(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 245 884 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.11.2017 Bulletin 2017/47

(51) Int Cl.:
A24C 5/18 *(2006.01)*

(21) Application number: **17171321.7**

(22) Date of filing: **16.05.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **18.05.2016 IT UA20163538**

(71) Applicant: **G.D S.p.A.**
40133 Bologna (IT)

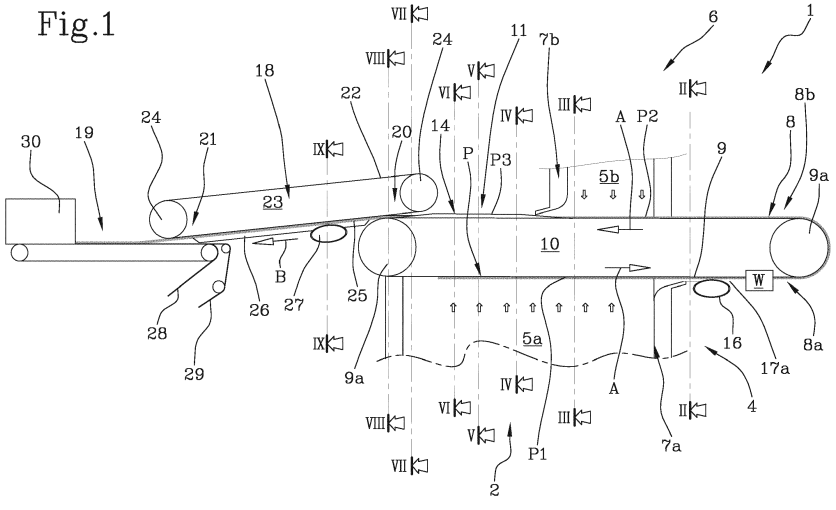
(72) Inventors:
- **MENGOLI, Fausto**
  40037 SASSO MARCONI (IT)
- **EUSEPI, Ivan**
  40013 CASTELMAGGIORE (IT)
- **SARTONI, Massimo**
  40139 BOLOGNA (IT)
- **FEDERICI, Luca**
  40135 Bologna (IT)

(74) Representative: **Bianciardi, Ezio**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

(54) UNIT AND METHOD FOR FORMING A COAXIAL STREAM IN A MACHINE FOR MAKING COAXIAL CIGARETTES

(57) A unit (2) for forming a coaxial stream (3) in a machine (1) for making coaxial cigarettes, comprises a suction conveyor (8) comprising an air permeable belt (9) which is wound in a loop around a chamber (10) communicating with a suction unit and which is movable in a direction of travel ("A") to define a closed path ("P"). A first unit (4) for feeding a first smokable material suitable for at least partly forming a tubular portion (3b) of the coaxial stream (3) is configured to feed the first smokable material along a first stretch ("P1") of the path ("P") and a second unit (6) for feeding a second smokable material suitable for forming a core (3a) of the coaxial stream (3) is configured to feed the second smokable material along a second stretch ("P2") of the path ("P") downstream of the first stretch ("P1") in the direction of travel ("A") of the belt (9). Shaping means (11) are located along a third stretch ("P3") of the path ("P") downstream of the second stretch ("P2") in the direction of travel ("A") of the belt (9) and are configured to progressively deform the belt (9) as it advances along the path ("P") in such a way as to wrap it around the first smokable material to form the tubular portion (3b) of the coaxial stream (3) around the core

Fig.1



EP 3 245 884 A1

Description

[0001] This invention relates to a unit and a method for forming a coaxial stream in a machine for making coaxial cigarettes.

[0002] The term "coaxial cigarette" is used to mean a cigarette or similar smoking article in which the piece of smokable material comprises a central core and a tubular portion placed around the central core.

[0003] Thus, the tubular portion can be made of a first smokable material, preferably comprising shredded tobacco, and the core of a second smokable material.

[0004] Coaxial cigarettes are known from documents WO2007/069091 and EP503461.

[0005] Document DE102013220757 schematically describes producing coaxial cigarettes by making a first stream formed by a plurality of tobacco segments, joining the first stream to a bed of tobacco fibres on a suction conveyor and placing other tobacco fibres on the first bed of tobacco fibres and on the first stream to form a second stream.

[0006] Document DE102013220757 thus shows a layered cigarette in which a first stream, made beforehand, is inserted between two layers of shredded tobacco. This feature does not allow obtaining a truly coaxial cigarette because it involves making a sequence of layers.

[0007] Besides that, document DE102013220757 provides a very schematic teaching which does not tackle aspects of applicability and functionality such as centring the first stream on the first layer and controlling the streams up to the point where the cigarette rod is formed. For example, moving the first stream requires special attention at curves and changes of direction and may interfere with the placing of the further tobacco fibres.

[0008] Document GB2260887, too, describes the formation of a first stream over which two layers of shredded tobacco are placed in various ways and configurations. In one of the embodiments described, a layer of shredded tobacco is wound around the first stream by a specific device located downstream of the suction conveyor.

[0009] Document GB2260887, too, provides a very schematic teaching, especially with reference to this embodiment, and also does not tackle the issues mentioned above with reference to document DE102013220757.

[0010] This invention has for an aim to provide a unit and a method for forming a coaxial stream for a machine for making coaxial cigarettes to overcome the above mentioned drawbacks. More specifically, the aim of the invention is to provide a unit and a method for forming a coaxial stream for a machine for making coaxial cigarettes and which allow optimum control of the streams as far as the point where the cigarette rod is formed, optimum control of the materials and their correct positioning relative to each other.

[0011] This invention accordingly provides a unit and a method for forming a coaxial stream in a machine for making coaxial cigarettes as described in the accompanying claims.

[0012] The invention is described below with reference to the accompanying drawings, which illustrate non-limiting embodiments of it, and in which:

- Figure 1 is a schematic side view, partly in cross section, showing a portion of a cigarette making machine comprising a unit for forming a coaxial stream according to a first embodiment of this invention;

  Figure 2 is a cross-section through the line II-II of Figure 1;

  Figure 3 is a cross-section through the line III-III of Figure 1;

  Figure 4 is a cross-section through the line IV-IV of Figure 1;

  Figure 5 is a cross-section through the line V-V of Figure 1;

  Figure 6 is a cross-section through the line VI-VI of Figure 1;

  Figure 7 is a cross-section through the line VII-VII of Figure 1;

  Figure 8 is a cross-section through the line VIII-VIII of Figure 1;

  Figure 9 is a cross-section through the line IX-IX of Figure 1;
- Figure 10 is a schematic side view, partly in cross section, showing a portion of a cigarette making machine comprising a unit for forming a coaxial stream according to a second embodiment of this invention;
- Figure 11 is a schematic front view, partly in cross section, showing a portion of a cigarette making machine comprising a unit for forming a coaxial stream according to this invention;
- Figure 11 a is a schematic front view, partly in cross section, showing a portion of a cigarette making machine comprising a unit for forming a coaxial stream according to this invention;
- Figure 12 is a perspective view showing a portion of a coaxial stream made by a unit for forming a coaxial stream according to this invention;
- Figure 13 is a schematic side view, partly in cross section, showing a portion of a cigarette making machine comprising a unit for forming a coaxial stream according to a third embodiment of this invention.

[0013] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a cigarette making machine comprising a unit 2 for forming a coaxial stream 3 comprising an elongate central core 3a and an elongate tubular portion 3b placed around the central core 3a. The tubular portion 3b is made of a first smokable material, preferably comprising shredded tobacco; the core 3a is made of a second smokable material, comprising shredded tobacco (obtainable from the unit 2 of Figure 1), preferably of a different type from that used to make the tubular portion, or segments of one or more smokable materials (obtainable from the unit 2 of Figure 10).

[0014] The coaxial stream 3 will eventually be divided into cigarette segments used to make coaxial cigarettes,

not illustrated.

[0015] The unit 2 comprises a first feed unit 4 for feeding the first smokable material, preferably shredded tobacco, suitable for forming the tubular portion 3b, and a second feed unit 6 for feeding the second smokable material, suitable for forming the core 3a.

[0016] Described below is a first embodiment of the unit 2, with reference to Figures 1-9, where both the first smokable material and the second smokable material are in the form of shredded tobacco 5a, 5b.

[0017] With reference to Figure 1, in the final stretch of the first unit 4, the first smokable material is fed by means of an air flow along a substantially vertical duct 7a defining an ascending flow of tobacco particles 5a. The duct 7a is the final stretch of the first unit 4 which, in a first possible embodiment of it, is described in detail further on in this description. Further, in the final stretch of the second unit 6, the second smokable material is fed by means of an air flow and/or by gravity along a substantially vertical duct 7b defining a descending flow of tobacco particles 5b. The duct 7b is the final stretch of the second unit 6.

[0018] The unit 2 also comprises a suction conveyor 8 comprising an air permeable belt 9 which is wound in a loop around a chamber 10. The chamber 10 communicates with a suction unit of known type, not illustrated, and is configured to apply the suction on the belt 9 at least at some zones, for example through openings made in the wall which delimits the chamber, in known manner and not illustrated.

[0019] The belt 9 is wound around pulleys 9a which move it in a direction of travel "A" to define a closed path "P" which follows the lateral profile of the belt itself.

[0020] The first unit 4 is configured to feed the first smokable material along a first stretch "P1" of the path "P" along which the belt 9 is subjected to the suction applied by the chamber 10. In the embodiment illustrated, the suction conveyor 8, and in particular the belt 9, closes the top of the duct 7a so that the first stretch "P1" is located in a lower portion 8a of the suction conveyor 8.

[0021] The second unit 6 is configured to feed the second smokable material along a second stretch "P2" of the path "P" downstream of the first stretch "P1" in the direction of travel "A" of the belt 9. Along the aforesaid second stretch "P2", the belt 9 is subjected to the suction applied by the chamber 10. In the embodiment illustrated, the suction conveyor 8, and in particular the belt 9, closes the bottom of the duct 7b so that the second stretch "P2" is located in an upper portion 8b of the suction conveyor 8.

[0022] The numeral 11 denotes shaping means located along a third stretch "P3" of the path "P" downstream of the second stretch "P2" in the direction of travel "A" of the belt 9. With reference to the embodiment illustrated for example in Figure 1, where the second stretch "P2" is located in the upper portion 8a of the suction conveyor 8, the third stretch "P3" is also located in the upper portion 8a of the suction conveyor 8.

[0023] The shaping means 11 are configured to progressively deform the belt 9 as it advances along the path "P" in such a way as to wrap it around the first smokable material to form the tubular portion 3b of the coaxial stream 3 around the core 3a.

[0024] The shaping means 11 comprise at least two side walls 12 configured to support the belt 9 at least laterally and defining a supporting cavity 13. Transversely to the feed direction "A", the cross section of the supporting cavity changes by closing along the feed direction "A" of the belt 9 along an initial portion of the third stretch "P3" which extends up to a section 14 for forming the coaxial stream 3. In the initial portion of the third stretch "P3", the belt 9 is wound round itself along the feed direction "A" of the belt itself, following the shape of the side walls 12 and of the supporting cavity 13.

[0025] Starting from the section 14 for forming the coaxial stream 3 along a final portion of the third stretch "P3", the transverse cross section of the supporting cavity 13 changes by opening along the feed direction "A" of the belt 9. In the final portion of the third stretch "P3", the belt 9 gradually opens out and returns to its flat shape along the feed direction "A" of the belt itself following the shape of the side walls 12 and of the supporting cavity 13.

[0026] At least in the final portion of the third stretch "P3", the belt 9 is isolated from the chamber 10 so as not to be subjected to suction. In other words, for example starting from the section 14 for forming the coaxial stream 3, the side walls 12 meet under the belt 9 in such a way as to isolate it from the chamber 10, as illustrated in Figures 6 and 7.

[0027] Preferably, in the initial portion of the third stretch "P3", the belt 9 is placed in communication with the chamber 10 so as to be subjected to suction. In other words, upstream of the section 14 for forming the coaxial stream 3, the side walls 12 are spaced apart under the belt 9, creating a channel 15 in communication with the chamber 10, as illustrated in Figures 4 and 5.

[0028] Preferably, the unit 2 comprises a levelling device 16 positioned between the first stretch "P1" and the second stretch "P2" and operating on a layer 17a of the first smokable material feeding out of the duct 7a. More specifically, the levelling device 16 is positioned at the lower portion 8a of the suction conveyor 8. The desired quantity of tobacco can be measured by the weight control system "W", schematically illustrated in Figure 1, which adjusts the height of the levelling device 16.

[0029] The unit 2 also comprises a suction transfer conveyor 18 interposed at the top between the suction conveyor 8 and a rod forming unit 19 which, in a first possible embodiment of it, is described in detail further on in this description.

[0030] The suction transfer conveyor 18 is configured to transfer the coaxial stream 3 from an upper unloading station 20 of the suction conveyor 8 along the third stretch "P3" downstream of the section 14 for forming the coaxial stream to an upper loading station 21 of the rod forming unit 19.

[0031] The suction transfer conveyor 18 comprises an

air permeable belt 22 which is wound in a loop around a chamber 23.

[0032] The chamber 23 communicates with a suction unit of known type, not illustrated, and is configured to apply the suction on the belt 22 at least at some zones, for example through openings made in the wall which delimits the chamber, in known manner and not illustrated.

[0033] The belt 23 is wound around pulleys 24 which move it in a direction of travel "B" to define a closed path "P" which follows the lateral profile of the belt itself. A lower stretch 25 of the belt 22 is configured to partly wrap an upper portion of the coaxial stream 3 to define a path for transferring the coaxial stream itself. The numeral 26 denotes containment walls associated with the suction transfer conveyor 18 and extending between the unloading station 20 and the loading station 21 in the lower stretch 25 of the belt 22 for laterally containing the coaxial stream 3 being transferred by the suction conveyor 8 to the rod forming unit 19.

[0034] Preferably, a levelling device 27 is located along the transfer path to operate on the tubular portion 3b of the coaxial stream 3. In this case, the containment walls 26 advantageously have a break in them at the levelling device 27.

[0035] With reference to the loading station 21, the coaxial stream 3 is disposed on a belt 28 of the rod forming unit 19 with a continuous paper tape 29 interposed between it and the belt. The paper tape 29 is fed together with the belt 28 along a customary rod forming beam 30 which, in known manner, progressively folds the belt 28 transversely around the tape 29 and the coaxial stream 3. When the tape 29 is wrapped all the way round the coaxial stream 3, the opposite longitudinal ends of the tape 29 are joined to each other in known manner by a gluing device, not illustrated, to form a continuous coaxial rod, which is subsequently cut transversely into segments (not illustrated) by a cutting head (of known type not illustrated) to form cigarettes.

[0036] Figure 11 shows a cigarette making machine 1 comprising the first feed unit 4 for feeding the first smokable material, the second feed unit 6 for feeding the second smokable material and the suction conveyor 8.

[0037] The first unit 4 comprises an infeed hopper through which the smokable material is fed to a feed duct 31 comprising a conveying wheel 32. In the feed duct 31, the flow "F" of material is preferably directed upwards and vertical.

[0038] Starting from the conveying wheel 32, the feed duct divides into a first feed portion 33 configured to feed the first unit 4 and a second feed portion 34 configured to feed the second unit 6. Thus, the first smokable material and the second smokable material coincide.

[0039] Alternatively, the first and second feed portions may be connected to respective feed ducts, each intended to feed a specific smokable material when the first and second smokable materials are different.

[0040] One or more conveying wheels 35 may be disposed along the first feed portion 33 and/or the second feed portion 34. Suitable suction and/or blowing means are provided along the feed duct 31 or along the first and second feed portions 33, 34.

[0041] In use, the first smokable material suitable for forming the tubular portion 3b of the coaxial stream is fed at the bottom of the suction conveyor 8, in particular along the first stretch "P1" of the path "P" defined by the belt 9 of the suction conveyor 8. The tobacco 5a coming out of the duct 7a collects on the lower branch of the belt 9, forming a layer 17a of tobacco whose thickness is adjusted by the levelling device 16, which removes the excess of the first smokable material as it passes between the first and the second stretch, as a function of the necessary quantity of tobacco, measured by the weight control system "W" which adjusts the height of the levelling device 16.

[0042] The second smokable material suitable for forming the core 3a of the coaxial stream 3 is fed at the top of the suction conveyor 8, along the second stretch "P2" of the path "P". More specifically, the tobacco 5b falling down along the duct 7b collects on the upper branch of the belt 9, forming a layer 17b of tobacco.

[0043] Preferably, the width of the layer 17a is comparable to the circumference of the finished cigarette and the width of the layer 17b is comparable to the diameter of the core 3a.

[0044] As it advances along the third stretch "P3" of the path "P", the belt 9 is progressively deformed in such a way as to wrap it around the first smokable material to form the tubular portion 3b of the coaxial stream 3 around the core 3a. More specifically, the belt 9 is wound round itself along the feed direction "A" as far as the section 14 for forming the coaxial stream 3 and then opened out after the forming section.

[0045] Preferably, during the opening out step, the belt 9 is not subjected to suction, that is to say, it is not in communication with the chamber 10.

[0046] The coaxial stream 3 thus obtained is transferred between the upper unloading station 20 of the suction conveyor 8 and the upper loading station 21 of the rod forming unit 19. In transferring the coaxial stream 3, the belt 22 of the suction conveyor 18 is wrapped around at least an upper portion of the coaxial stream, which is suspended along the transfer path and held in place by suction. The coaxial stream 3 is kept in shape by the containment walls 26 associated with the suction transfer conveyor 18. The excess of the first smokable material is removed by the levelling device 27 while the coaxial stream 3 is being transferred from the suction conveyor 8 to the rod forming unit 19. The levelling device is adjustable in height by a total weight control unit, of known type and not illustrated, so that once the weight of the tobacco is adjusted by means of the levelling device 16, the two tobacco components are precisely measured.

[0047] The coaxial stream 3 received by the rod forming unit 19 advances along the rod forming beam 30 together with the paper tape 29 to form the continuous rod.

[0048] Figure 10 shows a possible variant embodiment comprising the first feed unit 4 for feeding the first smokable material, preferably in the form of shredded tobacco 5a, suitable for forming the tubular portion 3b, and a second feed unit 60 for feeding the second smokable material, suitable for forming the core 3a in the form of segments of one or more smokable materials, which in the example, are two different smokable materials.

[0049] The second unit 60 comprises a rotary element 61 configured to position the segments parallel to the second stretch "P2" of the path "P". The rotary element 61 is fed by one or more loading hoppers 62 (two in the example of Figure 11) and by one or more sequences 63 of feed drums, preferably spacing adapters.

[0050] In this case, in use of the machine, the second smokable material suitable for forming a core 3a of the coaxial stream 3 is fed by placing an aligned sequence of segments on the upper branch of the belt 9 to form a core 3a resting on the layer 17a of tobacco.

[0051] The rest of the unit 2 is similar to that described with reference to Figures 1-9.

[0052] Figure 13 shows a possible variant embodiment comprising the first feed unit 4 for feeding the first smokable material, in the form of shredded tobacco 5a, suitable for partially forming the tubular portion 3b. More specifically, the first unit 4 comprises a substantially vertical duct 7a defining an ascending flow of particles of the first smokable material in the form of shredded tobacco 5a. The belt 9, closes the top of the duct 7a so that the first stretch P1 is located in a lower portion 8a of the suction conveyor 8.

[0053] The numeral 9' denotes a further air permeable belt which is wound in a loop around a further chamber 10a communicating with a suction unit and which is movable in a direction of travel A' to define a closed path P'.

[0054] A stretch "X1" of the further belt 9' is superposed on the top of a stretch "X" of the belt 9.

[0055] The second unit 600 comprises feed means, not illustrated, configured to feed, between the belt 9 and the further belt 9', an elongate element "L" of the second smokable material suitable for forming the core 3a.

[0056] The reference label 7b denotes a substantially vertical duct defining a descending flow of particles of a third smokable material in the form of shredded tobacco, preferably the same as the first smokable material.

[0057] The further belt 9' closes the bottom of the duct 7b.

[0058] As in the other examples described, the suction transfer conveyor 18 is interposed between the suction conveyor 8 and the rod forming unit 19. The suction transfer conveyor 18 is configured to transfer the coaxial stream 3 and comprises an air permeable belt which is wound in a loop around a chamber 23 in communication with a suction unit. In the example illustrated, the further belt 9' itself forms the suction conveyor 18.

[0059] As described above, the suction conveyor 18 is configured to partly wrap an upper portion of the coaxial stream 3 and to keep it suspended and held by suction along the transfer path.

[0060] In use of the unit according to this embodiment, the first smokable material is fed below the suction conveyor 8 and the third smokable material, preferably the same as the first smokable material, is fed above the further belt 9'. The elongate element "L" of the second smokable material is fed in such a way as to place it between the belt 9 and the further belt 9', in particular between the two stretches "X" and "X1 ".

[0061] The machine 1 illustrated in Figure 11 may be used in conjunction with the embodiment illustrated in Figure 13.

[0062] In a possible alternative embodiment, illustrated for example in Figure 11a, the belt 9 is fed by the duct 7a, preferably curved, and the belt 9' is fed by the duct 7b, preferably curved. The two ducts are fed with the same smokable material coming from the feed duct 31 and divided Into the first and second feed portions 33, 34.

[0063] The first and second feed portions 33, 34 may be positioned in a front plane of the machine 1.

Claims

1. A unit (2) for forming a coaxial stream (3) for a machine (1) for making coaxial cigarettes, comprising:

- a suction conveyor (8) comprising an air permeable belt (9) which is wound in a loop around a chamber (10) communicating with a suction unit and which is movable in a direction of travel ("A") to define a closed path ("P"),
- a first unit (4) for feeding a first smokable material suitable for at least partly forming a tubular portion (3b) of the coaxial stream (3), the first unit (4) being configured to feed the first smokable material along a first stretch ("P1") of the path ("P"),
- a second unit (6; 60; 600) for feeding a second smokable material suitable for forming a core (3a) of the coaxial stream (3), the second unit (6; 60; 600) being configured to feed the second smokable material along a second stretch ("P2") of the path ("P") downstream of the first stretch ("P1") in the direction of travel ("A") of the belt (9),

characterized in that it comprises a suction transfer conveyor (18) interposed between the suction conveyor (8) and a rod forming unit (19), the suction transfer conveyor (18) being configured to transfer the coaxial stream (3), and **in that** the suction transfer conveyor (18) comprises an air permeable belt (22) which is wound in a loop around a chamber (23) communicating with a suction unit and which is movable in a direction of travel ("B") to define a closed path, where the suction conveyor (18), at a lower stretch of the belt (22), is configured to partly wrap an upper portion of the coaxial stream (3) and to

keep it suspended and held by suction along a transfer path.

2. The unit (2) according to claim 1, **characterized in that** it comprises shaping means (11) located along a third stretch ("P3") of the path ("P") downstream of the second stretch ("P2") in the direction of travel ("A") of the belt (9), the shaping means (11) being configured to progressively deform the belt (9) as it advances along the path ("P") in such a way as to wrap it around the first smokable material to form the tubular portion (3b) of the coaxial stream (3) around the core (3a).

3. The unit (2) according to claim 2, **characterized in that** the wrapping means (11) comprise at least two side walls (12) configured to support the belt (9) at least laterally and defining a supporting cavity (13) whose transverse cross section changes by closing along the feed direction ("A") of the belt (9) in an initial portion of the third stretch ("P3") which extends up to a section (14) for forming the coaxial stream (3) and which preferably changes by opening along the feed direction ("A") of the belt (9) starting from the section (14) for forming the coaxial stream in a final portion of the third stretch ("P3").

4. The unit (2), according to claim 3, **characterized in that** at least in the final portion of the third stretch ("P3"), the belt (9) is isolated from the chamber (10) so as not to be subjected to suction.

5. The unit (2) according to claim 4, **characterized in that** in the initial portion of the third stretch ("P3"), the belt (9) is in communication with the chamber (10) so as to be subjected to suction.

6. The unit (2) according to one or more of claims 2 to 5, **characterized in that** at least the second stretch ("P2") and the third stretch ("P3") are located in an upper portion (8b) of the suction conveyor (8).

7. The unit (2) according to claim 6, **characterized in that** the second unit (6) comprises a substantially vertical duct (7b) defining a descending flow of particles of the second smokable material in the form of shredded tobacco (5b) and **in that** the belt (9) closes the bottom of the duct (7b).

8. The unit (2), according to claim 6, **characterized in that** the second unit (60) comprises a rotary element (61) configured to position pieces of one or more smokable materials parallel to the second stretch ("P2") of the path ("P") and fed by at least one loading hopper (62) and by at least one sequence (63) of feeding drums, preferably spacing adapters.

9. The unit (2) according to any one of claims 6-8, **characterized in that** the first unit (4) comprises a substantially vertical duct (7a) defining an ascending flow of particles of the first smokable material in the form of shredded tobacco (5a) and **in that** the belt (9) closes the top of the duct (7a) so that the first stretch ("P1") is located in a lower portion (8a) of the suction conveyor (8).

10. The unit (2) according to claim 9, **characterized in that** it comprises a levelling device (16) positioned between the first stretch ("P1") and the second stretch ("P2") and operating on a layer (17a) of the first smokable material feeding out of the duct (7a), the levelling device (16) being preferably adjustable in height by a weight checking system (W).

11. The unit (2) according to claim 10, **characterized in that** the levelling device (16) is positioned at the lower portion (8a) of the suction conveyor (8).

12. The unit (2) according to any one of claims 2-11, **characterized in that** the suction transfer conveyor (18) is interposed at the top between the suction conveyor (8) and the rod forming unit (19), the suction transfer conveyor (18) being configured to transfer the coaxial stream (3) from an upper loading station (20) of the suction conveyor (8) along the third stretch ("P3") downstream of a section (14) for forming the coaxial stream (3) to an upper loading station (21) of the rod forming unit (19).

13. The unit (2) according to one or more of the preceding claims and in particular according to claim 12, **characterized in that** it comprises a levelling device (27) located along the transfer stretch and operating on the tubular portion (3b) of the coaxial stream (3), the levelling device (27) being preferably adjustable in height by a total weight checking device.

14. The unit (2) according to claim 1, **characterized in that** it comprises a further air permeable belt (9') which is wound in a loop around a further chamber (10a) communicating with a suction unit and which is movable in a direction of travel (A') to define a closed path (P'), a stretch of the further belt (9) being superposed at the top on a stretch of the belt (9),
wherein the first unit (4) comprises a substantially vertical duct (7a) defining an ascending flow of particles of the first smokable material in the form of shredded tobacco (5a), wherein the belt (9) closes the top of the duct (7a) so that the first stretch (P1) is located in a lower portion (8a) of the suction conveyor (8),
wherein the second unit (600) comprises feed means configured to feed, between the belt (9) and the further belt (9'), an elongate element (L) of the second smokable material suitable for forming the core (3a), the unit (2) being **characterized in that** it comprises

a substantially vertical duct (7b) defining a descending flow of particles of a third smokable material in the form of shredded tobacco, preferably the same as the first smokable material, wherein the further belt (9') closes the bottom of the duct (7b).

15. A method for forming a coaxial stream (3) in a machine for making coaxial cigarettes, comprising the following steps:

- feeding a first smokable material suitable for at least partly form a tubular portion (3b) of the coaxial stream (3) in a first stretch ("P1") of a path ("P") defined by a belt (9) of a suction conveyor (8),
- feeding a second smokable material suitable for forming a core (3a) of the coaxial stream (3), in a second stretch ("P2") of the path ("P") downstream of the first stretch ("P1") along the direction of travel ("A") of the belt (9), **characterized in that** it comprises the step of transferring the coaxial stream from the suction conveyor (8) to a rod forming unit (19) along a transfer path and **in that** it comprises a step of partly wrapping an upper portion of the coaxial stream (3) keeping the coaxial stream (3) suspended and held by suction along the transfer path.

16. The method according to claim 15, **characterized in that** it comprises the step of progressively deforming the belt (9) as it advances along a third stretch ("P3") of the path ("P") downstream of the second stretch ("P2") in the direction of travel ("A") of the belt itself, in such a way as to wrap it around the first smokable material to form the tubular portion (3b) of the coaxial stream (3) around the core (3a).

17. The method according to claim 16, **characterized by** closing the belt (9) on itself along the feed direction ("A") of the belt (9) itself in an initial portion of the third stretch ("P3") which extends up to a forming section (14) of the coaxial stream (3) and opening the belt (9) along the feed direction ("A") of the belt (9) starting from the section (14) for forming the coaxial stream (3) in a final portion of the third stretch ("P3"), the method being further **characterized in that** it at least in the final portion of the third stretch ("P3") the belt (9) is not subjected to suction.

18. The method according to one or both of claims 16-17, **characterized in that** at least the second stretch ("P2") and the third stretch ("P3") are located in an upper portion (8b) of the suction conveyor (8), the second smokable material being fed above the suction conveyor (8).

19. The method according to claim 18, **characterized in that** the first stretch ("P1") is located in a lower portion (8a) of the suction conveyor (8), the first smokable material being fed below the suction conveyor (8).

20. The method according to claim 19, **characterized in that** it comprises a step of removing the excess of the first smokable material between the first stretch ("P1") and the second stretch ("P2") as a function of a weight check on the first smokable material.

21. The method according to one or more of claims 16-20, **characterized in that** it comprises transferring the coaxial stream from an upper loading station (20) of the suction conveyor (8) located in the third stretch ("P3") downstream of a section (14) for forming the coaxial stream (3) to an upper loading station (21) of a rod forming unit (19).

22. The method according to one or more of claims 16-21, **characterized in that** it comprises a step of removing the excess of the first smokable material while the coaxial stream (3) is transferred from the suction conveyor (8) to the rod forming unit (19) preferably as a function of a total weight check.

23. The method according to claim 15, **characterized in that**

- the first smokable material is fed below the suction conveyor (8), the first stretch ("P1") being located in a lower portion (8a) of the suction conveyor (8),
- a third smokable material, preferably the same as the first smokable material, is fed above a further air permeable belt (9') which is wound in a loop around a further chamber (10a) communicating with a suction unit and which is movable in a direction of travel (A') to define a closed path (P'), a stretch of the further belt (9) being superposed at the top on a stretch of the belt (9),
- feeding an elongate element (L) of the second smokable material suitable for forming the core (3a) in such a way as to position it between the belt (9) and the further belt (9').

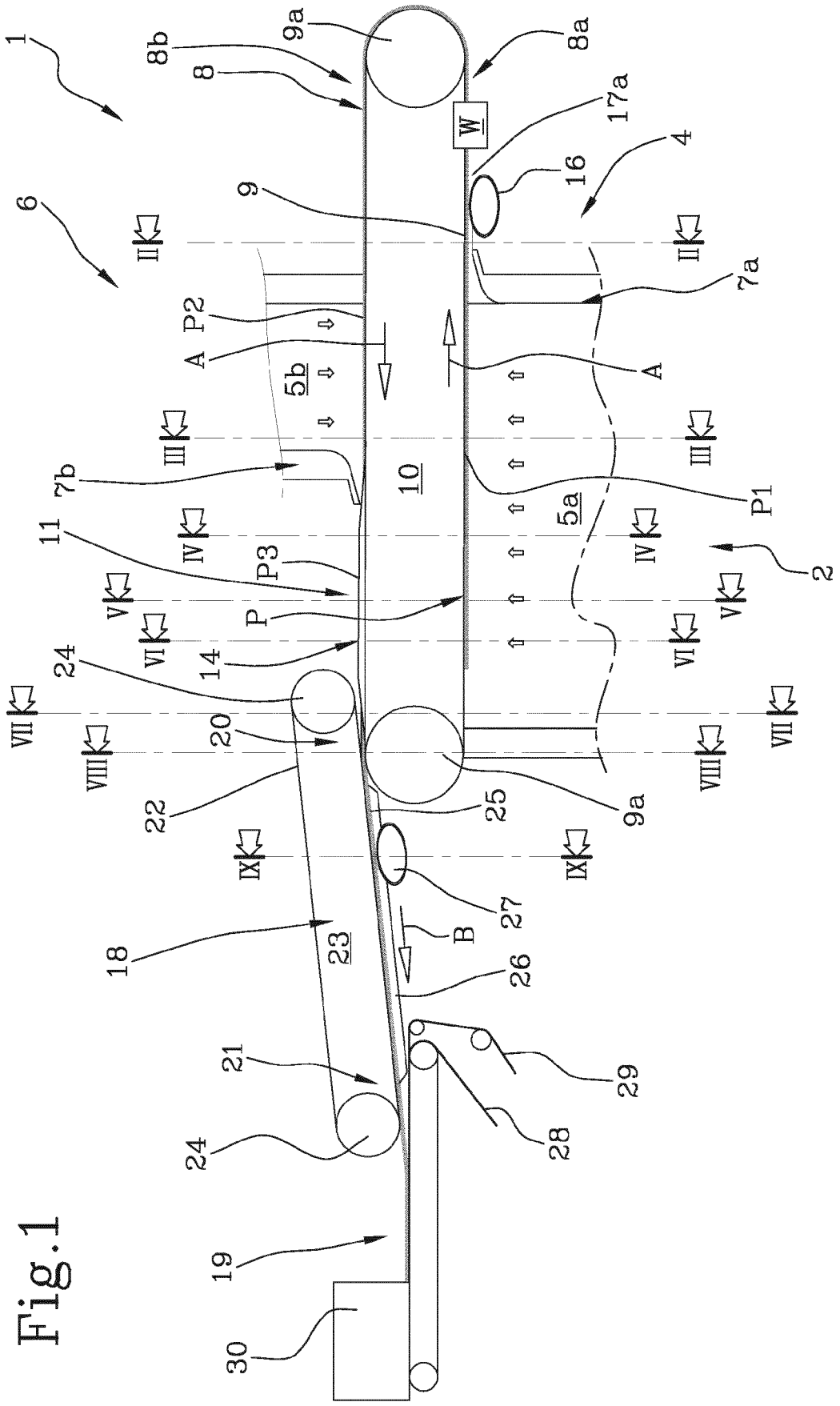

1
8b
8
9a
8a
17a
4
16
9
6
II
II
7a
P2
A
A
5b
III
III
7b
10
P1
11
IV
IV
5a
P3
2
V
V
P
VI
VI
14
24
VII
VII
20
VIII
VIII
22
25
9a
IX
IX
27
18
23
B
26
21
29
24
28
19
30

Fig.1

Fig.2

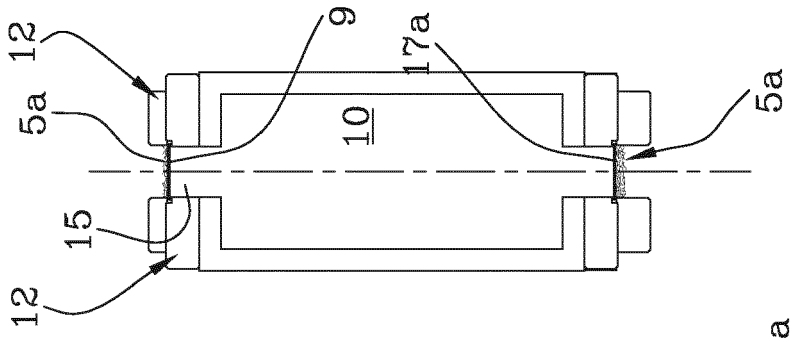


Fig.3

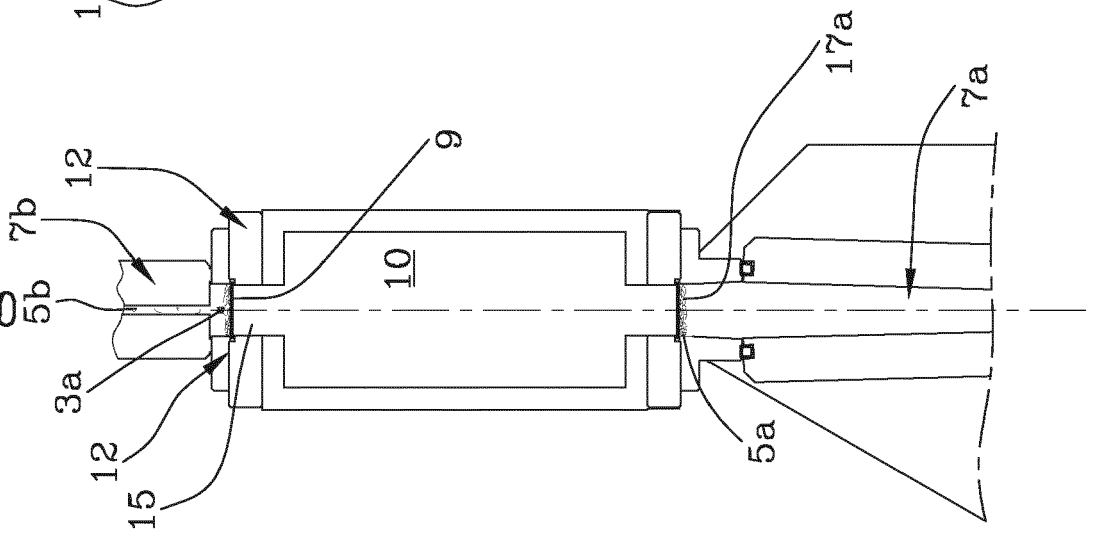


Fig.4

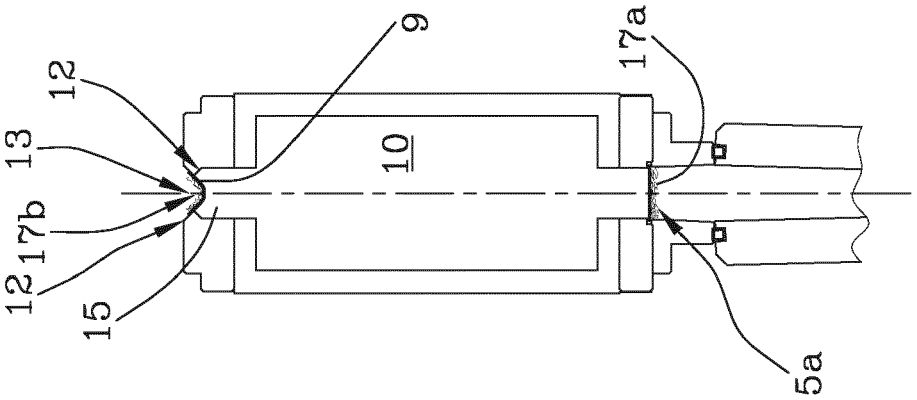


Fig.5

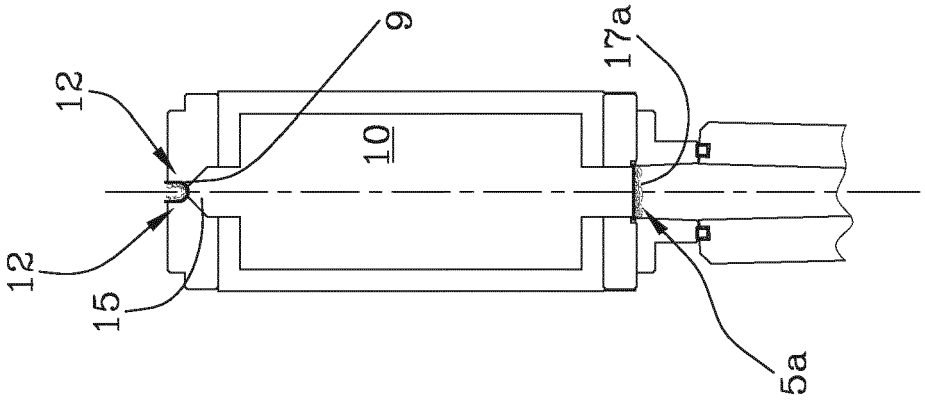


Fig.6

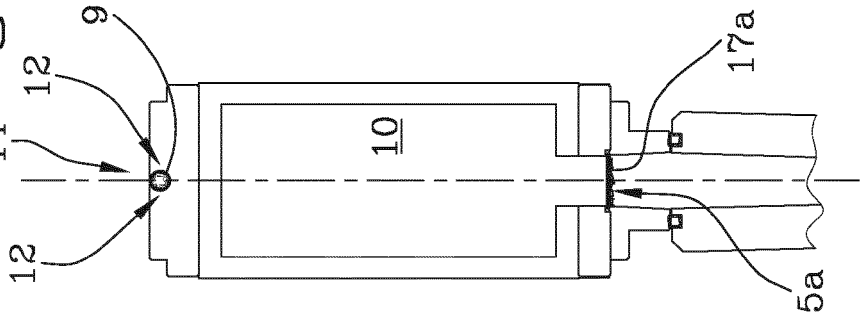


Fig.7

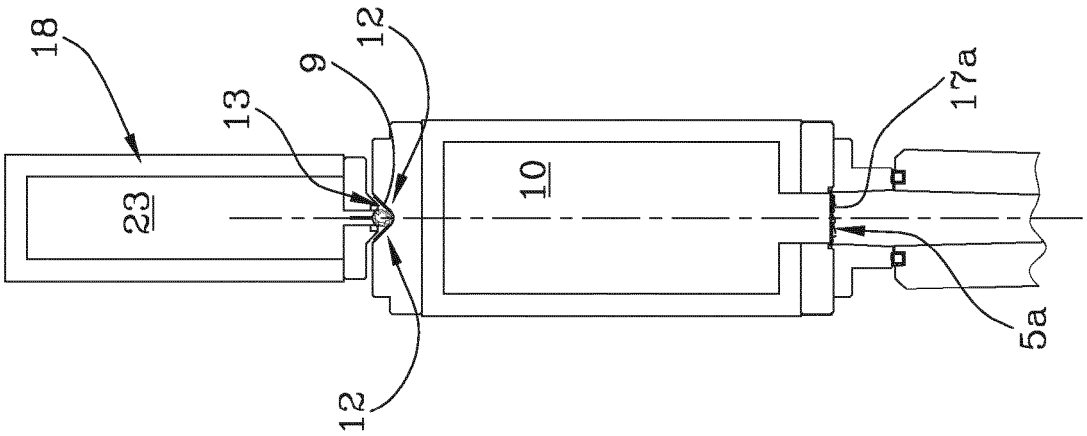


Fig.8

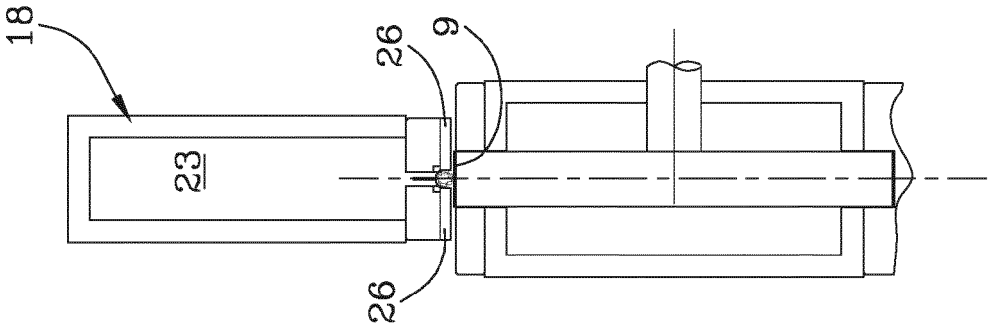
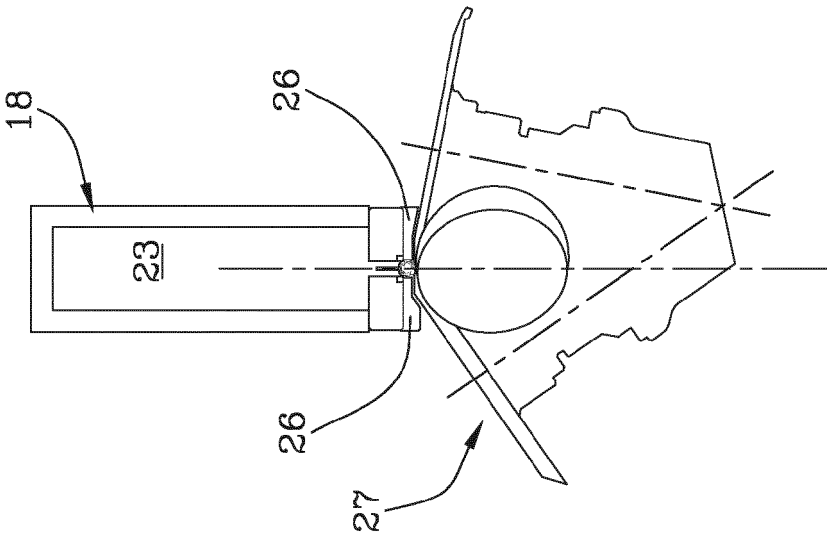


Fig.9



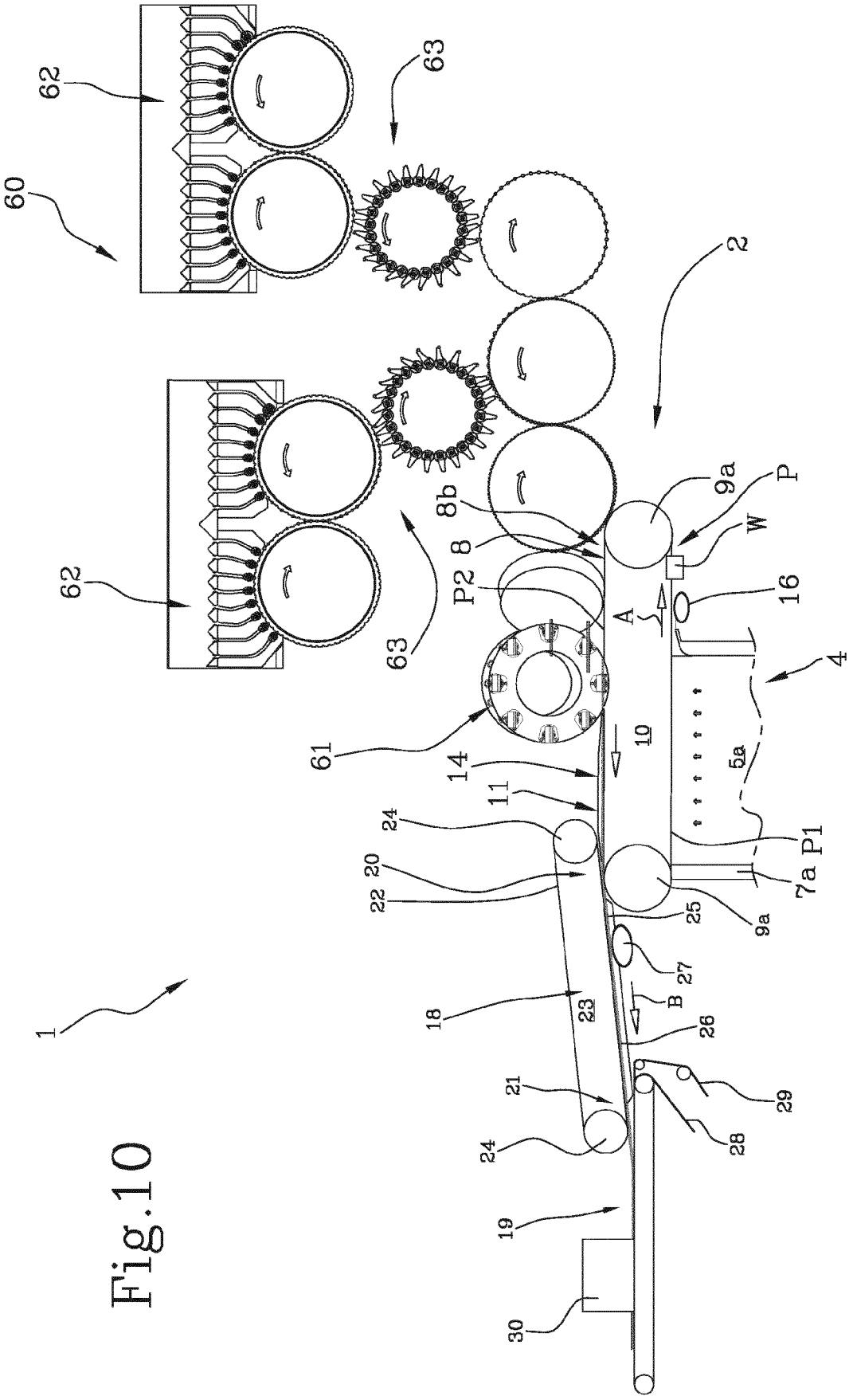

62
63
60
2
62
63
9a
P
8b
W
8
P2
16
A
4
61
10
14
5a
11
24
20
22
7a
P1
25
9a
27
B
18
23
26
21
29
24
28
19
30
1

Fig.10

Fig.11

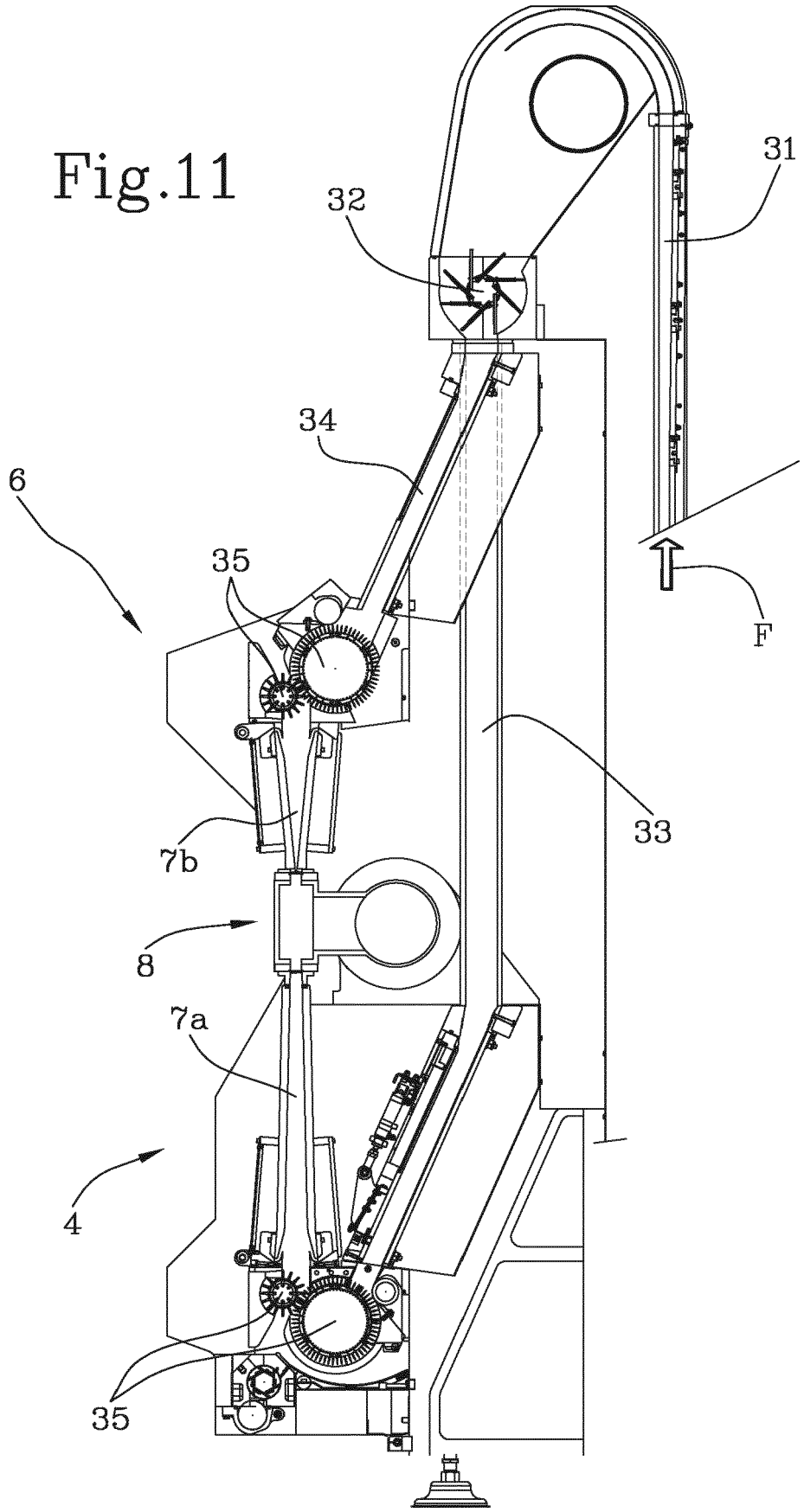
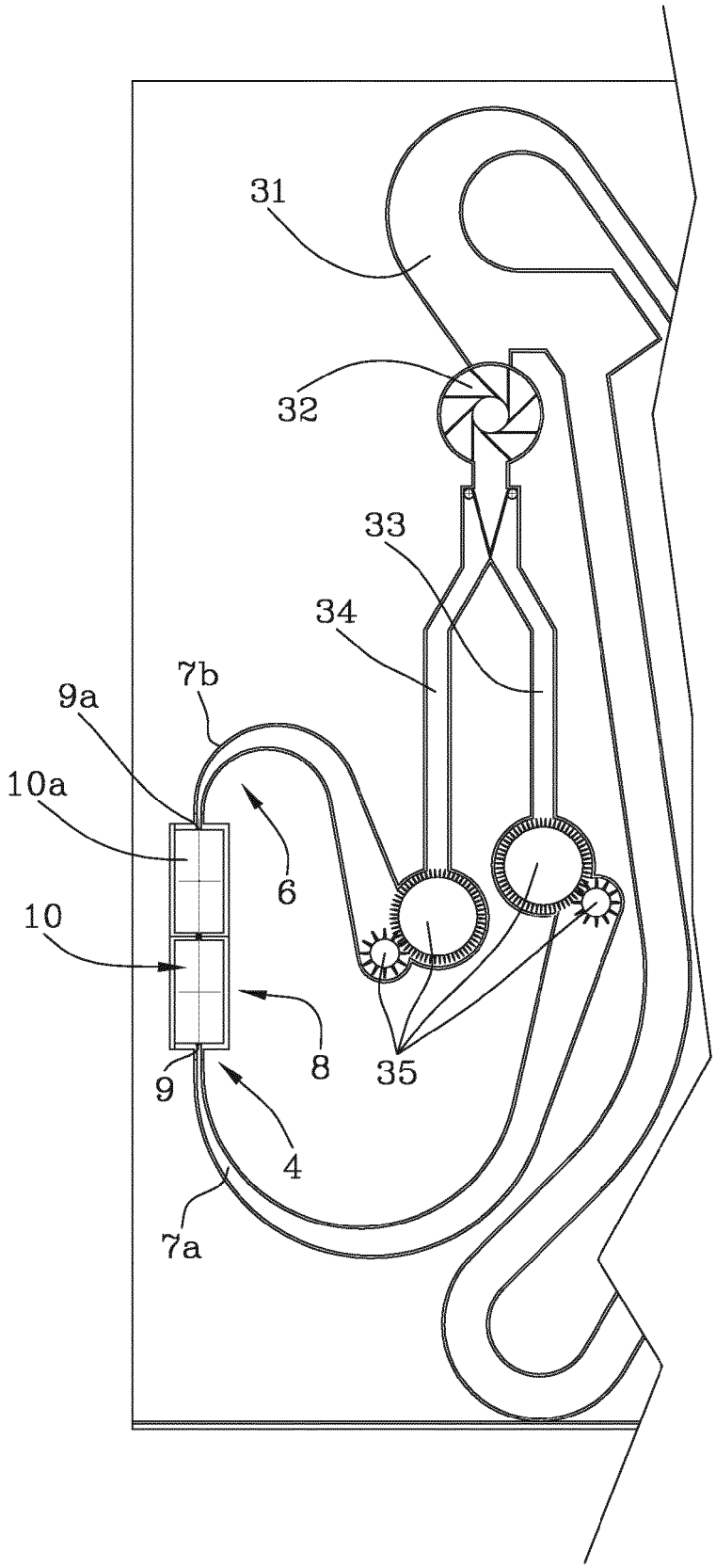


Fig.11a



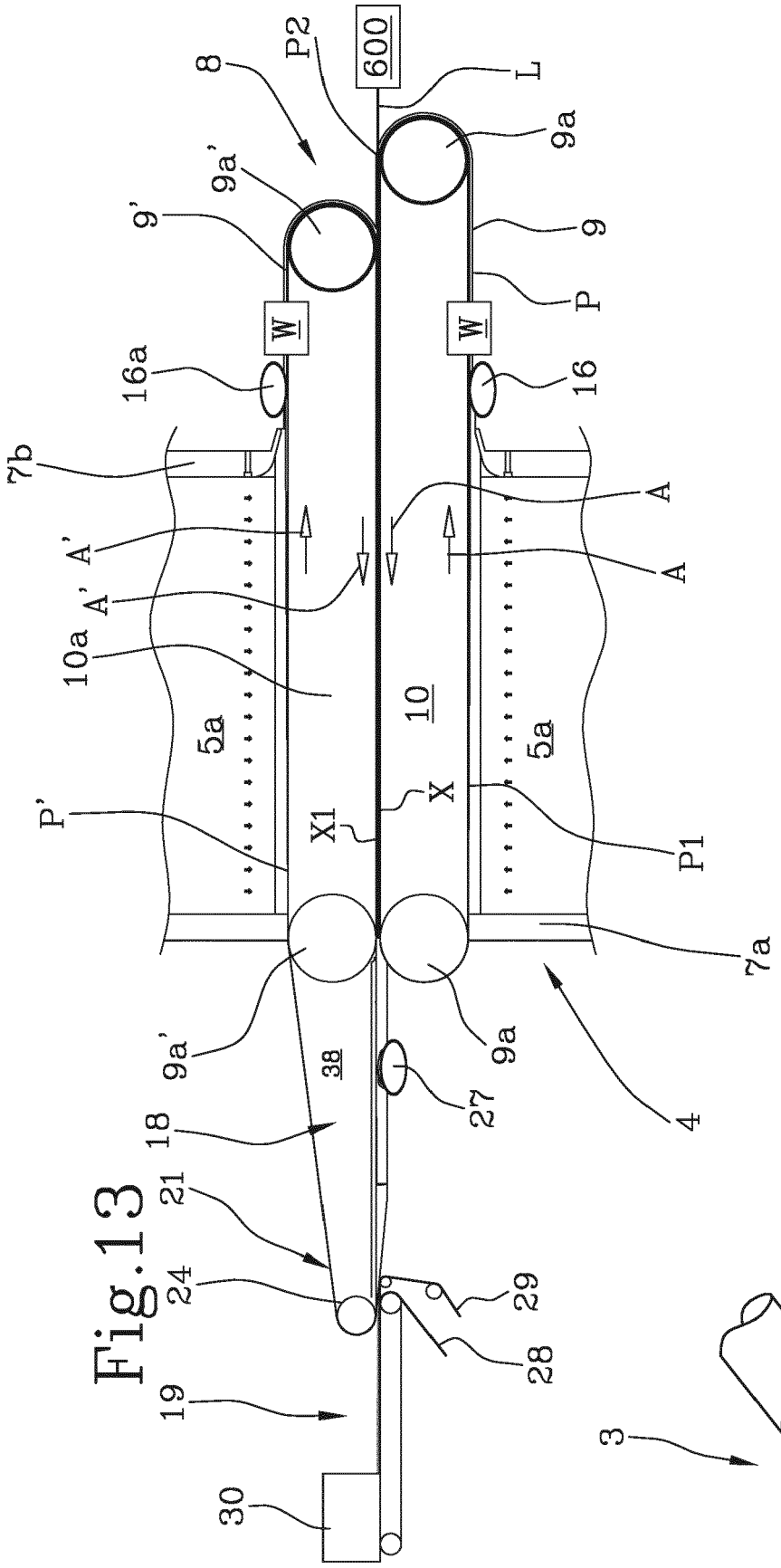

600
P2
L
8
9a
9a'
9'
9
P
W
W
16a
16
7b
A
A'
A'
A
10a
5a
10
5a
P'
X1
X
P1
7a
9a'
9a
38
27
4
18
21
24
29
28
19
30

Fig.13

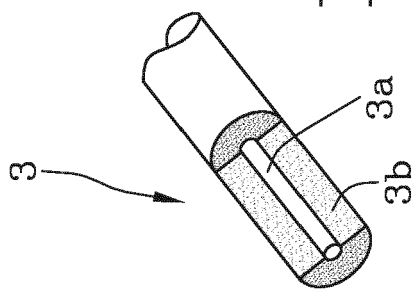

3
3a
3b

Fig.12

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 17 1321

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 4 632 130 A (HEITMANN UWE [DE] ET AL) 30 December 1986 (1986-12-30) * column 5, line 49 - column 11, line 7; figures *	1-23	INV. A24C5/18
A	EP 1 449 447 A1 (JAPAN TOBACCO INC [JP]) 25 August 2004 (2004-08-25) * paragraph [0029] - paragraph [0037]; figure 3 * * paragraph [0051] - paragraph [0057]; figures 4-8 *	1-23	
A	EP 1 004 248 A2 (HAUNI MASCHINENBAU AG [DE]) 31 May 2000 (2000-05-31) * paragraph [0023] - paragraph [0026]; figures *	1-23	
A	US 4 207 906 A (KALIES HELMUT [DE] ET AL) 17 June 1980 (1980-06-17) * column 2, line 39 - column 3, line 10; figures *	1-23	TECHNICAL FIELDS SEARCHED (IPC)
A,D	DE 10 2013 220757 B3 (HAUNI MASCHINENBAU AG [DE]) 15 January 2015 (2015-01-15) * paragraph [0055] - paragraph [0059]; figures *	1-23	A24C
A	GB 2 260 887 A (ROTHMANS INT TOBACCO [GB]) 5 May 1993 (1993-05-05) * page 11 - page 14; figures 7-14 *	1-23	
A	DE 195 18 179 A1 (MOLINS PLC [GB]) 23 November 1995 (1995-11-23) * abstract; figures *	1-23	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 September 2017	Marzano Monterosso

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 17 1321

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-09-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4632130 A	30-12-1986	GB 2150008 A	26-06-1985
		IT 1178560 B	09-09-1987
		JP S6098975 A	01-06-1985
		US 4632130 A	30-12-1986
EP 1449447 A1	25-08-2004	AT 547016 T	15-03-2012
		CA 2465844 A1	15-05-2003
		CN 1582119 A	16-02-2005
		DK 1449447 T3	21-05-2012
		EP 1449447 A1	25-08-2004
		ES 2380314 T3	10-05-2012
		JP 4002887 B2	07-11-2007
		JP WO2003039275 A1	24-02-2005
		KR 20050039698 A	29-04-2005
		PT 1449447 E	26-04-2012
		TW I224951 B	11-12-2004
		US 2004200493 A1	14-10-2004
		WO 03039275 A1	15-05-2003
EP 1004248 A2	31-05-2000	CN 1254535 A	31-05-2000
		DE 19854364 A1	31-05-2000
		EP 1004248 A2	31-05-2000
		JP 2000253865 A	19-09-2000
		PL 336741 A1	05-06-2000
		US 6390100 B1	21-05-2002
US 4207906 A	17-06-1980	AU 513260 B2	20-11-1980
		BE 863115 A1	16-05-1978
		CH 626789 A5	15-12-1981
		DE 2633119 A1	02-02-1978
		GB 1541339 A	28-02-1979
		NL 7714445 A	29-06-1979
		US 4207906 A	17-06-1980
DE 102013220757 B3	15-01-2015	NONE	
GB 2260887 A	05-05-1993	NONE	
DE 19518179 A1	23-11-1995	CN 1117829 A	06-03-1996
		DE 19518179 A1	23-11-1995
		FR 2719980 A1	24-11-1995
		IT 1278071 B1	17-11-1997
		JP H0838141 A	13-02-1996

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2007069091 A **[0004]**
- EP 503461 A **[0004]**
- DE 102013220757 **[0005] [0006] [0007] [0009]**
- GB 2260887 A **[0008] [0009]**