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(54) **MACHINE FOR MAKING SMOKERS' ARTICLES**

MASCHINE ZUR HERSTELLUNG VON RAUCHERARTIKELN

MACHINE DE FABRICATION D'ARTICLES POUR FUMEURS

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EP 3 197 302 B1

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Description

Technical field

[0001] This invention relates to a machine for making smoker's articles and comprising a unit for recovering tobacco from rejected products in said machine. Hereinafter in this description, reference is made, by way of example only and without losing in generality, to smokers' articles such as cigarettes.

Background art

[0002] During the production of cigarettes, the total number of cigarettes made inevitably includes defective cigarettes among the cigarettes which meet accepted standards of quality. In light of this, cigarette making machines are equipped with numerous checking devices by which each cigarette is tested for conformity to specifications. In effect, it is necessary, for example, to check that every cigarette made contains the right quantity of tobacco, that there is enough tobacco at the end opposite the filter to make that end sufficiently compact to prevent the tobacco from falling out, that the paper wrapped around the tobacco is correctly glued and is not torn or stained, and so on.

[0003] Cigarettes found to be defective are rejected at specific expulsion stations, thus becoming reject products, and are collected, usually in specific containers, and then transferred to specific machines especially designed to recover the tobacco from them.

[0004] In these machines, the defective cigarettes are crushed or the paper is cut lengthways by a blade, and the different cigarette parts (filter, paper and tobacco) are separated. The filters and paper are scrapped, whereas the tobacco is recovered and then re-used in cigarette making machines.

[0005] There are numerous examples of machines of the above mentioned type for recovering tobacco from defective cigarettes and publications EP2289356A1, EP0990395A1 and US5000196A, for example, describe three different types.

[0006] The machines concerned are usually relatively complex and expensive. Also, their use has major negative aspects in terms of wasted time and energy in that the defective cigarettes must be collected, transferred to the machine which crushes them and separates out the different materials they are made of, and the tobacco recovered must be stored and then taken to the cigarette making machine which re-uses it.

[0007] Moreover, crushing the cigarettes or cutting the paper with a blade inevitably deteriorates the quality of the tobacco recovered, which is broken up into very short fibres containing a large amount of dust and which is therefore not very suitable for making good quality cigarettes. Another prior art machine is disclosed in document EP2730182, which describes a tobacco recovery unit in which cutting means first cut off the filter from the body

of the cigarette and blowing means then extract the tobacco from the tubular wrap of the cigarette.

[0008] Disadvantageously, the solution described in EP2730182 has numerous drawbacks, connected mainly with the high level of tobacco loss and the difficulty of combining the continuous movement of the conveyor with the efficiency of emptying the cigarette. Document WO2013/064352 discloses a machine for making smoking articles such as cigarettes that include filters, for use in recovering smokeable material from the smoking articles rejected during manufacture.

Disclosure of the invention

[0009] This invention therefore has for an aim to provide machines for making smokers' articles to overcome the disadvantages described above with reference to the prior art.

[0010] More specifically, the aim of this invention is to provide a machine for making smokers' articles having a unit for recovering tobacco from rejected products and capable of maximizing the degree of material recovery.

[0011] Another aim of the invention is to provide a unit for recovering tobacco from rejected products and which operates in-process and at high speeds. These aims are achieved by a machines for making smokers' articles, having the features described in one or more of the appended claims and, more specifically, comprising conveyor means configured to move a sequence of smokers' articles along a direction transversal to their axes of extension between a pickup position and a disposal position, at least one tobacco recovery channel and at least one reject collector for the scrap materials (paper and filters).

[0012] According to the invention, the unit comprises a cutting unit operatively interposed between the pickup position and the disposal position and configured to separate the main portion from the filter of each smokers' article and pneumatic means operatively located along the conveyor means and configured to generate a negative pressure or an overpressure at at least one smokers' article along the conveyor means in order to extract the tobacco from the main portion, where the pneumatic means are associated with the tobacco recovery channel.

[0013] Advantageously, thanks to the unit of this invention, it is possible to recover the tobacco without subjecting the tobacco to any mechanical or crushing action, while the reject materials (paper and filters) are separated and disposed of in specific, dedicated containers (or collectors).

Brief description of the drawings

[0014] Further features and advantages of the invention are more apparent from the following exemplary and therefore non-limiting description of a preferred and hence non-exclusive embodiment of a unit and a method

for recovering tobacco from rejected products in machines for making smokers' articles, as illustrated in the accompanying drawings, in which:

- Figure 1 shows a side view of a machine for making smokers' articles comprising a unit for recovering tobacco from rejected products according to this invention;
- Figure 2 shows a schematic view of a first embodiment of a unit for recovering tobacco from rejected products according to this invention;
- Figure 2a shows a side view of a detail from Figure 2.
- Figure 3 shows a schematic view of a second embodiment of a unit for recovering tobacco from rejected products according to this invention;
- Figure 4 shows a schematic view of a third embodiment of a unit for recovering tobacco from rejected products according to this invention;
- Figure 5 shows a schematic view of a fourth embodiment of a unit for recovering tobacco from rejected products according to this invention;
- Figure 6 shows a side view of a further preferred embodiment of a machine for making smokers' articles comprising a unit for recovering tobacco from rejected products according to this invention;
- Figure 7 shows a schematic view of the tobacco recovery unit of the machine of Figure 6;
- Figure 7a shows a schematic view of a detail from Figure 7 in two different operating conditions.

Detailed description of preferred embodiments of the invention

[0015] With reference to the accompanying drawings, the numeral 1 denotes a unit for recovering tobacco from rejected products in machines for making smokers' articles, in particular cigarettes "S" according to this invention. Hereinafter, reference is made, by way of example only and hence without losing in generality, to smokers' articles such as cigarettes "S", in particular filter-tipped cigarettes.

[0016] As this description continues, therefore, reference will be made to "cigarette" or "smokers' article" without distinction and in the most general sense of the term.

[0017] Each cigarette "S" (or smokers' article) extends along its main axis "A" of extension and comprises at least a main portion "S1" and a filter "F" positioned in series along the axis "A".

[0018] The main portion "S1" is basically a paper wrapper containing a predetermined quantity of tobacco.

[0019] The recovery unit 1 according to the invention is associated with a machine 100 for making smokers' articles, in particular a filter tip attachment machine, that is to say, a machine configured to combine (in essentially known manner) a filter "F" with the corresponding main portion "S1" of each cigarette "S".

[0020] The machine 100 thus comprises at least one combining station (not illustrated), where each filter "F"

is combined with the respective main portion "S1" and then transported by one or more movement rollers 101 towards an outfeed section 102 of the machine 100.

[0021] The roller 101 is preferably provided on its periphery with a plurality of flutes, typically suction flutes, which hold the cigarettes "S" in position. The one or more rollers 101 are designed to transport the smokers' articles "S" towards an outfeed conveyor 105 located at an end section of the machine 100.

[0022] Preferably, along the outfeed path, the machine is also provided with inspection means 103 for checking the quality of each cigarette "S".

[0023] For example, the inspection means 103 are configured to check the degree of ventilation of each cigarette "S" or that the end opposite the filter tip contains the right quantity tobacco or that the paper wrapped around the tobacco is correctly glued and is not torn or soiled. Operatively downstream of the inspection means 103, the machine comprises at least one selector element 104 configured to pick out the defective smokers' articles and to divert them away from the path defined by the one or more rollers 101.

[0024] Preferably, the selector element 104 is configured to distinguish between defective smokers' articles of a first type, which are recoverable, and defective smokers' articles of a second type, which are difficult to recover. Defective smokers' articles of the first type are preferably substantially complete cigarettes with ventilation or insufficient tobacco defects. Defective smokers' articles of the second type, on the other hand, are smokers' articles at an intermediate processing stage, damaged, for example, by malfunctions or jams, such that their components (paper wrapper, filter, tobacco) are difficult to distinguish.

[0025] In light of this, with reference in particular to Figure 6, the selector element 104 comprises detecting and rejecting means 106 configured to reject the defective smokers' articles of the second type and convey them to a release or dumping zone 107. Preferably, the release or dumping zone 107 comprises a conveyor 107a or chute designed to direct such rejects into specific containers without returning them to the production process.

[0026] More specifically, the selector element 104 is operatively interposed between the inspection means 103 and the conveyor 105.

[0027] Preferably, therefore, the unit 1 for recovering tobacco from rejected products according to this invention is operatively located downstream of the selector element 104.

[0028] The unit 1 comprises conveyor means 2 configured to move a sequence of smokers' articles "S" along a direction transversal to their axes "A" of extension between a pickup position and a disposal position.

[0029] More specifically, the pickup position is preferably located in proximity to the selector element 104 of the machine 100, while the disposal position is located at at least one specific reject collector 3..

[0030] It should be noted that in this text, the term "re-

ject" is used to denote those parts of the cigarette "S" (or of the smokers' articles) which are not recovered or returned to the production process, such as, for example, the filters "F" and the paper wrappers "P" of the main portions "S1". Preferably, the conveyor means 2 comprise at least one conveyor belt 4 provided with a plurality of transversal grooves 4a arranged in sequence and each defining a housing for a respective smokers' article or cigarette "S".

[0031] In the embodiment illustrated, the conveyor means 2 comprise two facing conveyor belts 4, opposite to each other in such a way as to define a section for the passage of the smokers' articles, delimited both above and below the cigarette "S".

[0032] Thus, the conveyor belts 4 move at the same speed and synchronously so that each transversal groove 4a of one belt faces and is superposed on a corresponding transversal groove 4a on the other belt 4.

[0033] Preferably, the unit 1 comprises at least one accumulation unit 16 (or hopper 16a) located just downstream of the selector element 104 and configured to define a buffer zone for the cigarettes "S" to be rejected.

[0034] It is thus advantageously possible to keep the operating speed of the unit 1 independent of that of the machine 100 to allow for peak workloads (when production of rejected products is at its highest).

[0035] The conveyor means 2 preferably also comprise at least one retaining device 5 for retaining at least one of the cigarettes "S".

[0036] The retaining device 5 is configured to prevent (or limit) the sliding of the cigarette "S" along its axis "A".

[0037] In the preferred embodiment, the retaining device 5 is a suction unit (not illustrated in detail) associated with each transversal groove 4a of at least one of the conveyor belts 4. Alternatively, the retaining device 5 might be a pusher which moves towards and away from the filter "F" of the cigarette (see Figure 7a).

[0038] Alternatively, the retaining device 5 might be embodied by the conveyor belts 4 themselves, spaced from each other by a gap which is smaller than the maximum transversal dimension (i.e. diameter) of the cigarette "S".

[0039] In other words, in this embodiment, the cigarettes "S" are held in position by compression, preferably applied at the filter "F".

[0040] Preferably, the unit 1 also comprises pneumatic means 6 operatively located along the conveyor means 2 and configured to generate a negative pressure or an overpressure at at least one smokers' article "S" along the conveyor means 2 in order to extract the tobacco T from the main portion "S1".

[0041] Thus, the pneumatic means 6 are located along the conveyor means 2, laterally thereof, in such a way as to face a free end of the cigarette "S".

[0042] Preferably, the conveyor belts 4 are a little larger in width than a cigarette "S" in order to minimize the distance which the tobacco must travel after it has been blown or sucked out by the pneumatic means, thereby

limiting tobacco loss.

[0043] More preferably, the width of the conveyor is substantially equal to the length of the cigarette to be broken down/recovered.

5 **[0044]** In the preferred embodiment, the pneumatic means 6 are located laterally of the conveyor means 2 so that, at least at an operating position thereof, they face the end of the cigarette "S" provided with the filter "F".

10 **[0045]** Thus, in the preferred embodiment, the pneumatic means 6 comprise a blowing device 6a configured to generate an overpressure inside the cigarette "S" to facilitate removal of the tobacco.

[0046] In this embodiment, the unit 1 also comprises a tobacco recovery channel 7 located on the side opposite to the conveyors 2 relative to the pneumatic means 6.

15 **[0047]** In other words, in the embodiment illustrated, the pneumatic means 6 and the recovery channel 7 are located on opposite sides of the conveyor means, with reference to the feed direction of the conveyors.

20 **[0048]** Alternatively (or in addition to), in some embodiments not illustrated, the pneumatic means 6 comprise a suction unit juxtaposed with the conveyor means 2 so that, at least at an operating position thereof, they face the free end of the main portion "S1" of the cigarette "S".

25 **[0049]** It should be noted that in this embodiment, the recovery channel 7 is located on the same side of the pneumatic means 6 as the conveyor means 2.

30 **[0050]** Whatever the case, in both of the embodiments described above, the pneumatic means 6 are associated with the tobacco recovery channel 7.

[0051] The recovery channel 7 is configured to transport the tobacco recovered by the recovery unit 1 to a feed station (not illustrated) where the tobacco, not processed in any way and therefore suitable for making another cigarette "S" is fed back into the machine 100.

35 **[0052]** Thus, the recovery channel 7 is preferably in fluid communication with, or otherwise connected to, the hopper (not illustrated) of the machine 100. Advantageously, the tobacco is thus recovered in-process, maximizing recovery efficiency and minimizing operator involvement.

40 **[0053]** It should be noted that the retaining device 5 described above is particularly useful and effective when used in combination with the pneumatic means 6 because it allows maximizing the blowing and/or sucking action without affecting the position of the cigarette "S".

45 **[0054]** Thus, the retaining device 5 is operatively located precisely at least at the pneumatic means 6 so as to keep the cigarette "S" in place during the blowing or sucking action of the pneumatic means 6.

[0055] Preferably, however, the retaining device 5 operates along the whole of the conveyor belt 4.

50 **[0056]** As regards the pneumatic means 6, these preferably comprise at least one blowing nozzle 8 located laterally of the conveyor 2 and having at least one operating position where it faces the filter "F" of a cigarette "S" in order to generate an overpressure inside the cigarette "S" itself so as to allow tobacco to be extracted

from the main portion "S1".

[0057] It should be noted that in some embodiments (Figure 4) the nozzle might face a mouth of the main portion "S1" of the smokers' article "S", where the mouth corresponds to the end opposite the free end, which in use is connected to the filter "F".

[0058] Thus, in the operating position, the nozzle 8 is substantially coaxial with a flute 4a of the conveyor belt in order to optimize the blowing action.

[0059] Preferably, the nozzle 8 is movable at least partly in synchrony with the conveyor means 2 to act on the cigarette "S" along at least one stretch of predetermined length (not on a point) in order to better empty the main portion "S1".

[0060] In other words, during the forward motion of the conveyor belt 4, and thus of the flutes 4a, the nozzle 8 is movable in the same direction as the belt 4 from an attached position, where it at least partly faces a respective flute to start blowing, to a detached position by way of an intermediate position of maximum efficiency where the nozzle 8 is fully coaxial with the flute 4a (and thus with the cigarette "S").

[0061] To increase the productivity of the unit 1 to make it compatible with the high production capacities of machines which make smokers' articles, the pneumatic means 6 comprise preferably at least one rotatable drum 9 equipped with a plurality of blowing nozzles 8, angularly spaced from each other, each having at least one operating position where it (laterally) faces the conveyor means 2.

[0062] Advantageously, the rotational motion of the drum 9 makes the movement of the nozzles 8 less critical in structural terms (reciprocating motion would certainly place more stress on the structure on account of speed). In the preferred embodiments (Figures 2, 3, 4), the pneumatic means 6 comprise a plurality of rotatable drums 9 mounted in sequence along the conveyor means 2 (that is, along the feed direction "B") in order to generate an overpressure at a corresponding plurality of cigarettes "S". Advantageously, the unit can thus operate simultaneously on a plurality of cigarettes "S" either individually or in different runs whereby a cigarette partly emptied by one nozzle is "finished" by the next nozzle.

[0063] In light of this, the recovery unit 1 comprises a control unit (not illustrated) configured to synergically combine the movement of the conveyor belt 2 with that of the drums 9 depending on the operating mode preferred by the operator.

[0064] More specifically, the unit has at least two operating modes.

[0065] In the first operating mode, shown in Figure 2, the conveyor belt 4 moves forward in such a way that each flute 4a faces at least one nozzle 8 of each drum 9.

[0066] That way, the nozzle 8 of the first drum 9 (or of the first drums 9) starts the emptying-out action on the main portion "S1", whilst the nozzles 8 after that complete it.

[0067] Advantageously, this allows keeping the con-

veyor means 2 running at high speed without the need for excessively powerful pneumatic means. Alternatively, in the second operating mode, with reference to Figures 3 and 4, the cigarettes "S" on the conveyor belt can be divided into first (10a), second (10b) and third smokers' articles (10c) arranged in alternating sequence.

[0068] At the same time, the plurality of rotatable drums 9 in turn comprise a first 9a, a second 9b and a third drum 9c which are spaced from each other. The control unit is configured to drive the conveyor means 2 and the drum 9 in such a way that:

- the first drum 9a, at the predetermined operating position, can be coupled to the first smokers' articles 10a;
- the second drum 9b, at the predetermined operating position, can be coupled to the second smokers' articles 10b;
- the third drum 9c, at the predetermined operating position, can be coupled to the third smokers' articles 10c.;

[0069] Advantageously, thanks to this control logic, using relatively high power pneumatic means 6 maximizes the productivity of the unit 1.

[0070] It should also be noted that the example given can be generalized to a different number of drums 9.

[0071] Thus, if there are four drums (a first 9a, a second 9b, a third 9c and a fourth 9d, as shown in Figures 3 and 4) the smokers' articles would be divided into a sequence of fours, with first 10a, second 10b, third 10c and fourth smokers' articles 10d.

[0072] Consequently, the control logic described here can be summed up by the equation:

$$N_t = N_g$$

where:

N_t is the number of drums;

N_g is the number of groups which the sequence of smokers' articles can be divided into.

[0073] It should also be noted that the number of groups corresponds to the distance travelled by the conveyor means 2 between one activation and the next of two nozzles 8 on the same drum 9.

[0074] Figure 5, on the other hand, shows a further embodiment of the unit 1, where there is only one rotatable drum 9 which comprises at least one straight stretch 11a of predetermined length, where each nozzle 8 is movable in parallel with the conveyor means 2 and faces a respective cigarette "S".

[0075] In other words, the drum 9 has a plurality of nozzles 8 movable along an annular path having two curved stretches 11b and at least one straight stretch 11a facing (and parallel to) the conveyor belt 2.

[0076] Advantageously, therefore, the pneumatic means 6, and more specifically, the nozzles 8, can remain active on a single cigarette "S" for a stretch of considerable length, thus maximizing their effect.

[0077] Alternatively, if there are less constraints regarding reduced production speed compared to the machines which make the smokers' articles, the conveyor 2 might be moved intermittently in order to maximize the time the nozzles remain active.

[0078] It should be noted that, preferably and with reference to Figure 7a, the drum 9 is movable towards and away from the conveyor 2 transversely to the feed direction "B".

[0079] Advantageously, that way, the control unit can drive the drum 9, and hence the nozzle 8, towards the cigarette "S", preferably into contact with the filter "F", in order to maximize the blowing effect.

[0080] According to a further aspect of the invention, the unit 1 comprises a cutting unit 12 operatively interposed between the pickup position and the disposal position and configured to separate the main portion "S1" from the filter "F" of each smokers' article "S".

[0081] Preferably, the cutting unit 12 comprises at least one blade 13 oriented along the feed direction "B" of the conveyor means 2.

[0082] The blade 13 is configured to be positioned between the filter "F" and the main portion "S1" in such a way as to separate them.

[0083] Preferably, the blade 13 has at least one active position in which it protrudes above the conveyor means 2.

[0084] More specifically, the conveyor belt 4 has at least one slot 14 or longitudinal slit which divides it into a first part 4b and a second part (or half-part) 4c, both extending along the feed direction "B".

[0085] More specifically, the first part 4b is designed to house the main portions "S1" of the cigarettes "S" and the second part 4c is designed to house the filters "F" of the cigarettes "S".

[0086] The blade 13 is located at the slot 14 or slit and at least partly protrudes above the conveyor belt 4.

[0087] Advantageously, that way, the cutting action on the cigarettes "S" is precise and easy.

[0088] It should be noted that depending on the embodiment, the cutting unit 12 may be positioned operatively upstream or downstream of the pneumatic means 6.

[0089] Preferably, however, the cutting unit 12 is operatively located downstream of the pneumatic means 6.

[0090] Advantageously, it is thus possible for the pneumatic means to act directly on the filter "F" to blow the tobacco out of the main portion "S1" and the cutting unit does not risk damaging the tobacco to be recovered. Moreover, the presence of the filter "F" guarantees the radial grip of the tobacco wrapper, thus preventing tobacco loss and optimizing tobacco recovery. Operatively downstream of the cutting unit 13, there is, lastly, a rejects 3 - preferably at least two collectors, a first collector 15a

designed to collect the filters "F" and a second collector 15b designed to collect the paper wrappers of the main portions "S1".

[0091] This disclosure also has for an object a method for recovering tobacco from defective cigarettes "S". Preferably but not exclusively, the method is implemented through use of a machine for making smoker's articles comprising the tobacco recovery unit 1 according to this invention.

[0092] The method comprises a step of feeding a sequence of smokers' articles (in particular, cigarettes "S") along a direction transversal to their axes "A" between a pickup position and a disposal position.

[0093] As they are being fed, the smokers' articles are cut in such a way that the main portion "S1" is separated from the filter "F".

[0094] Before or after cutting, the tobacco inside the main portion "S1" is blown or sucked out in such a way as to empty the paper wrapper.

[0095] Preferably, this step comprises blowing through the filter.

[0096] The tobacco extracted from the main portion is recovered, whilst the filter and the paper wrapper are disposed of (separately from each other).

[0097] The invention achieves the above mentioned aims and brings important advantages.

[0098] In effect, the use of a recovery unit capable of extracting the tobacco at high speed without fragmenting it, combined with a cutting unit which can divide the reject materials, makes for an efficient recovery and effective scrap disposal system.

[0099] In effect, the presence of a cutting unit which is independent of tobacco extraction allows the cigarette materials to be separated precisely without, however, any unwanted effects (i.e. fragmentation) on the tobacco fibres which can thus be returned to the process immediately without being damaged.

[0100] Moreover, the use of a movable nozzle (or a plurality of movable nozzles) allows maximizing productivity by speeding up the recovery process.

Claims

1. A machine for making smokers' articles, in particular cigarettes, each extending along its main axis (A) of extension and comprising at least a main portion (S1) and a filter (F) positioned in series along the axis (A); the machine comprising:

- means for making a sequence of smokers' articles (S);
- inspection means (103) for checking the quality of each smokers' article;
- at least one outfeed conveyor (105) configured to move the smokers' articles (S) feeding out of the machine (100);
- at least one selector element (104) configured

to pick out the defective smokers' articles (S); wherein the machine comprises a tobacco recovery unit (1) comprising:

- conveyor means (2) configured to move a sequence of smokers' articles (S) along a feed direction (B) transversal to the axis (A) between a pickup position and a disposal position;
- at least one tobacco recovery channel (7);
- at least one reject collector (3);

characterized in that it comprises a cutting unit (12) operatively interposed between the pickup position and the disposal position and configured to separate the main portion (S1) from the filter (F) of each smokers' article (S) and pneumatic means (6) operatively located along the conveyor means (2) and configured to generate a negative pressure or an overpressure at at least one smokers' article (S) along the conveyor means (2) in order to extract the tobacco (T) from the main portion (S1); the pneumatic means (6) being associated with the tobacco recovery channel (7), wherein the selector element (104) is configured to distinguish between defective smokers' articles of a first type, which are recoverable, and defective smokers' articles of a second type, which are not recoverable.

2. The machine according to claim 1, **characterized in that** the selector element (104) comprises detecting and rejecting means (105) configured to reject the defective smokers' articles of the second type and convey them to a release or dumping zone (106).
3. The machine according to claim 2, **characterized in that** the release or dumping zone (106) comprises a conveyor (107) or chute designed to direct the defective smokers' articles of the second type into specific containers without returning them to the production process.
4. The machine according to any one of claims 1 to 3, **characterized in that** it comprises a hopper for collecting the tobacco (T) and operatively located upstream of the means for making a sequence of smokers' articles (S); the recovery channel (7) being in fluid communication with, or in any case connected to, the hopper in order to allow the tobacco to be recovered in-process.
5. The machine according to any of the preceding claims, **characterized in that** the conveyor means (2) comprise at least one conveyor belt (4) provided with a plurality of transversal grooves (4a) arranged in sequence and each defining a housing for a respective smokers' article (S).
6. The machine according to any of the preceding

claims, **characterized in that** the conveyor means (2) comprise at least one retaining device (5) for holding down at least one smokers' article (S) and operatively located at least at the pneumatic means (6) in order to hold the smokers' article (S) in place during the suction or blowing action of the pneumatic means (6).

7. The machine according to any of the preceding claims, **characterized in that** the cutting unit (12) comprises at least one blade (13) oriented along the feed direction (B) of the conveyor means (2) and having at least one operating position where it protrudes above the conveyor means (2).
8. The machine according to claim 7, **characterized in that** the conveyor means (2) comprise at least one conveyor belt (4) having a slot (14) or slit which divides the conveyor belt (4) into a first part (4b) for housing the main portion (S1) of the smokers' articles (S), and a second part (4c) for housing the filter (F) of the smokers' articles (S); the blade (14) being located at the slot (14) or slit and at least partly protruding above the conveyor belt (4).
9. The machine according to any of the preceding claims, **characterized in that** the pneumatic means (6) comprise at least one blow nozzle (8) located laterally of the conveyor means (2) and having at least one operating position where it faces the filter (F) or the mouth of the main portion (S1) of a smokers' article (S) to produce an overpressure inside the smokers' article (S) such as to blow the tobacco (T) out of the main portion (S1).
10. The machine according to claim 9, **characterized in that** the at least one nozzle (8) is movable at least partly in synchrony with the conveyor means (2) to act on the smokers' article (S) along at least one stretch of predetermined length so as to better empty out the main portion (S1).
11. The machine according to claim 9 or 10, **characterized in that** the pneumatic means (6) comprise at least one rotatable drum (9) equipped with a plurality of nozzles (8) spaced at equal angular intervals and each having a respective operating position where it laterally faces the conveyor means (2).
12. The machine according to claim 11, **characterized in that** the pneumatic means (6) comprise a plurality of rotatable drums (9) arranged in sequence along the conveyor means (2) in order to produce the overpressure at a corresponding plurality of smokers' articles (S).
13. The machine according to claim 12, **characterized in that** the sequence of smokers' articles (S) com-

prises first (10a), second (10b) and third smokers' articles (10c) in alternating sequence; the plurality of rotatable drums (9) in turn comprising a first (9a), a second (9b) and a third drum (9c) spaced from each other in such a way that:

- the first drum (9a), at the predetermined operating position, can be coupled to the first smokers' articles (10a);
- the second drum (9b), at the predetermined operating position, can be coupled to the second smokers' articles (10b);
- the third drum (9c), at the predetermined operating position, can be coupled to the third smokers' articles (10c).

14. The machine according to claim 11, **characterized in that** the rotatable drum (9) comprises at least one straight stretch (11a) of predetermined length, where each nozzle (8) is movable in parallel with the conveyor means (2) and faces a respective smokers' article (S).

Patentansprüche

1. Maschine zur Herstellung von Raucherartikeln, insbesondere von Zigaretten, die sich jeweils entlang ihrer Hauptausdehnungsachse (A) erstrecken und mindestens einen Hauptabschnitt (S1) und einen Filter (F) umfassen, positioniert in Reihe entlang der Achse (A), wobei die Maschine umfasst:

- Mittel zur Herstellung einer Abfolge von Raucherartikeln (S);
- Inspektionsmittel (103) zum Prüfen der Qualität eines jeden Raucherartikels;
- mindestens einen Abtransportförderer (105), der ausgelegt ist, um die Raucherartikel (S) zu bewegen und aus der Maschine (100) zu fördern;
- mindestens ein Auswahlelement (104), das ausgelegt ist, um die fehlerhaften Raucherartikel (S) auszusortieren,

wobei die Maschine eine Tabakrückgewinnungseinheit (1) umfasst, umfassend:

- Fördermittel (2), die ausgelegt sind, um eine Abfolge von Raucherartikeln (S) entlang einer Zuführungsrichtung (B) quer zur Achse (A) zwischen einer Aufnahmeposition und einer Ablageposition zu bewegen;
- mindestens einen Tabakrückgewinnungskanal (7);
- mindestens einen Ausschusssammler (3),

dadurch gekennzeichnet, dass sie eine

Schneideinheit (12) umfasst, die betriebswirksam zwischen der Aufnahmeposition und der Ablageposition eingesetzt und ausgelegt ist, um den Hauptabschnitt (S1) vom Filter (F) eines jeden Raucherartikels (S) zu trennen, und pneumatische Mittel (6), die betriebswirksam entlang der Fördermittel (2) angeordnet und ausgelegt sind, um einen Unterdruck oder einen Überdruck auf mindestens einem Raucherartikel (S) entlang der Fördermittel (2) zu erzeugen, um den Tabak (T) aus dem Hauptabschnitt (S1) zu extrahieren, wobei die pneumatischen Mittel (6) mit dem Tabakrückgewinnungskanal (7) assoziiert sind, wobei das Auswahlelement (104) ausgelegt ist, um zwischen fehlerhaften Raucherartikeln eines ersten Typs, die rückgewonnen werden können, und fehlerhaften Raucherartikeln eines zweiten Typs, die nicht rückgewonnen werden können, zu unterscheiden.

2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** das Auswahlelement (104) Erfassungs- und Ausschussmittel (105) umfasst, die ausgelegt sind, um fehlerhafte Raucherartikel des zweiten Typs auszusortieren und diese in einen Freigabe- oder Abladebereich (106) zu fördern.

3. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** der Freigabe- oder Abladebereich (106) einen Förderer (107) oder eine Rinne umfasst, die ausgelegt ist, um die fehlerhaften Raucherartikel des zweiten Typs in spezifische Behälter zu lenken, ohne sie dem Produktionsprozess zurückzuführen.

4. Maschine nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** sie einen Trichter umfasst, um den Tabak (T) zu sammeln, der betriebswirksam stromaufwärts der Mittel zur Herstellung einer Abfolge von Raucherartikeln (S) angeordnet ist, wobei der Rückgewinnungskanal (7) in Fluidkommunikation mit dem Trichter steht oder in jedem Fall mit diesem verbunden ist, um zu ermöglichen, dass der Tabak prozessintern rückgewonnen wird.

5. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fördermittel (2) mindestens ein Förderband (4) umfassen, das mit einer Vielzahl von quer verlaufenden Rillen (4a) versehen ist, die nacheinander angeordnet sind und jeweils eine Aufnahme für einen jeweiligen Raucherartikel (S) bilden.

6. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fördermittel (2) mindestens eine Haltevorrichtung (5) umfassen, um mindestens einen Raucherartikel (S) festzuhalten, die betriebswirksam mindestens an den pneumatischen Mitteln (6) angeordnet ist, um den Raucherartikel (S) während der Saug- oder

Blaswirkung der pneumatischen Mittel (6) an Ort und Stelle zu halten.

7. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Schneideinheit (12) mindestens ein Messer (13) umfasst, das entlang der Zuführungsrichtung (B) der Fördermittel (2) ausgerichtet ist und mindestens eine Betriebsposition aufweist, in der es über den Fördermitteln (2) hervorsteht. 5
8. Maschine nach Anspruch 7, **dadurch gekennzeichnet, dass** die Fördermittel (2) mindestens ein Förderband (4) umfassen, aufweisend eine Aussparung (14) oder einen Schlitz, die/der das Förderband (4) in einen ersten Teil (4b) zur Aufnahme des Hauptabschnitts (S1) der Raucherartikel (S) und einen zweiten Teil (4c) zur Aufnahme des Filters (F) der Raucherartikel (S) teilt, wobei das Messer (14) an der Aussparung (14) oder dem Schlitz angeordnet ist und mindestens teilweise über dem Förderband (4) hervorsteht. 10
9. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die pneumatischen Mittel (6) mindestens eine Blasdüse (8) umfassen, die seitlich der Fördermittel (2) angeordnet ist, aufweisend mindestens eine Betriebsposition, in der sie dem Filter (F) oder der Öffnung des Hauptabschnitts (S1) eines Raucherartikels (S) zugewandt ist, um einen Überdruck im Raucherartikel (S) zu erzeugen, sodass der Tabak (T) aus dem Hauptabschnitt (S1) geblasen wird. 15
10. Maschine nach Anspruch 9, **dadurch gekennzeichnet, dass** die mindestens eine Düse (8) mindestens teilweise synchron mit den Fördermitteln (2) bewegbar ist, um auf den Raucherartikel (S) entlang mindestens eines Teilstücks einer vorgegebenen Länge zu wirken, sodass der Hauptabschnitt (S1) besser entleert wird. 20
11. Maschine nach Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** die pneumatischen Mittel (6) mindestens eine Drehtrommel (9) umfassen, die mit einer Vielzahl an Düsen (8) ausgestattet ist, die in gleichen Winkelintervallen beabstandet sind und jeweils eine jeweilige Betriebsposition aufweisen, in der sie seitlich den Fördermitteln (2) zugewandt sind. 25
12. Maschine nach Anspruch 11, **dadurch gekennzeichnet, dass** die pneumatischen Mittel (6) eine Vielzahl an Drehtrommeln (9) umfassen, die nacheinander entlang der Fördermittel (2) angeordnet sind, um den Überdruck an einer entsprechenden Vielzahl an Raucherartikeln (S) zu erzeugen. 30
13. Maschine nach Anspruch 12, **dadurch gekennzeichnet, dass** die Drehtrommeln (9) ihrerseits eine erste (9a), eine zweite (9b) und eine dritte Trommel (9c) umfasst, die voneinander so beabstandet sind, dass 35

zeichnet, dass die Abfolge an Raucherartikeln (S) erste (10a), zweite (10b) und dritte Raucherartikel (10c) in abwechselnder Abfolge umfasst, wobei die Vielzahl an Drehtrommeln (9) ihrerseits eine erste (9a), eine zweite (9b) und eine dritte Trommel (9c) umfasst, die voneinander so beabstandet sind, dass

- die erste Trommel (9a) an der vorgegebenen Betriebsposition mit den ersten Raucherartikeln (10a) gekuppelt werden kann;
- die zweite Trommel (9b) an der vorgegebenen Betriebsposition mit den zweiten Raucherartikeln (10b) gekuppelt werden kann;
- die dritte Trommel (9c) an der vorgegebenen Betriebsposition mit den dritten Raucherartikeln (10c) gekuppelt werden kann.

14. Maschine nach Anspruch 11, **dadurch gekennzeichnet, dass** die Drehtrommel (9) mindestens ein gerades Teilstück (11a) einer vorgegebenen Länge umfasst, an dem eine jede Düse (8) parallel mit den Fördermitteln (2) bewegbar ist und einem jeweiligen Raucherartikel (S) zugewandt ist. 40

Revendications

1. Machine de fabrication d'articles pour fumeurs, en particulier des cigarettes, chacune se prolongeant le long de son axe principal (A) d'extension et comprenant au moins une partie principale (S1) et un filtre (F) positionnés en série le long de l'axe (A) ; la machine comprenant : 45

- des moyens pour fabriquer une séquence d'articles pour fumeurs (S) ;
- des moyens d'inspection (103) pour contrôler la qualité de chaque article pour fumeurs ;
- au moins un convoyeur de sortie (105) configuré pour déplacer les articles pour fumeurs (S) sortant de la machine (100) ;
- au moins un élément sélecteur (104) configuré pour écarter les articles pour fumeurs défectueux (S) ;

dans laquelle la machine comprend une unité de récupération de tabac (1) comprenant :

- des moyens de convoyage (2) configurés pour déplacer une séquence d'articles pour fumeurs (S) le long d'une direction d'alimentation (B) transversale à l'axe (A) entre une position de préhension et une position d'élimination ;
- au moins un canal (7) de récupération de tabac ;
- au moins un collecteur des rebuts (3) ;

caractérisée en ce qu'elle comprend une unité de

- coupe (12) fonctionnellement interposée entre la position de préhension et la position d'élimination et configurée pour séparer la partie principale (S1) du filtre (F) de chaque article pour fumeurs (S) et des moyens pneumatiques (6) fonctionnellement situés le long des moyens de convoyage (2) et configurés pour générer une pression négative ou une surpression sur au moins un article pour fumeurs (S) le long des moyens de convoyage (2) afin d'extraire le tabac (T) de la partie principale (S1) ; les moyens pneumatiques (6) étant associés au canal (7) de récupération de tabac, dans laquelle l'élément sélecteur (104) est configuré pour distinguer entre des articles pour fumeurs défectueux d'un premier type, étant récupérables, et des articles pour fumeurs défectueux d'un second type, n'étant pas récupérables.
2. Machine selon la revendication 1, **caractérisée en ce que** l'élément sélecteur (104) comprend des moyens de détection et de rejet (105) configurés pour rejeter les articles pour fumeurs défectueux du second type et les acheminer vers une zone de libération ou de décharge (106) .
 3. Machine selon la revendication 2, **caractérisée en ce que** la zone de libération ou de décharge (106) comprend un convoyeur (107) ou conduit d'éjection conçu pour diriger les articles pour fumeurs défectueux du second type dans des récipients spécifiques sans les remettre dans le processus de production.
 4. Machine selon l'une quelconque des revendications de 1 à 3, **caractérisée en ce qu'elle** comprend une trémie pour recueillir le tabac (T) et fonctionnellement située en amont des moyens de fabrication d'une séquence d'articles pour fumeurs (S) ; le canal (7) de récupération étant en communication fluïdique avec la ou, dans tous les cas, relié à la trémie afin de permettre au tabac d'être récupéré dans le processus d'élaboration.
 5. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de convoyage (2) comprennent au moins un tapis transporteur (4) pourvu d'une pluralité de rainures transversales (4a) disposées en séquence et définissant chacune un logement pour un article de fumeurs (S) respectif.
 6. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de convoyage (2) comprennent au moins un dispositif de retenue (5) pour retenir au moins un article pour fumeurs (S) et fonctionnellement situé au moins en correspondance des moyens pneumatiques (6) afin de maintenir en place l'article pour fumeurs (S) lors de l'action d'aspiration ou de soufflage des moyens pneumatiques (6).
 7. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'unité de découpe (12) comprend au moins une lame (13) orientée le long de la direction d'alimentation (B) des moyens de convoyage (2) et comportant au moins une position fonctionnelle où elle dépasse au-dessus des moyens de convoyage (2).
 8. Machine selon la revendication 7, **caractérisée en ce que** les moyens de convoyage (2) comprennent au moins un tapis transporteur (4) comportant une fente (14) ou incision qui divise le tapis transporteur (4) en une première partie (4b) pour loger la partie principale (S1) des articles pour fumeurs (S), et une seconde partie (4c) pour loger le filtre (F) des articles pour fumeurs (S) ; la lame (14) étant située en correspondance de la fente (14) ou incision et dépassant au moins partiellement au-dessus du tapis transporteur (4).
 9. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens pneumatiques (6) comprennent au moins une soufflette (8) située latéralement par rapport aux moyens de convoyage (2) et comportant au moins une position fonctionnelle où elle fait face au filtre (F) ou à l'embouchure de la partie principale (S1) d'un article pour fumeurs (S) pour produire une surpression à l'intérieur de l'article pour fumeur (S) de manière à éjecter le tabac (T) hors de la partie principale (S1).
 10. Machine selon la revendication 9, **caractérisée en ce que** l'au moins une buse (8) est mobile au moins partiellement de façon synchrone avec les moyens de convoyage (2) pour agir sur l'article pour fumeurs (S) le long au moins d'une portion de longueur prédéterminée de sorte à mieux vider la partie principale (S1).
 11. Machine selon la revendication 9 ou 10, **caractérisée en ce que** les moyens pneumatiques (6) comprennent au moins un tambour rotatif (9) équipé d'une pluralité de buses (8) espacées à des intervalles angulaires égaux et comportant chacune une position fonctionnelle respective où elles font face latéralement au moyens de convoyage (2).
 12. Machine selon la revendication 11, **caractérisée en ce que** les moyens pneumatiques (6) comprennent une pluralité de tambours rotatifs (9) disposés en séquence le long des moyens de convoyage (2) afin de produire la surpression en correspondance d'une pluralité correspondante d'articles pour fumeurs (S).
 13. Machine selon la revendication 12, **caractérisée en ce que** la séquence d'articles pour fumeurs (S) com-

prend des premier (10a), second (10b) et troisième articles pour fumeurs (10c) en séquence alternée ; la pluralité de tambours rotatifs (9) comprenant à son tour un premier (9a), un second (9b) et un troisième tambour (9c) espacés les uns des autres de manière à ce que :

- le premier tambour (9a), à la position fonctionnelle prédéterminée, puisse être couplé aux premiers articles pour fumeurs (10a) ;
- le second tambour (9b), à la position fonctionnelle prédéterminée, puisse être couplé aux seconds articles pour fumeurs (10b) ;
- le troisième tambour (9c), à la position fonctionnelle prédéterminée, puisse être couplé aux troisièmes articles pour fumeurs (10c).

14. Machine selon la revendication 11, **caractérisée en ce que** le tambour rotatif (9) comprend au moins une portion rectiligne (11a) de longueur prédéterminée, où chaque buse (8) est mobile en parallèle avec les moyens de convoyage (2) et fait face à l'article pour fumeurs (S) respectif.

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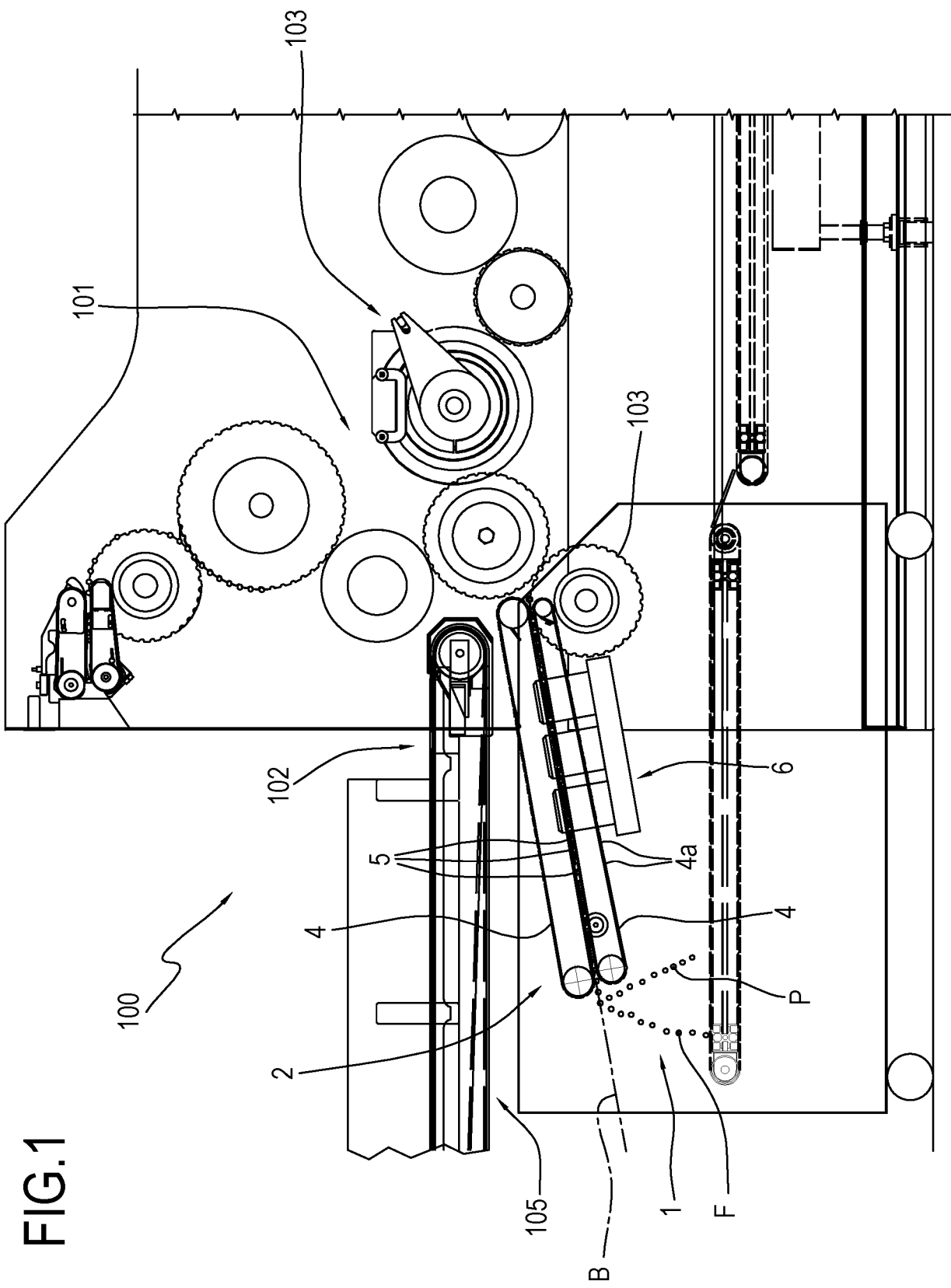
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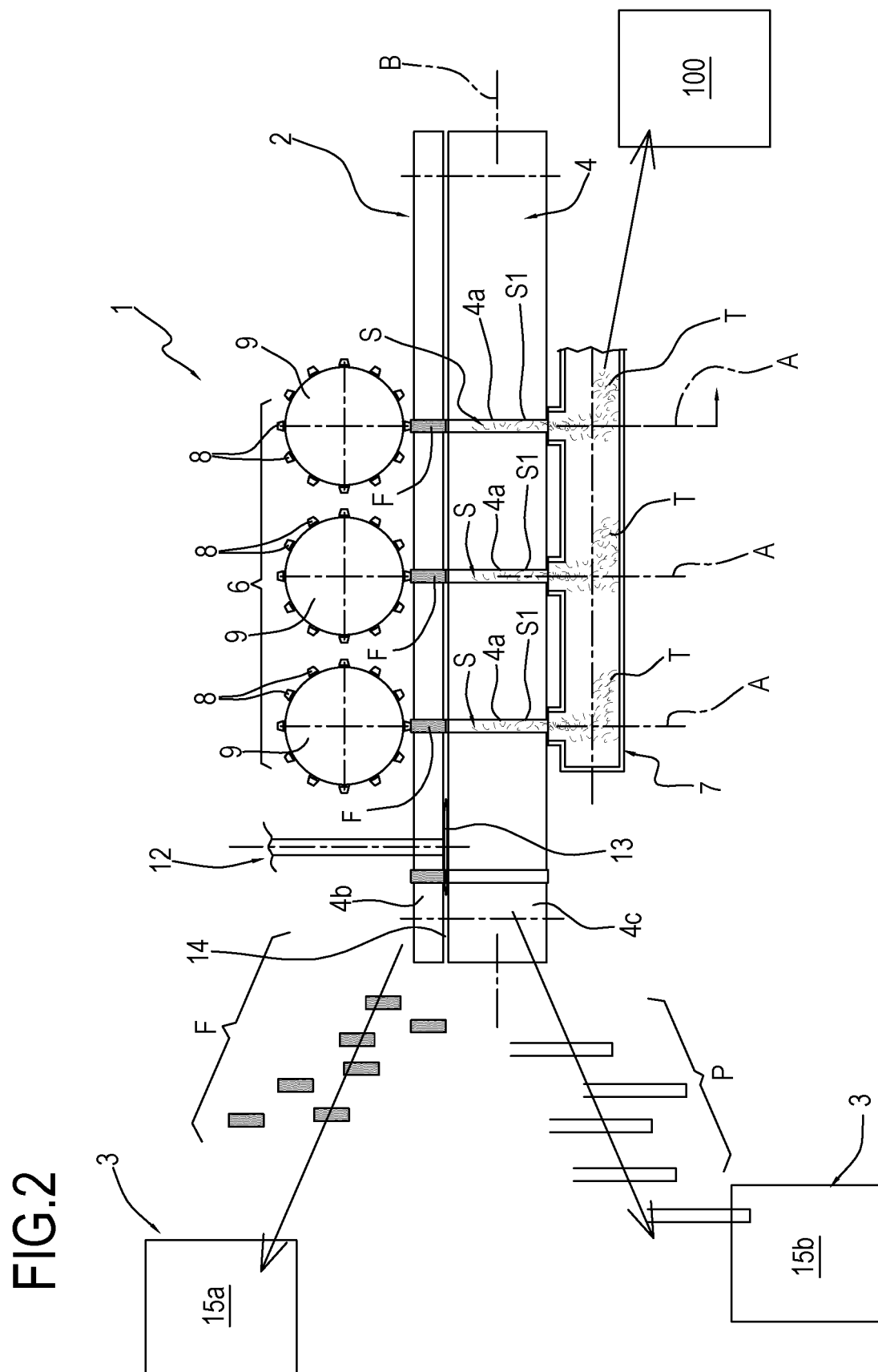
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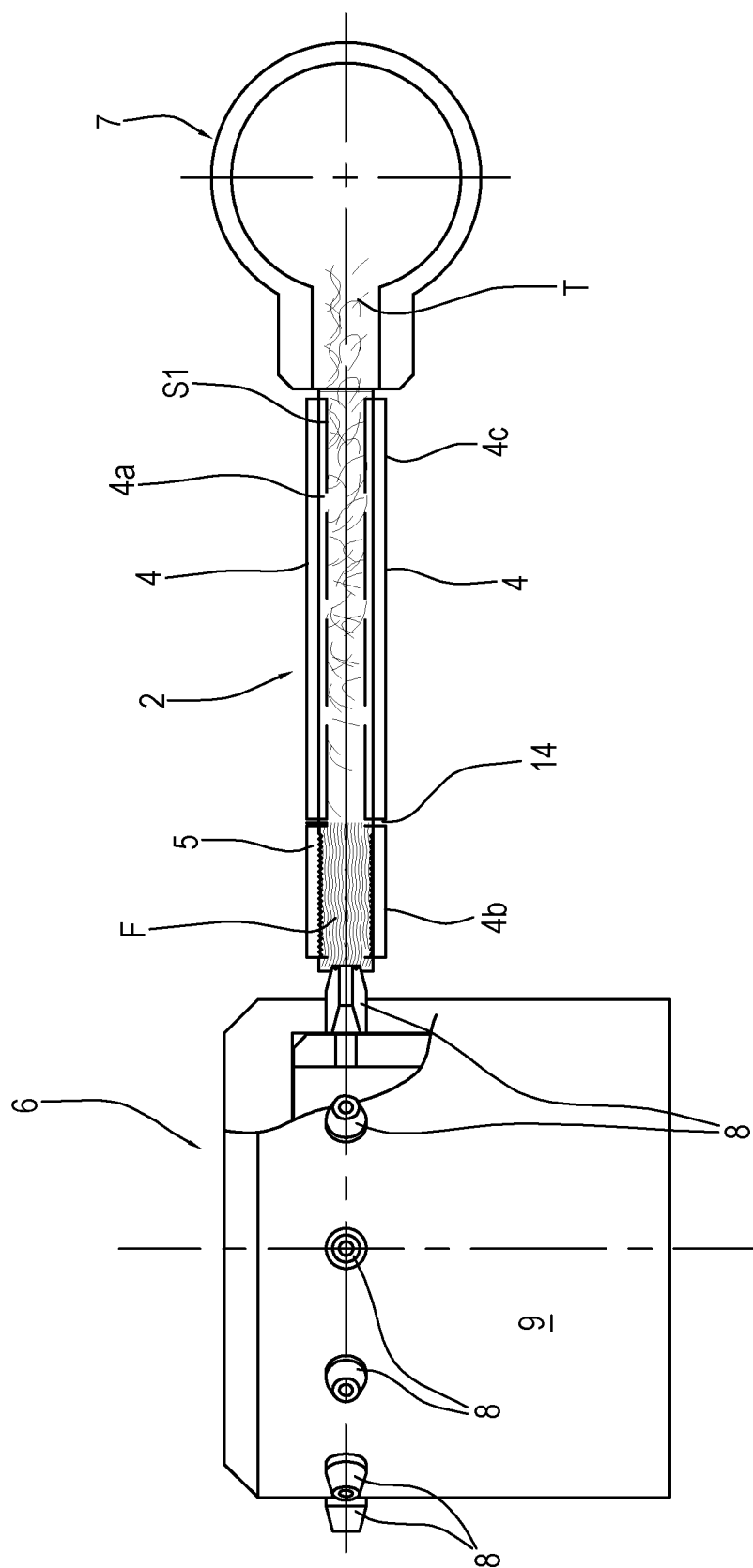
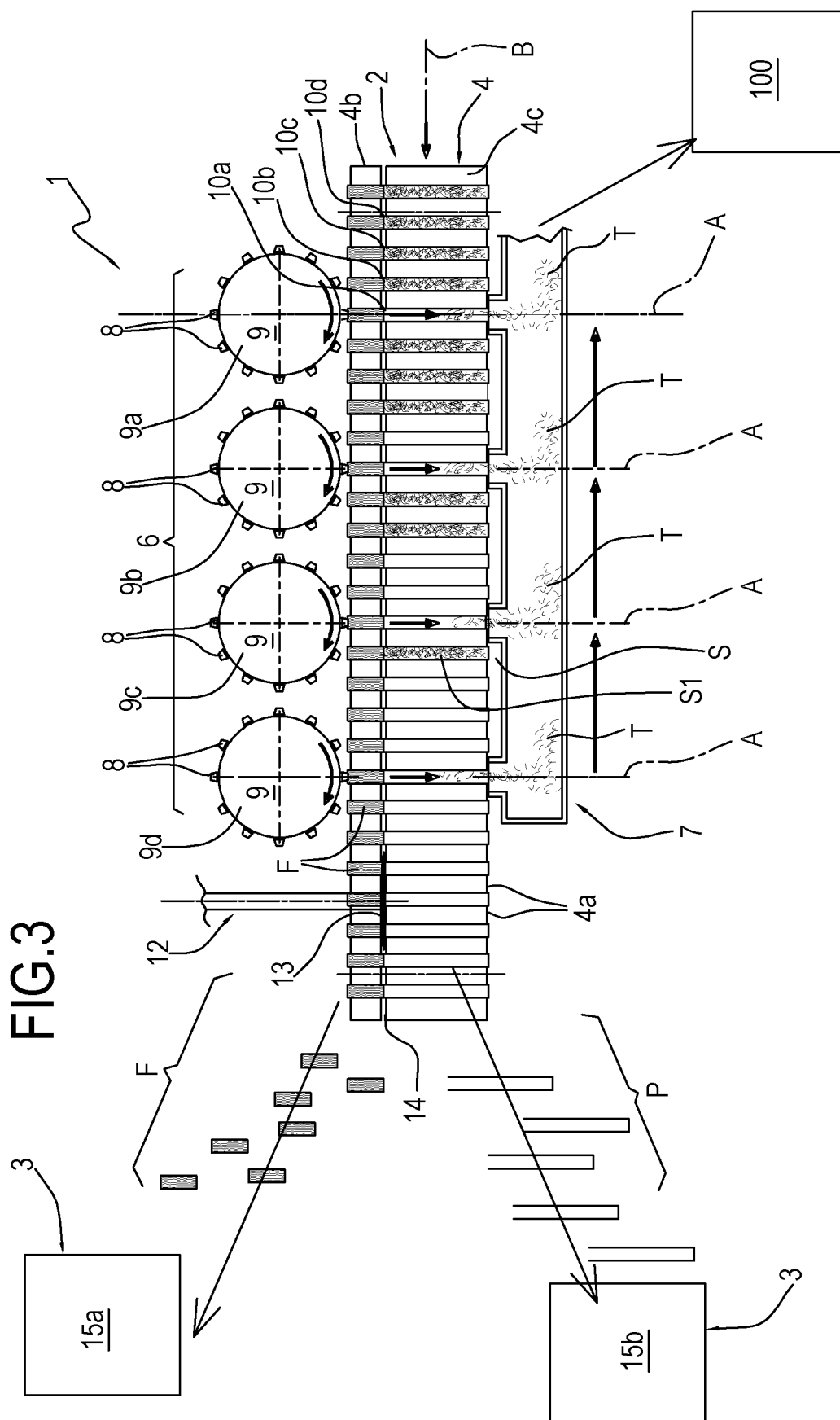
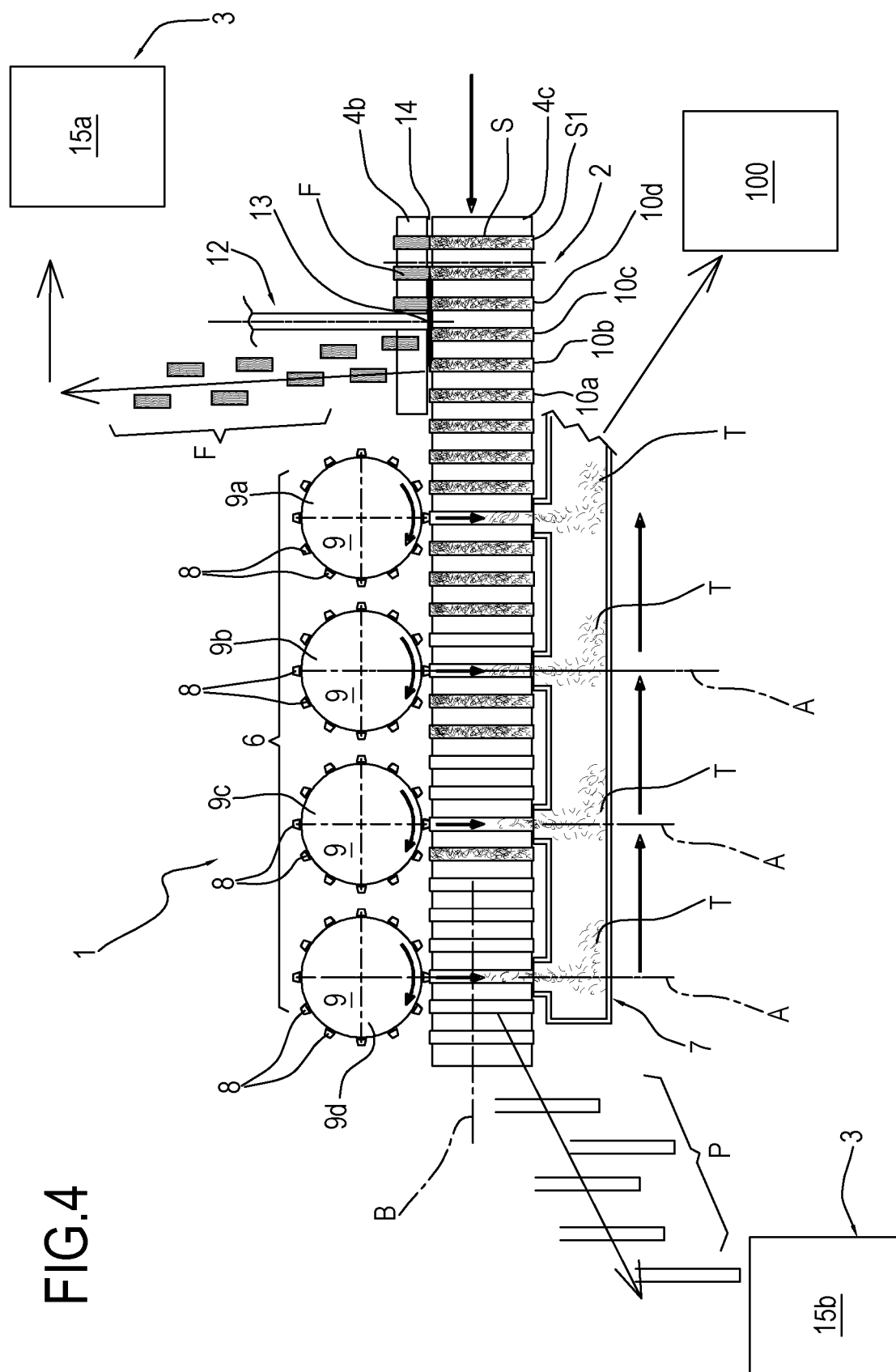
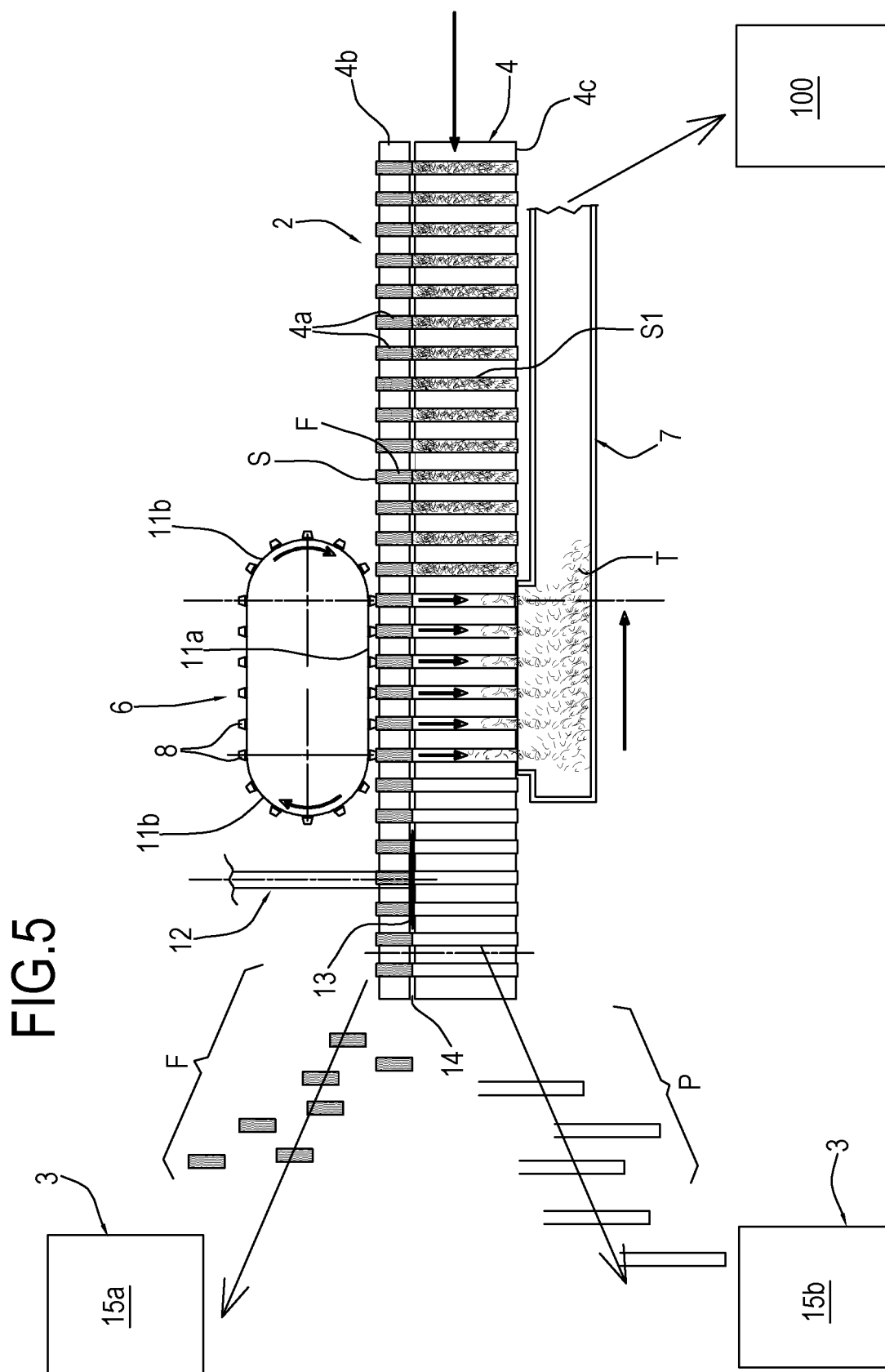
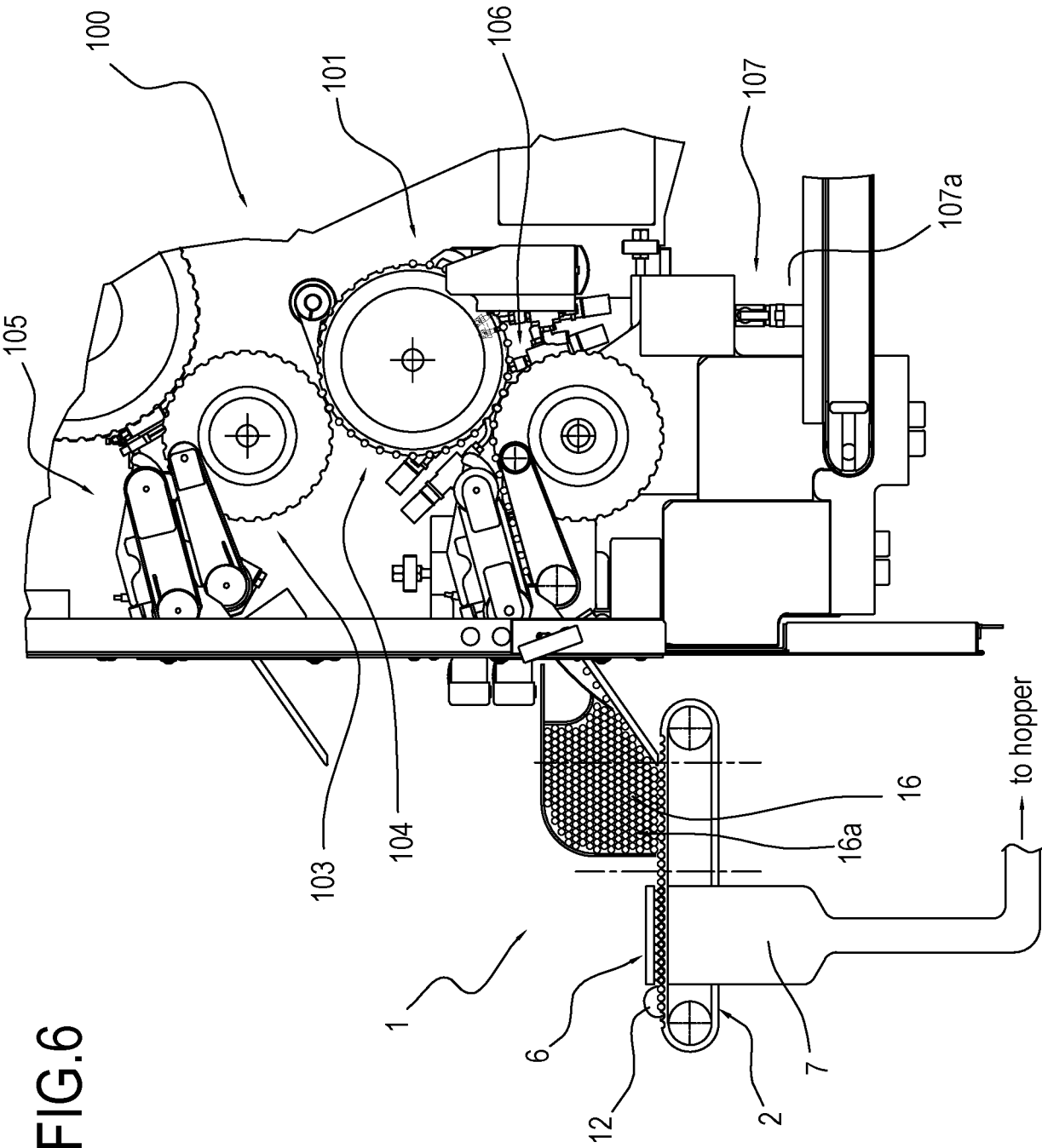


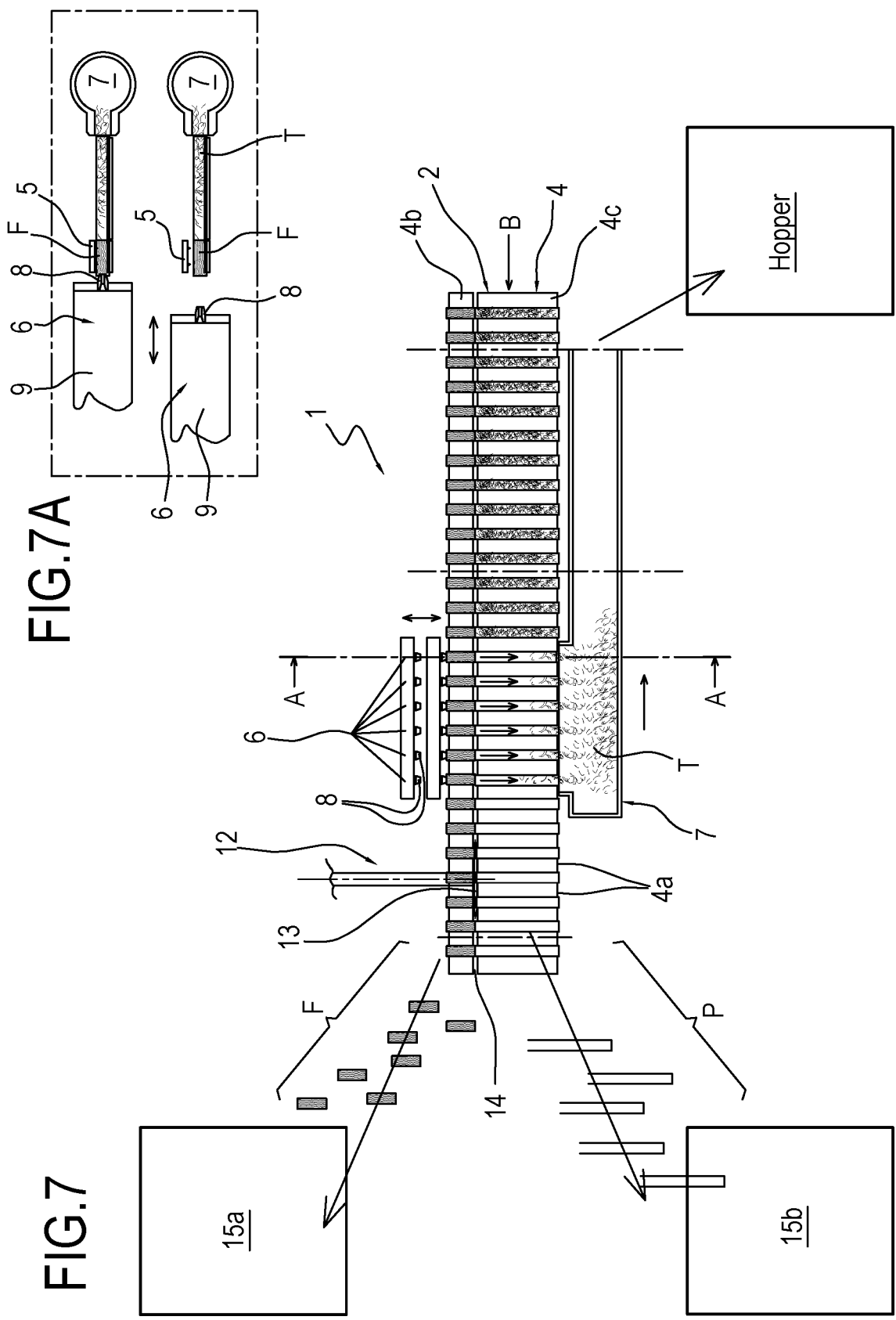
FIG. 2a











REFERENCES CITED IN THE DESCRIPTION

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