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(54) **FILTER MANUFACTURING MACHINE**

(57) Machine for manufacturing filters (2) for cigarettes, comprising an operating assembly (8) to widen a tow (4) of filtering material and a forming assembly (9) to obtain a filter rod (10) with the aforementioned tow (4); treatment modules (11), arranged between the operating assembly (8) and the forming assembly (9), can be re-

placed with other treatment modules (11) designed to treat the tow (4) of filtering material in a different manner and which can be mounted one on the other so as to be able to carry out several different treatments, at the same time, on the same tow of filtering material (4).

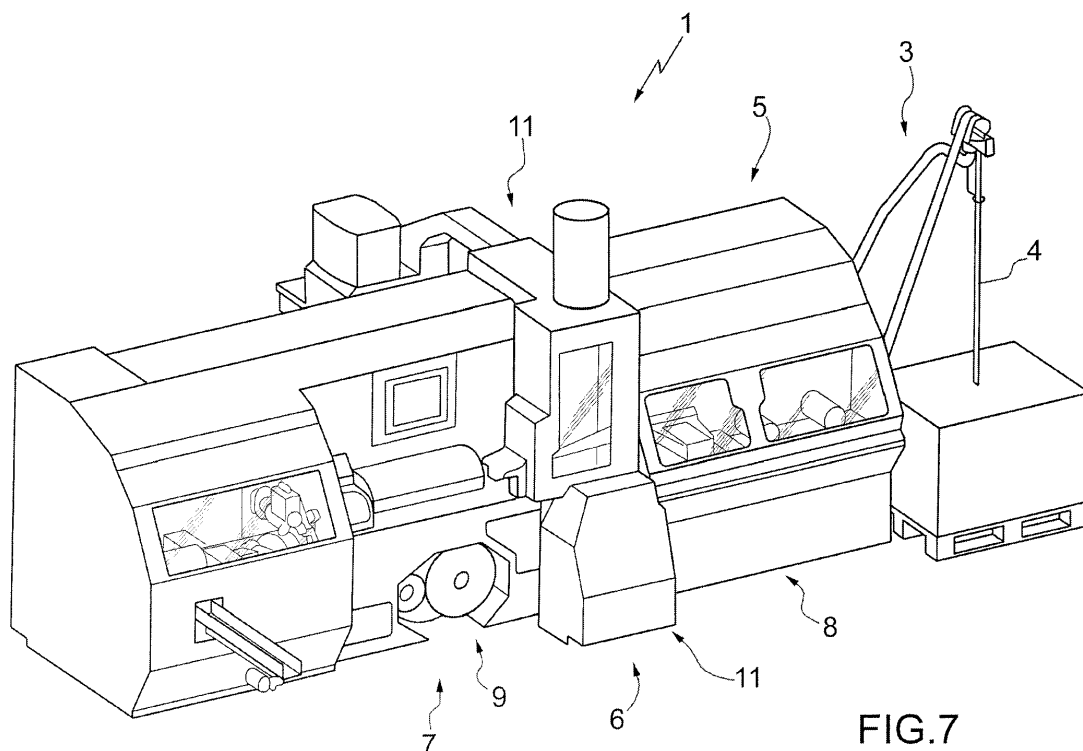


FIG.7

Description

[0001] The present invention relates to a machine for manufacturing filters of the tobacco processing industry. In particular, the present invention relates to a machine for manufacturing filters for smoking articles (cigarettes).

[0002] In the field of tobacco processing industry (Figure 14), it is known to produce filters by using a continuous tow A of filtering material, normally cellulose acetate, which is fed with a continuous motion through a operating station B, in the area of which the tow A is stretched so as to widen and possibly is impregnated with a hardening substance (e.g. triacetin), to a forming station C, in the area of which a substantially cylindrical shaped filter rod usually wrapped by a strip of paper is obtained.

[0003] In some cases (Figure 15), a treatment device D is arranged between the operating station B, and the forming station C to further treat the filtering material before the manufacturing of the filter rod. This further treatment can comprise, according to some examples, the inclusion of carbon particles or of a longitudinal flavored strand.

[0004] The known machines for manufacturing filters are relatively rigid and do not allow, in the majority of cases, to manufacture filters of a different type.

[0005] The object of the present invention is to provide a machine which allows to overcome, at least partially, the drawbacks of the known art and is, at the same time, easy and inexpensive to implement.

[0006] According to the present invention, a machine, as claimed in the independent claims below, and, preferably, in any one of the claims depending directly or indirectly on the aforementioned independent claims is provided.

[0007] The present invention will now be described with reference to the accompanying drawings, which illustrate examples of nonlimiting embodiments, wherein:

- Figure 1 is a schematic side view of a machine made according to the present invention;
- Figures from 2 to 7 are schematic and perspective views of machines made according to the present invention;
- Figures from 8 to 11 are schematic and perspective views of filters obtainable by means of machines according to the present invention;
- Figures 12 and 13 illustrate filters, partly disassembled, obtainable by means of machines according to the present invention;
- Figures 14 and 15 are perspective and schematic views of machines of the prior art.

[0008] In Figure 1, 1 denotes as a whole a machine A for manufacturing filters of the tobacco processing industry 2 (Figures 8-13). In particular, the machine 1 is designed to produce filters 2 for cigarettes.

[0009] The machine 1 (Figure 1) comprises a feeding

assembly 3 to feed a tow 4 of filtering material along a given path P1 through an operating station 5 and a treatment station 6 to a forming station 7. The treatment station 6 is arranged downstream of the operating station 5 (in particular, between the operating station 5 and the forming station 7).

[0010] According to some embodiments, the treatment station 6 is (at least) partially overlapping the forming station 7.

[0011] The machine 1 comprises an operating assembly 8, which is arranged in the area of the operating station 5 and is designed to stretch the tow 4 so that the tow 4 itself expands and generates a larger tow 4; and a forming assembly 9, which is arranged in the area of the forming station 7 and is designed to form a filter rod 10.

[0012] In particular, the operating assembly 8 is also designed to apply a hardening substance (typically, triacetin) to the larger tow 4.

[0013] The machine 1 further comprises a treatment module 11, which is arranged in the area of the processing station 5 and is designed to carry out a first treatment on the tow 3.

[0014] According to the embodiment illustrated in Figure 2, the treatment module 11 is designed to harden the tow 4 so as to be able to obtain a paperless filter (NWA - non-wrapped acetate). Typically, in this case, the treatment module 11 is designed to supply heat (in particular, steam) to the hardening substance (typically, triacetin) contained in the tow 4 of filtering material and (then) activate said hardening substance. The treatment module 11 can be, for example, made according to what is described in EP 263632B1.

[0015] Figure 11 illustrates a filter 2 obtainable when the treatment module 11 is designed to harden the tow 4.

[0016] According to the embodiment illustrated in Figure 3, the treatment module 11 is designed to insert particles 12 in the tow 4, in particular in powder or granular form. The particles 12, in some cases, contain (consist of) carbon (activated) particles and/or silica. In particular, the particles contain (consist of) carbon (activated) particles. The treatment module 11 can be, for example, formed according to what is described in one more of the following patent documents: GB1585761, US3128680, WO2005/087026, US6913784.

[0017] Figure 8 illustrates a filter 2 obtainable when the treatment module 11 is designed to insert particles 12 into the tow 4.

[0018] According to the embodiment illustrated in Figure 4, the treatment module 11 is designed to insert, into the tow 4, a strand 13 (in particular colored and/or flavored), which extends longitudinally along the tow 4 itself. The treatment module 11 can be, for example, made according to what is described in US2014/0100099.

[0019] Figure 10 illustrates a 2 filter obtainable when the treatment module 11 is designed to insert a strand 13 into the tow 4.

[0020] According to the embodiment illustrated in Figure 5, the treatment module 11 is designed to wrap the

tow 4 with a strip of corrugated material 14 so as to obtain double wrapped filters (corrugated filters). The treatment module 11 can be, for example, made according to what is described in JP2007000019. Figure 13 illustrates a filter 2 obtainable when the treatment module 11 is designed to wrap the tow 1 with a strip of corrugated material 14.

[0021] According to the embodiment illustrated in Figure 6, the treatment module 11 is designed to insert capsules 15 into the tow 4. The treatment module 11 may be, for example, formed according to what is described in GB1585761. Figure 12 illustrates a filter 2 obtainable when the treatment module 11 is designed to insert capsules 15 into the tow 4.

[0022] In particular, the treatment module 11 can be replaced with a second treatment module 11 designed to carry out a second treatment (different from the first treatment) to the tow 4 of filtering material.

[0023] In accordance with what has been mentioned above, it is for example possible to replace the treatment module 11, designed to harden the tow 3, with the treatment module 11, designed to insert the particles 12 or the strand 13 into the tow 3.

[0024] Preferably, the treatment module 11 is structured so that it is possible to connect a third treatment module 11, which is designed to carry out a third treatment (different from the first and from the second treatment) on the tow 4 of filtering material, so that the third treatment module 11 is arranged in the area of the treatment station. In this way it is possible to carry out two treatments, both the third treatment and the first (or the second) treatment on the tow 4. For example, it is possible to wrap the tow 4 with a strip of corrugated material 14 and to insert capsules 15 into the tow 4 itself or to insert both particles 12 and a strand 13 into the tow 4 (in order to obtain the filter illustrated in figure 9).

[0025] In particular, the treatment module 11 comprises a first connection unit, which connects (in a releasable manner) the treatment module 11 to the operating assembly 8 and/or to the forming assembly 9 so that the treatment module 11 functions in a coordinated manner (in other words, in step) relative to the operating assembly 8 and/or to the forming assembly 9. Advantageously, the treatment module 11 also comprises a second connection unit to connect (in a releasable manner) the connection module to a third connection unit 11 of the third treatment module.

[0026] The connection units (not illustrated) are of a known type and can be of a mechanic and/or electric (electronic) type. For example, the connection units can comprise the mechanic joints and/or a system of connectors/gates.

[0027] With particular reference to Figure 7, according to some embodiments (and according to a particular aspect of the present invention), the machine comprises the treatment module 11 (as defined above) and the third treatment module 11 (as defined above), which is arranged in the area of the treatment station, is designed

to carry out the third treatment on the tow 4 of filtering material. Advantageously, the third treatment module 11 can be replaced with a fourth treatment module 11 which is designed to carry out a fourth treatment on the tow 4 of filtering material, which is different from the third treatment.

[0028] For example the third treatment can be the insertion of the strand 13 and, the fourth treatment, the insertion of the particles 12.

[0029] More generally, advantageously, the first, the second and the third (and the fourth) treatment are selected in the group consisting of: insertion of the particles 12 (in particular, as defined above), insertion of the longitudinal strand 13, insertion of capsules 15, hardening treatment and wrapping with a strip of paper (more precisely, with the strip of corrugated material 14 - in particular, as referred to as a preference above).

[0030] Advantageously, the first and the third treatment are different from one another. In particular, the first, the second and the third treatment are mutually different. More precisely, the first, the second, the third and fourth treatment are different from one another.

[0031] According to preferred embodiments, the treatment module 11 occupies the space available between the forming assembly 9 and the operating assembly 8. The third treatment module 11 is mounted on the treatment module 11.

[0032] For example, in Figure 7 the machine 1 comprises the treatment module 11 for the insertion of capsules 15 into the tow 4 and the treatment module 11 for the insertion of the strand 13 into the tow 4.

[0033] In some cases, the machine 1 comprises a fifth treatment module (not illustrated and similar to the previously described treatment modules), which is arranged in the area of the processing station 6, is designed to carry out a fifth treatment on the tow of filtering material 4 and is removable and replaceable. In particular, the further fifth treatment is different from the first and from the third treatment. Advantageously, the further fifth treatment is (also) different from the second and from the fourth treatment.

[0034] In particular, the fifth treatment is selected in the group consisting of: insertion of the particles 12 (in particular, as defined above), insertion of the longitudinal strand 13, insertion of capsules 15, hardening treatment and wrapping with a strip of paper (more precisely, with the strip of corrugated material 14 - in particular, as referred to as a preference above).

[0035] More generally, the fifth treatment is different from the first, the second, the third and the fourth treatment. According to some embodiments, the fifth treatment module is mounted on the treatment module 11 and/or on the third treatment module 11.

[0036] Note that, advantageously, the fifth treatment module can be further mounted on the second and/or on the fourth treatment module 11.

[0037] In some embodiments (such as that illustrated in Figure 7), the treatment module 11 comprises a first

and a second connection unit (as defined above) and the third treatment module comprises a third connection unit (as defined above) to connect the treatment module 11 and the third treatment module 11 so that the third treatment module 11 functions in a coordinated manner (in other words, in step) relative to the first operating assembly 8 (and to the forming assembly 9). In particular, the second and the third connection units are coupled to one another.

[0038] According to some embodiments, the second treatment module 11 comprises a fourth connection unit to connect the second treatment module 11 to the third treatment module 11 by coupling (in a releasable manner) to the third connection unit 11. The fourth treatment module 11 comprises a fifth connection unit to connect the fourth treatment module 11 to the first or to the second treatment module 11 by coupling (in a releasable manner) to the first or to the fourth connection unit, respectively.

[0039] Alternatively or in addition, the second treatment module 11 comprises a sixth connection unit to connect (in a releasable manner) the second treatment module 11 to the operating assembly 8 and/or to the forming assembly 9 so that the second treatment module 11 functions in a coordinated manner (in other words, in step) relative to the operating assembly 8 and/or to the forming assembly 9.

[0040] According to some embodiments, the fifth treatment module comprises a seventh connection unit to connect (the fifth treatment module 11 to one of the other treatment modules 11 (in a releasable manner) through the respective further connection unit).

[0041] Advantageously, the connection units comprise respective electric and/or mechanic motion transfer means (for example, a shaft and/or a wheel).

[0042] For example, the connection unit may comprise mechanic joints and/or a system of connectors/gates.

[0043] Comparing what has been described above with the machine illustrated in Figure 15, it is important to note that the treatment device D is not replaceable and cannot be combined with other treatment devices in order to carry out more treatments on the tow A.

[0044] The object of the present invention allows to carry out more treatments on the tow 4 and to modify said treatments and, therefore, to manufacture, with a single machine 1, different types of cigarettes with ease.

[0045] Unless it is explicitly stated to the contrary, the content of the references (articles, texts, patent applications etc.) cited in this text is herein fully recalled for completeness of description. In particular, the mentioned references are incorporated herein by reference.

Claims

1. A machine for manufacturing filters (2) of the tobacco processing industry, in particular filters for cigarettes; the machine (1) comprises a feeding assembly (3)

to feed a tow (4) of filtering material along a given path (P1), through an operating station (5) to a forming station (7); the machine (1) comprising, an operating assembly (8), which is arranged in the area of the operating station (5) and is designed to stretch the tow (4) so that the tow (4) itself expands and generates a larger tow (4), and a forming assembly (9), which is arranged in the area of the forming station (7) and is designed to form a filter rod (10); the machine (1) being **characterized in that** the given path (P1) extends through a treatment station (6), which is arranged between the operating station (5) and the forming station (7); the machine (1) comprising a first treatment module (11), which is arranged in the area of the treatment station (6), is designed to carry out a first treatment on the tow (4) of filtering material and can be replaced with a second treatment module (11), which is designed to carry out a second treatment on the tow (4) of filtering material, which is different from the first treatment; and a third treatment module (11), which is arranged in the area of the treatment station (6), is designed to carry out a third treatment on the tow (4) of filtering material, which is different from the first and second treatment, and, in particular, can be replaced with a fourth treatment module (11), which is designed to carry out a fourth treatment on the tow (4) of filtering material, which is different from the third treatment.

2. The machine according to claim 1, wherein the operating assembly (8) is designed to apply a hardening substance (in particular, triacetin) to said larger tow (4); the first, the second, the third and the fourth treatment (11) being selected in the group consisting of: insertion of particles (12) (in particular, of activated carbon), insertion of a longitudinal strand (13), insertion of capsules (15), hardening treatment, wrapping with a strip of paper (14).
3. The machine according to claim 1 or 2, wherein the third treatment module (11) can be replaced with the fourth treatment module (11); the fourth treatment being different from the first and the second treatment; in particular, the first, the second, the third and the fourth treatment are different from one another.
4. The machine according to claim 1 or 2, wherein the first treatment module (11) occupies the space available between the forming assembly (7) and the operating assembly (8); the third treatment module (11) being mounted on the first treatment module (11).
5. The machine according to any of the preceding claims, and comprising a fifth treatment module (11), which is arranged in the area of the treatment station (6), is designed to carry out a fifth treatment on the tow (4) of filtering material and can be removed and replaced; the fifth treatment being different from the

first and the third treatment.

6. The machine according to claim 5, wherein the fifth treatment module (11) is mounted on the first and/or the third treatment module (11); the fifth treatment being different from the second and the fourth treatment. 5
7. The machine according to claim 5 or 6, wherein the fifth treatment is selected in the group consisting of: insertion of particles (12) (in particular, of activated carbon), insertion of a longitudinal strand (13), insertion of capsules (15), hardening treatment, wrapping with a strip of paper (14). 10
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8. The machine according to any of the preceding claims, wherein the first treatment module (11) comprises a first connection unit and a second connection unit; the first connection unit connects (in a releasable manner) the first treatment module (11) to the operating assembly (8) and/or to the forming assembly (9) so that the first treatment module (11) works in a coordinated manner relative to the operating assembly (8) and/or to the forming assembly (9); the third treatment module (11) comprises a third connection unit, which is coupled (in a releasable manner) to the second connection unit to connect the first and the third treatment module (11), so that the third treatment module (11) works in a coordinated manner relative to the first treatment module (11). 20
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9. The machine according to claim 8, wherein the first, the second and the third connection unit comprise respective electric and/or mechanic motion transfer means (for example, a shaft and/or a wheel). 35
10. The machine according to claim 8 or 9, wherein the second treatment module (11) comprises a fourth connection unit to connect the second treatment module (11) to the third treatment module (11) by being coupled (in a releasable manner) to the third connection unit; the fourth treatment module (11) comprises a fifth connection unit to connect the fourth treatment module (11) to the first or the second treatment module (11) by being coupled (in a releasable manner) to the first or the fourth connection unit, respectively. 40
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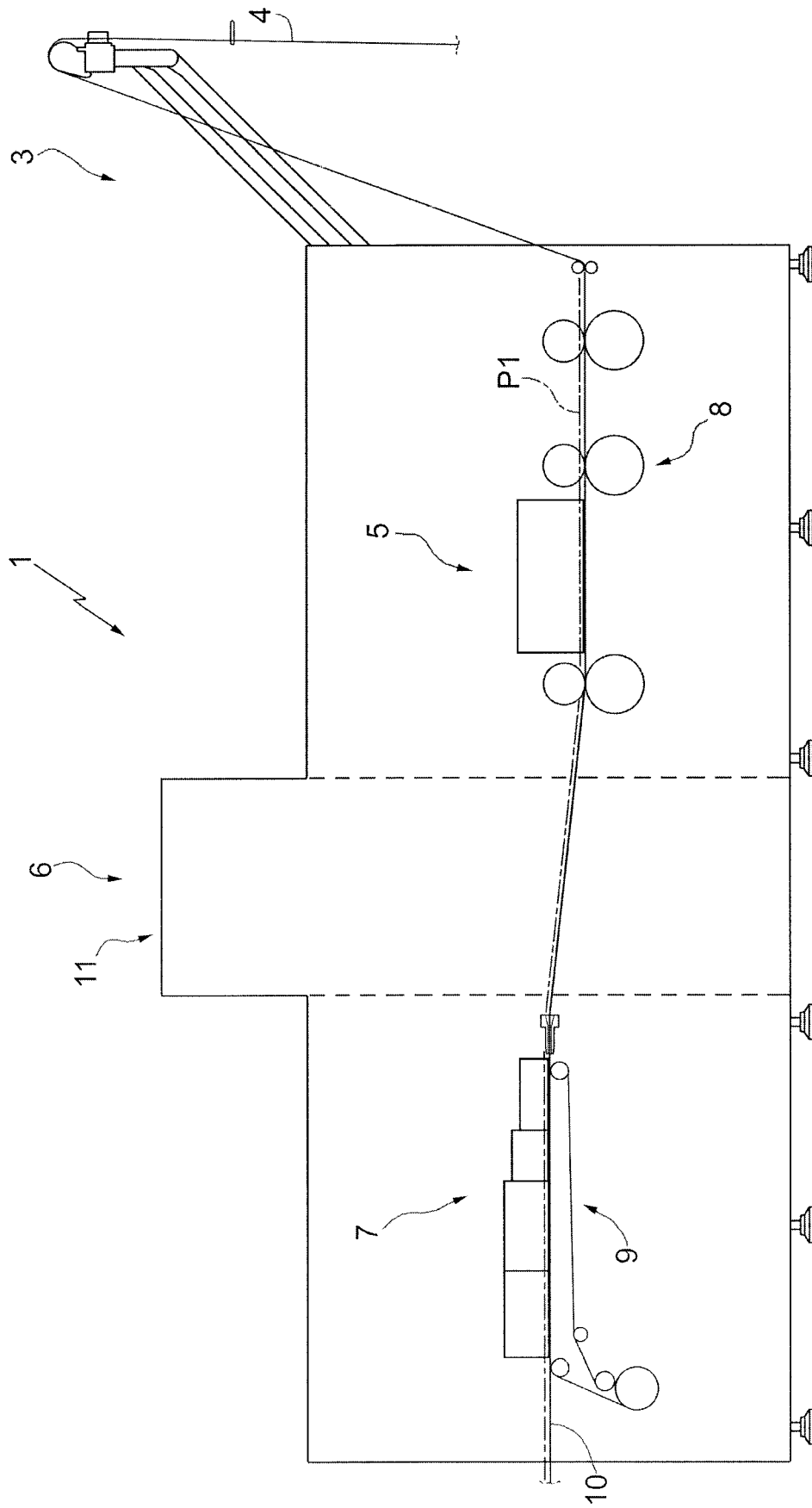
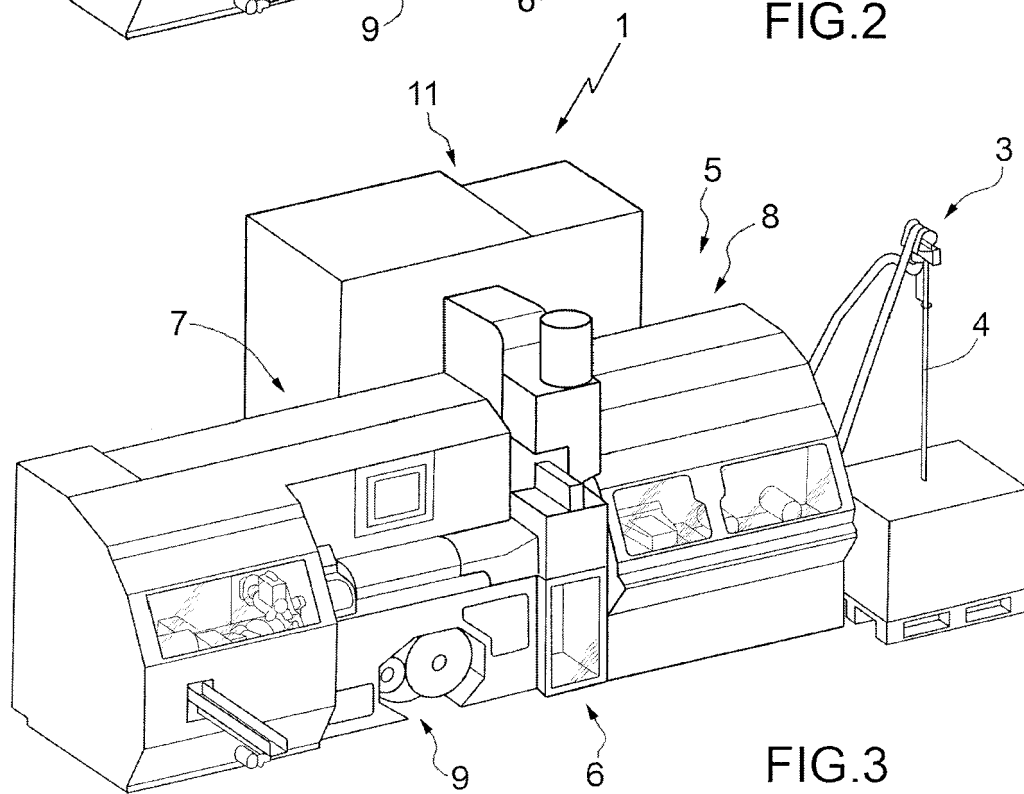
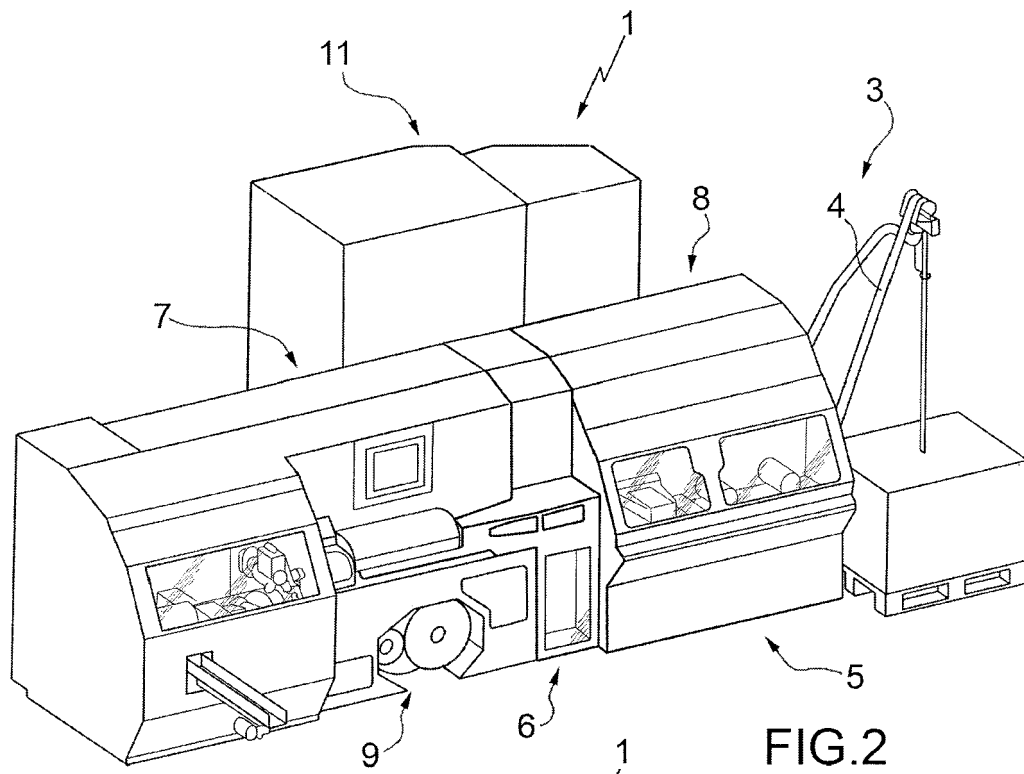


FIG.1



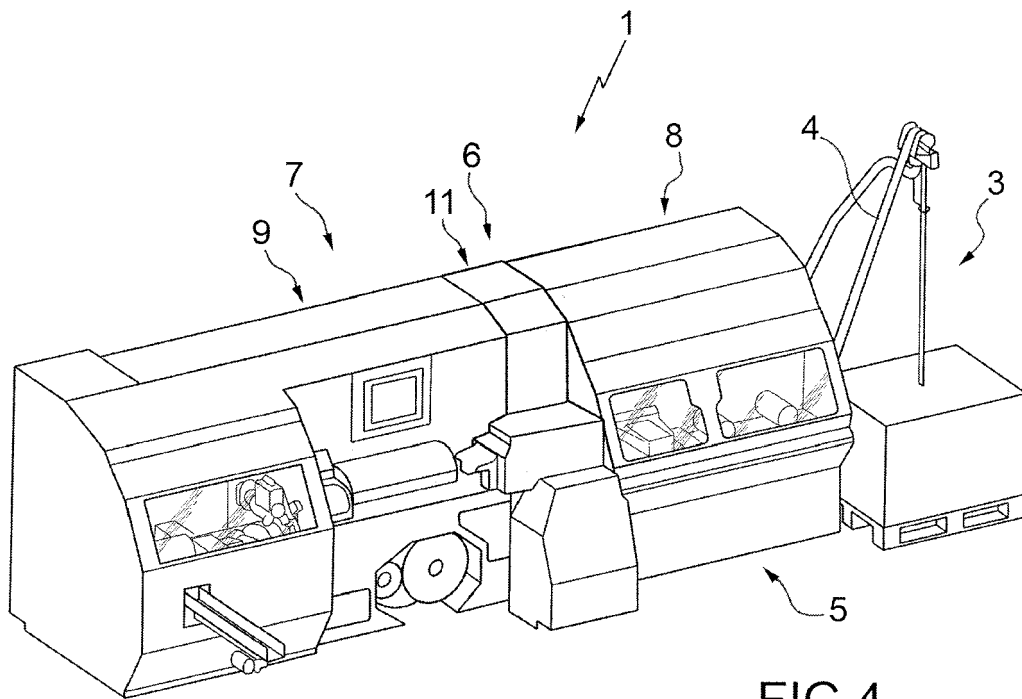


FIG. 4

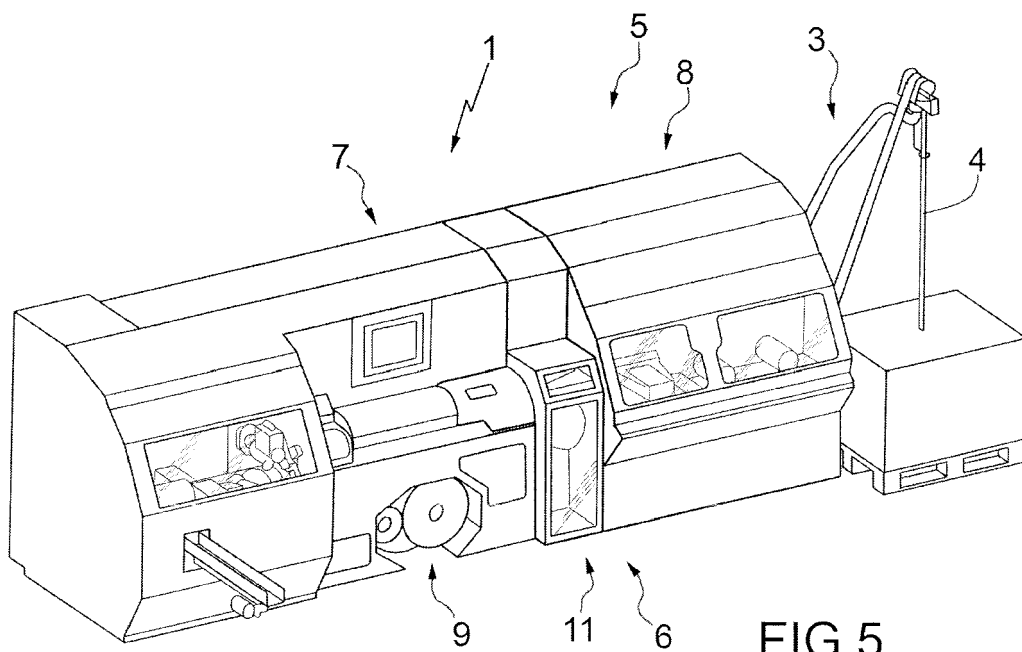
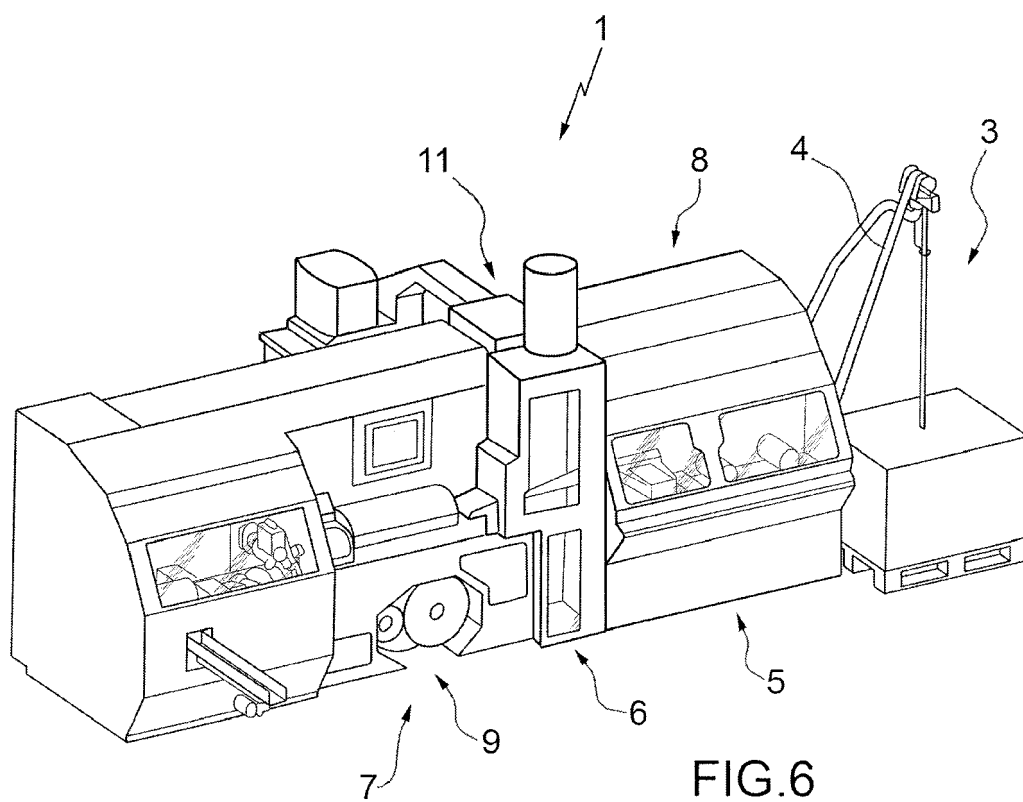


FIG. 5



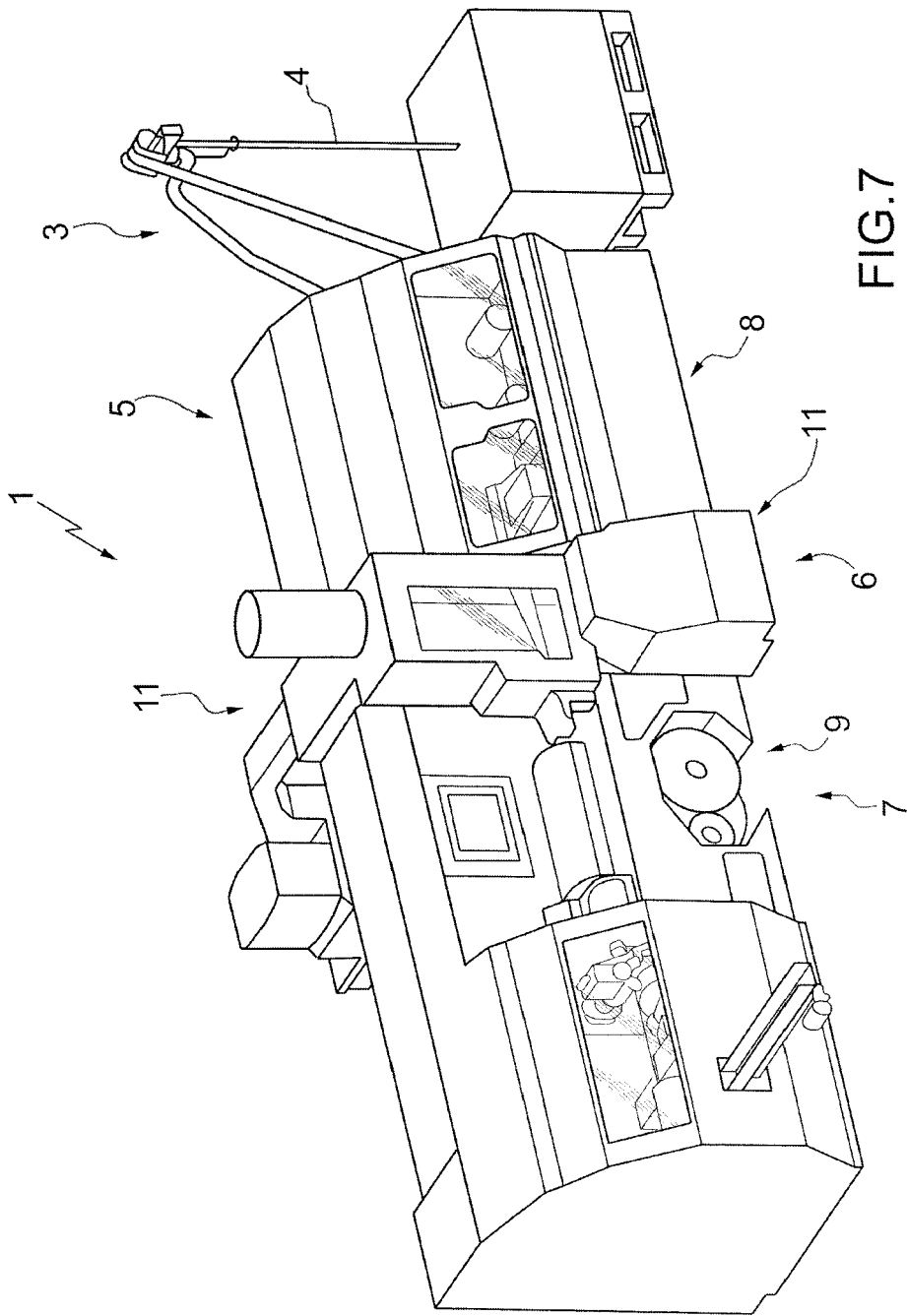
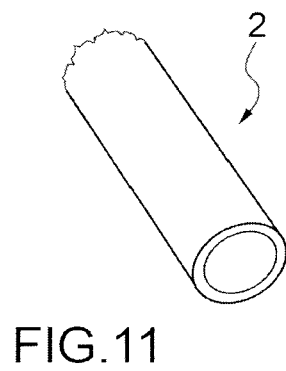
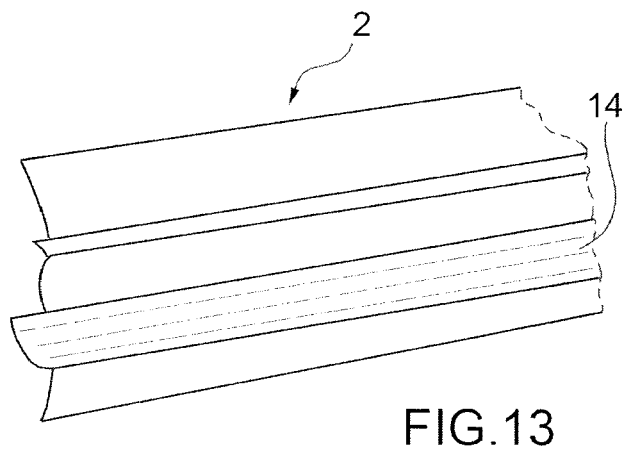
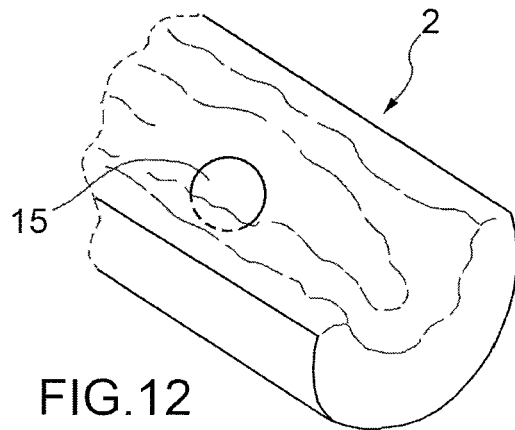
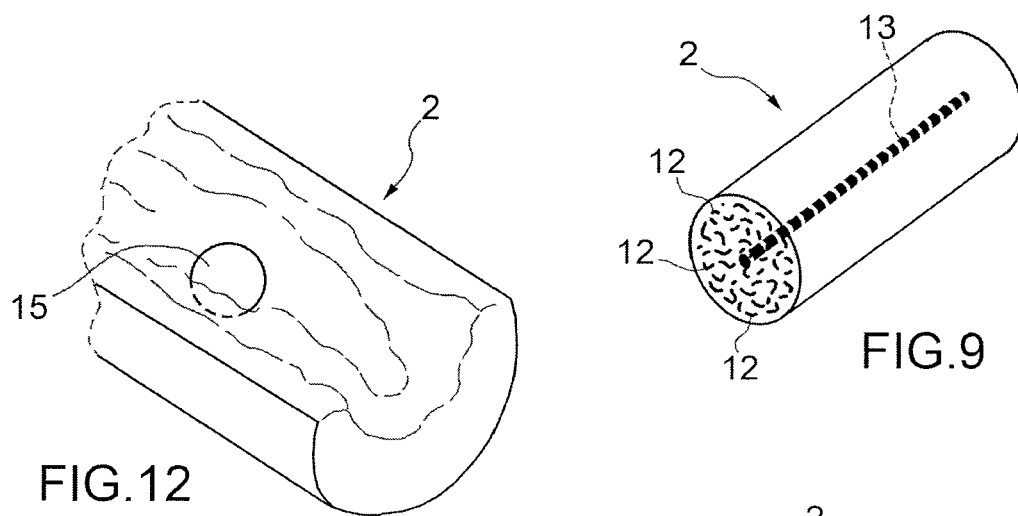
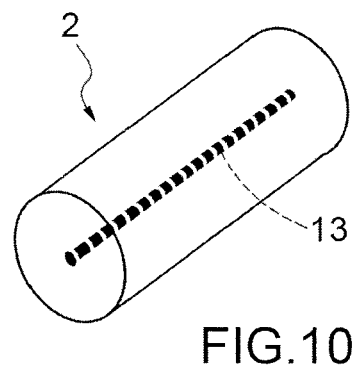
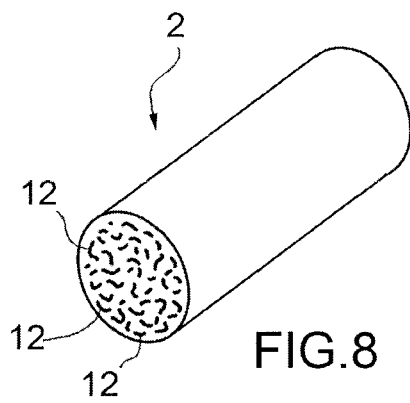
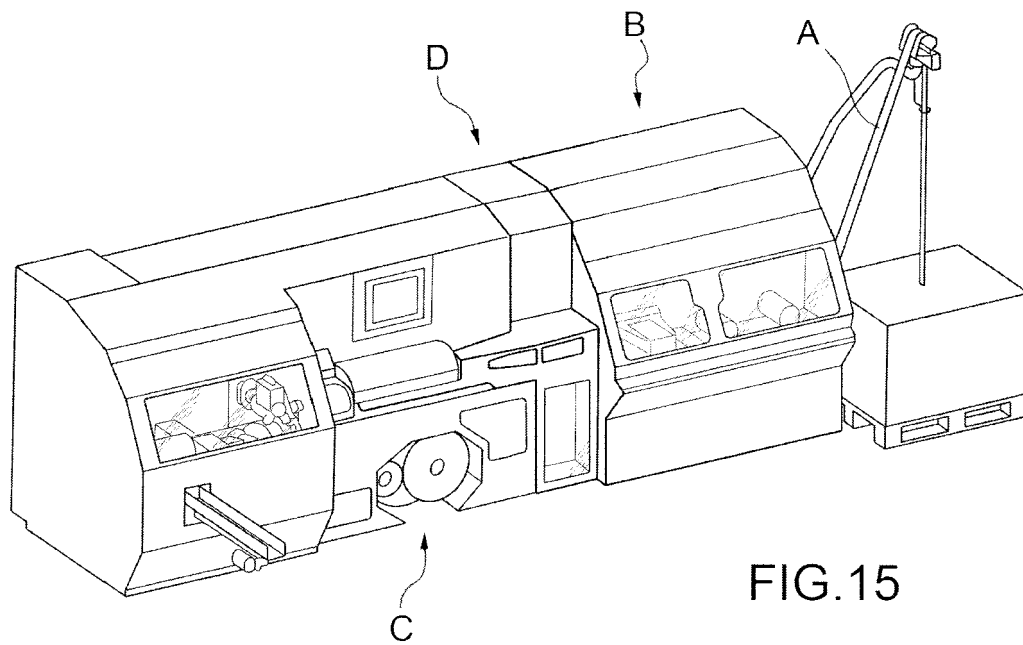
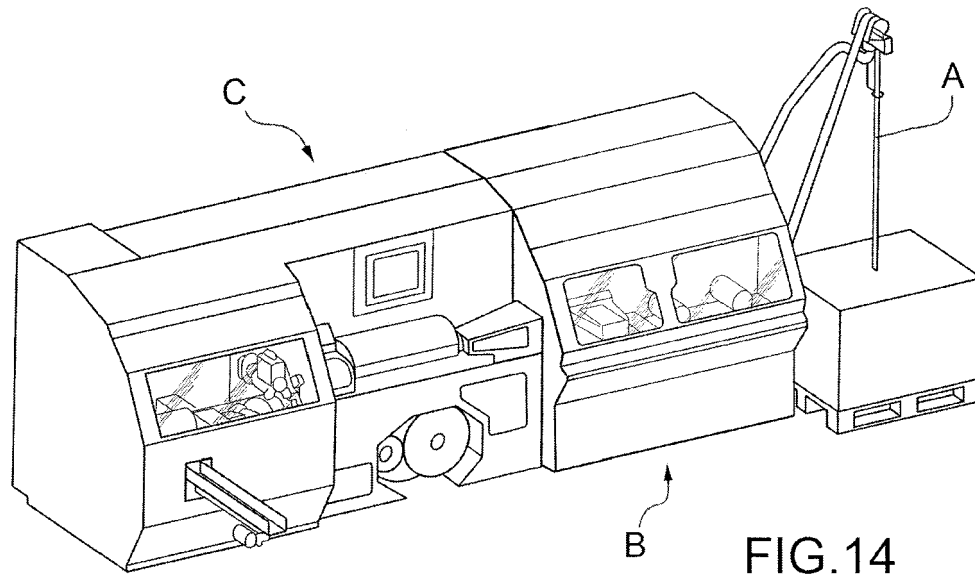


FIG. 7







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 Application Number
 EP 16 20 2066

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 May 2017	Examiner Marzano Monterosso
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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