuous stream 102 feeding out of the outfeed portion 12b of the connecting member 12 is compressed and compact; that

way, the filter material "F" and the tobacco "T" keep their shape and are prevented from breaking up/scattering.

[0056] With reference to a first embodiment of the machine 1 according to this invention, illustrated in Figure 3, the connecting member 12 preferably defines a straight intermediate connecting feed path P.

[0057] Still more preferably, the straight intermediate connecting feed path P is substantially parallel to the forming feed direction X. In other words, the inside surface 12' of the connecting member 12 is defined by a semi-cylindrical portion which is parallel to the forming feed direction "X".

[0058] Advantageously, therefore, the semi-finished, continuous stream 101 feeding out from the end portion 10b of the tile 10 is made to advance along an intermediate connecting feed path P which ensures that the semi-finished, continuous stream 101 adopts a constant cross section along the entire path P so as to effectively compact the filter material "F" or the tobacco "T" of the semi-finished, continuous stream 101. The transverse cross section imparted to the semi-finished, continuous stream 101 feeding along the straight intermediate connecting feed path P is advantageously maintained by the continuous stream 102 as it leaves the outfeed portion 12b of the connecting member 12 and enters the forming channel 5.

[0059] With reference to a second embodiment of the machine 1 according to this invention, illustrated in Figure 4, the connecting member 12 preferably defines a curved intermediate connecting feed path P. In other words, the inside surface 12' progressively blends in asymptotic manner the end portion 10b of the tile 10 with the outfeed portion 12b of the connecting member 12, defining, for example, an ideal pseudospherical portion.

[0060] That way, the semi-finished, continuous stream 101 is compressed and compacted more gradually, smoothly and less abruptly compared to the case where only the tile is present, thus guaranteeing correct compacting of certain types of tobacco "T" or filter material "F".

[0061] With reference to a third embodiment of the machine 1 according to this invention, illustrated in Figure 5, the pre-forming device 3 preferably also comprises, at an outfeed portion 12b of the connecting member 12 between the connecting member 12 itself and the garniture tongue 4, an upwardly-diverging tile shaped end member 13 having a respective directrix "D1" making a second defined angle "β" with the forming feed direction "X".

[0062] Advantageously, this end member 13, besides accompanying the continuous stream 102 as it leaves the connecting member 12, also has a safety function and that is to prevent any fragments or particles of filter material "F" or tobacco "T" which might in any case come away from the continuous stream 102 from being dispersed into the surrounding area and jamming the machine 1 or negatively affecting its operation.

[0063] Preferably, the second defined angle "β" between the directrix "D1" of the end member 13 and the forming feed direction "X" is between 0° and 10°.

[0064] More specifically, the second defined angle "β" between the directrix "D1" of the end member 13 and the forming feed direction "X" is equal to 2°.

[0065] In a possible variant embodiment of this invention, illustrated in Figure 6, the connecting member 12 defines a straight intermediate connecting feed path P and the inside surface 12' of the connecting member 12 has a directrix "D2" diverging upwards relative to the directrix "D" of the tile-shaped member 10 (in such a way as to define a frusto-conical portion) and making a third defined angle "γ" with the forming feed direction "X".

[0066] It should be noted that in an embodiment not illustrated but nevertheless falling within the scope of the inventive concept of the solution described, the connecting point between the inside surface 12' of the connecting member 12 and the inside surface 10' of the tile is made curved so that the two surfaces are smoothly blended with each other.

[0067] This invention achieves the preset aims by overcoming the above mentioned disadvantages of the prior art and providing the user with a machine 1 which allows making at least one excellent quality continuous rod of filter material or tobacco thanks to the presence of a connecting member 12 disposed between the forming channel 5 and the tile 10, ensuring that the continuous stream 102 formed is effectively compressed and compacted.

Claims

1. A machine (1) for making at least one continuous rod (100) of filter material (F) or tobacco (T), comprising:

   - a process station (2) for processing filter material (F) or tobacco (T) to make at least one semi-finished, continuous stream (101) of filter material (F) or tobacco (T),
   - a pre-forming device (3) located downstream of the process station (2) and adapted to receive the at least one semi-finished, continuous stream (101) in order to make at least one continuous stream (102) of filter material (F) or tobacco (T),
   - a garniture tongue (4) configured to form at least one continuous rod (100) of filter material (F) or tobacco (T), located downstream of the pre-forming device (3) and adapted to receive the at least one continuous stream (102), the garniture tongue (4) having a forming channel (5) along which the at least one continuous rod (100) is progressively formed as it feeds along a forming feed direction (X);

   the pre-forming device (3) comprising at least one oblong tile-shaped member (10) having a directrix (D) which makes a first defined angle (α) with the forming feed direction (X), the at least one oblong

tile-shaped member (10) having an inside surface (10') which is configured to progressively reduce the transverse cross section of the semi-finished, continuous stream (101) feeding along it between an infeed portion (10a) and an outfeed portion (10b) of the oblong tile-shaped member (10) and to channel the stream into the forming channel (5);
the machine (1) being **characterized in that** the pre-forming device (3) comprises at least one connecting member (12) blending the at least one oblong tile-shaped member (10) smoothly with the forming channel (5) of the garniture tongue (4), having an inside surface (12') which blends smoothly with the inside surface (10') of the oblong tile-shaped member (10) and defining an intermediate connecting feed path (P), the at least one connecting member (12) being configured in such a way as to allow the semi-finished, continuous stream (101) of filter material (F) or tobacco (T) to be progressively compacted.

2. The machine (1) according to claim 1, wherein the at least one connecting member (12) defines a straight intermediate connecting feed path (P).

3. The machine (1) according to claim 1, wherein the at least one connecting member (12) defines a curved intermediate connecting feed path (P).

4. The machine (1) according to claim 2, wherein the straight intermediate connecting feed path (P) is substantially parallel to the forming feed direction (X).

5. The machine (1) according to one or more of the preceding claims, wherein the first defined angle (α) between the directrix (D) of the oblong tile-shaped member (10) and the forming feed direction (X) is between 0° and 2°, preferably 0.5°.

6. The machine (1) according to one or more of the preceding claims when dependent on claim 4, wherein the pre-forming device (3) also comprises, at an outfeed portion (12b) of the at least one connecting member (12) between the connecting member (12) itself and the garniture tongue (4), at least one upwardly-diverging tile shaped end member (13) having a respective directrix (D1) making a second defined angle (β) with the forming feed direction (X).

7. The machine (1) according to claim 2, wherein the inside surface (12') of the connecting member (12) has a respective directrix (D2) diverging upwards relative to the directrix (D) of the tile-shaped member (10) and making a third defined angle (γ) with the forming feed direction (X).

8. The machine (1) according to claim 7, wherein the connecting point between the inside surface (12') of the connecting member (12) and the inside surface (10') of the tile is made curved so that the two surfaces are smoothly blended with each other.

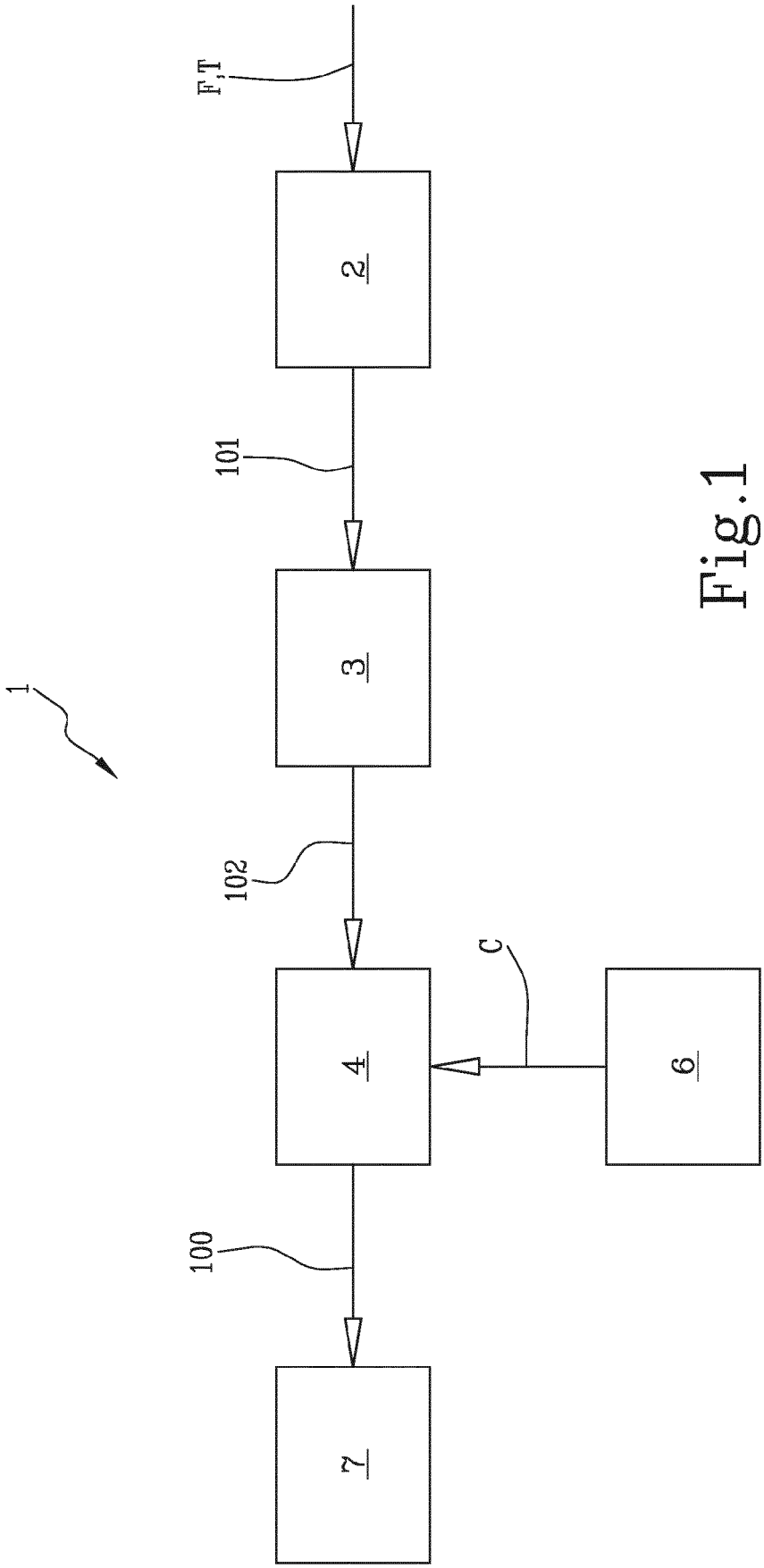


Fig.1

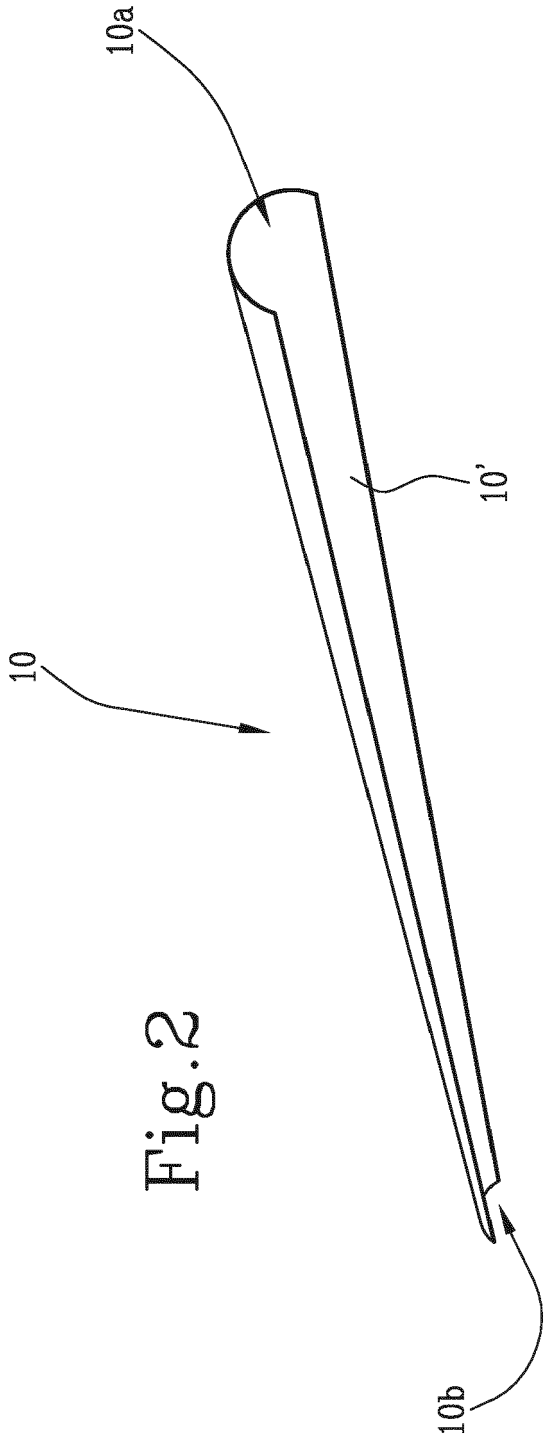


Fig.2

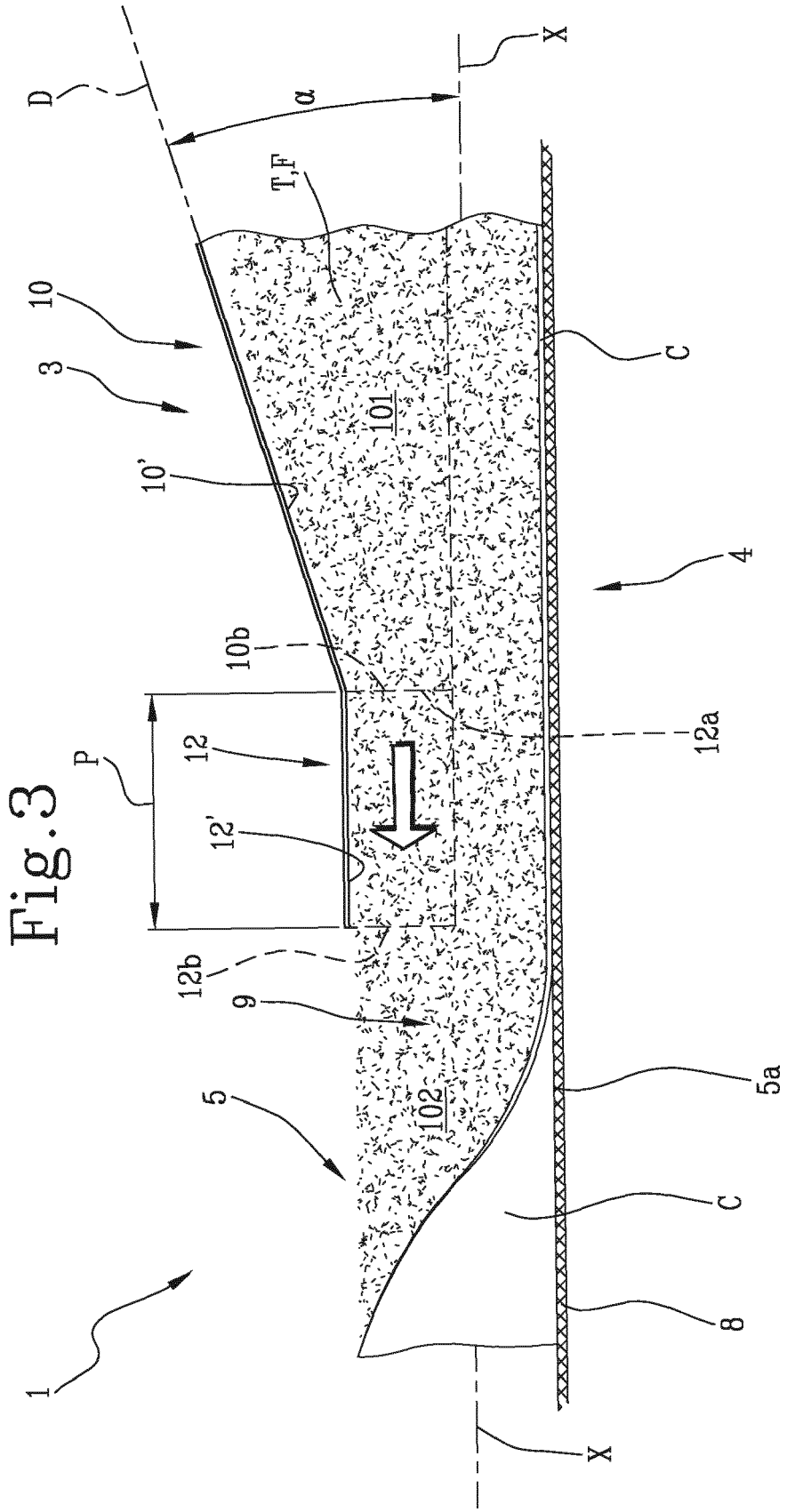


Fig.3

Fig.4

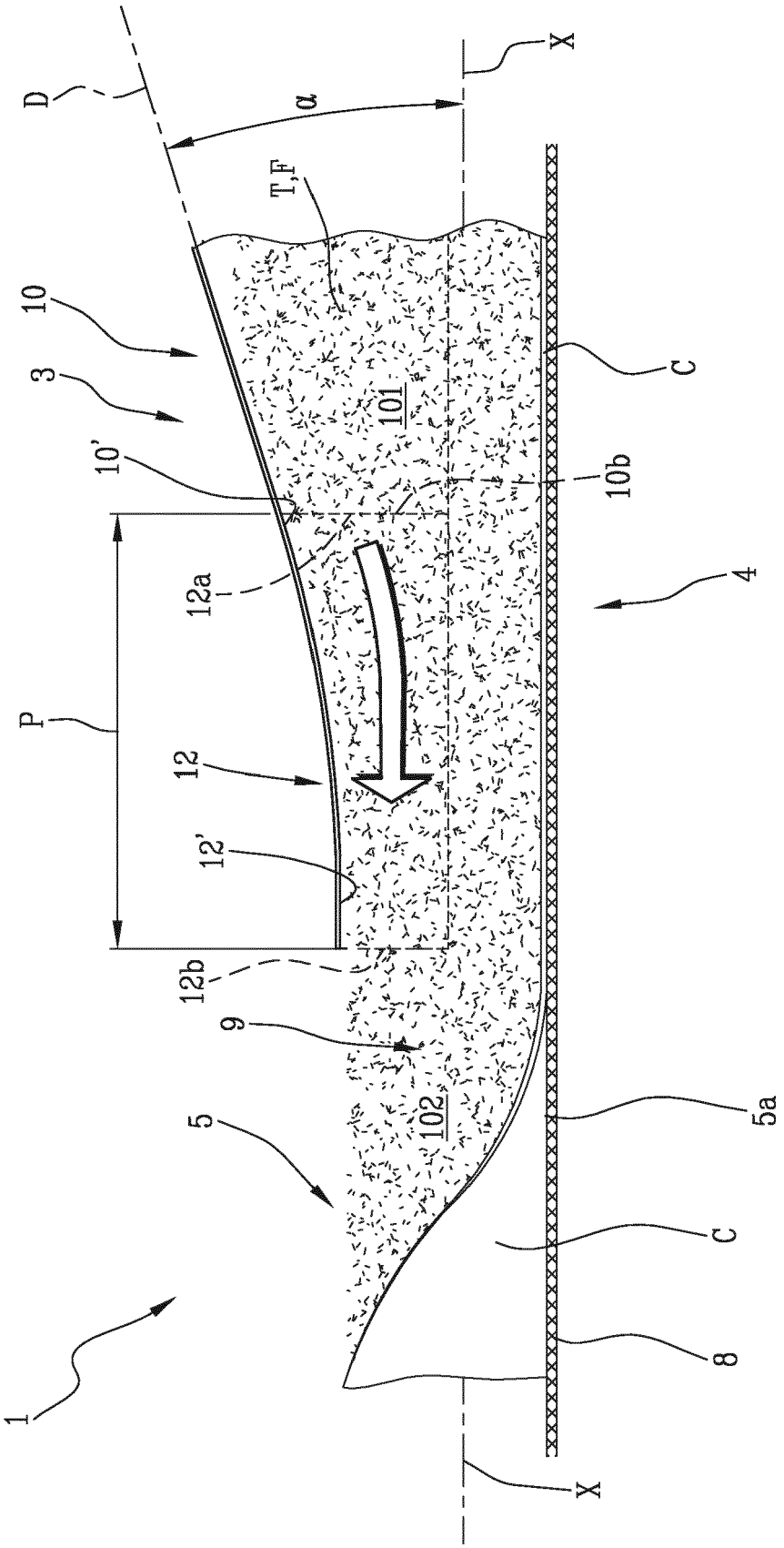


Fig.5

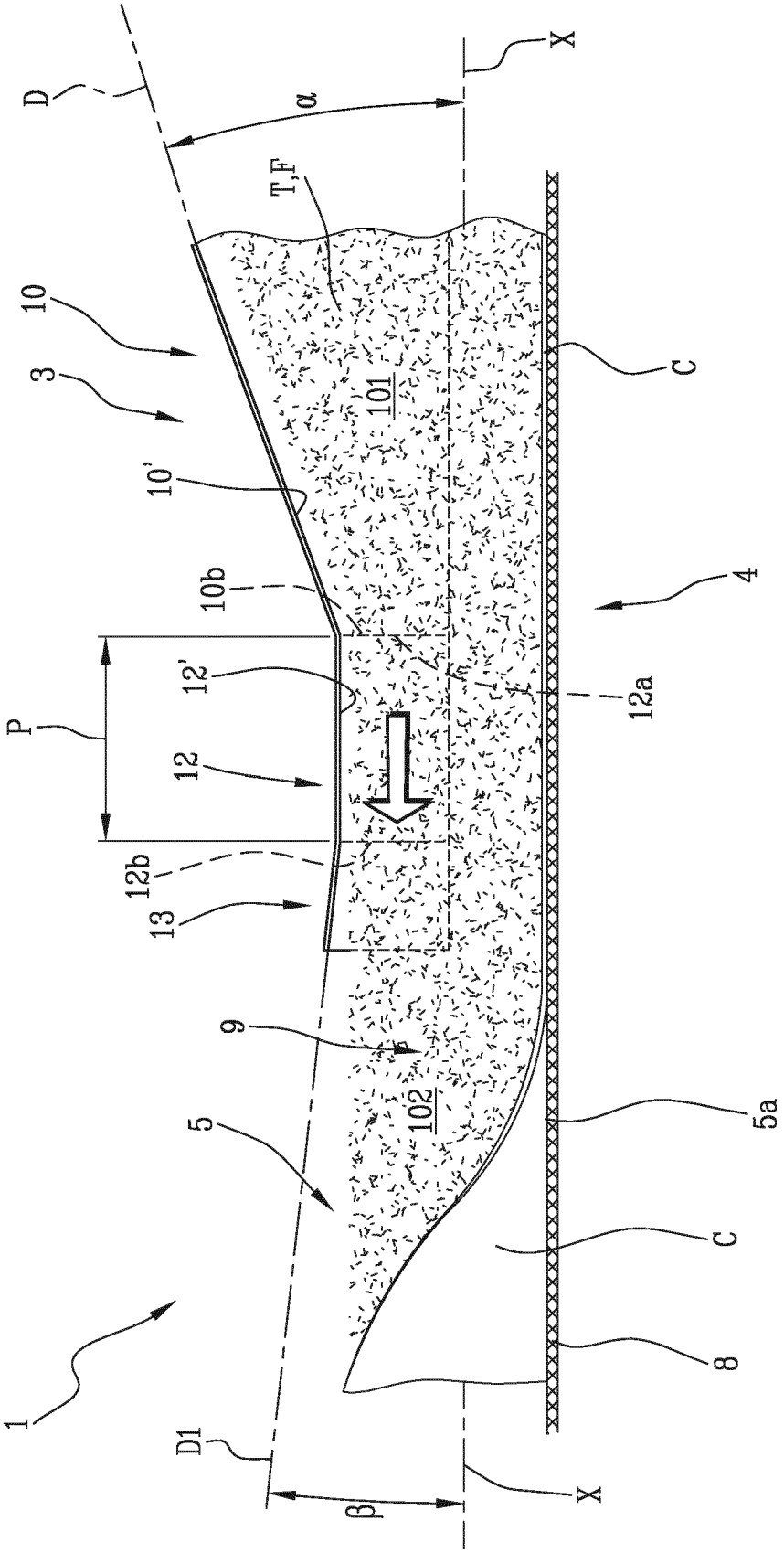
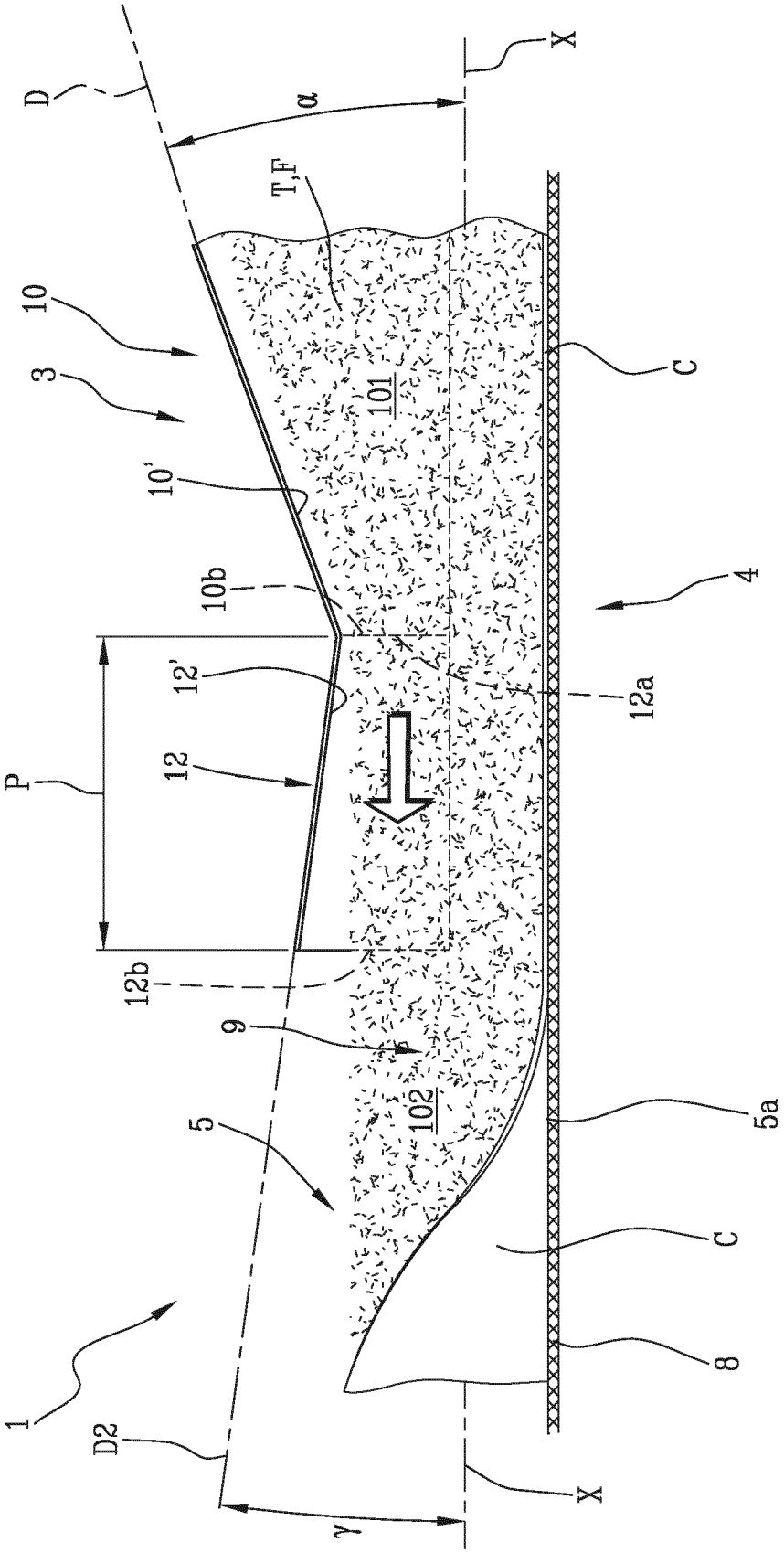


Fig.6



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EUROPEAN SEARCH REPORT

Application Number
EP 18 15 6228

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 June 2018	Marzano Monterosso

CATEGORY OF CITED DOCUMENTS

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