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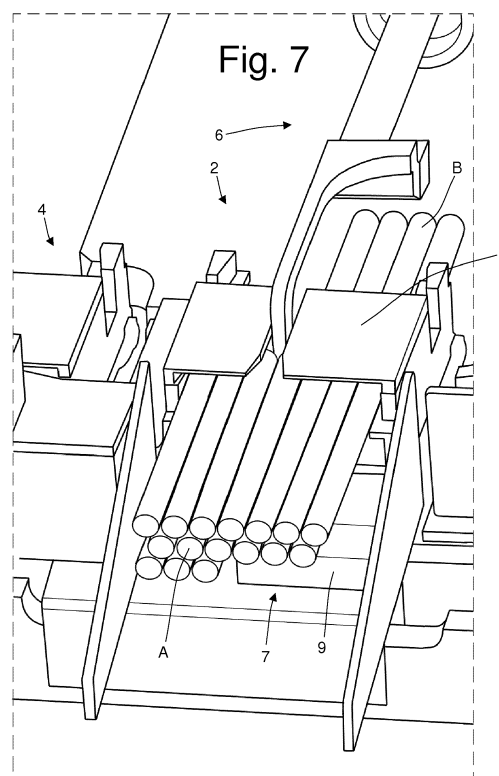
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(54) **REJECT STATION AND METHOD FOR EXPELLING A FLAWED GROUP OF CIGARETTES FROM A POCKET OF A CIGARETTE PACKING MACHINE GROUP-FORMING CONVEYOR**

(57) Reject station (S2) for expelling a flawed group (2) of cigarettes from a pocket (5) of a cigarette packing machine group-forming conveyor (4); the reject station (S2) comprises: a first push device (6) located alongside the group-forming conveyor (4) and which, to expel the flawed group (2) of cigarettes from the pocket (5), pushes some of the cigarettes in the group (2) in an expulsion direction (D) perpendicular to the feeding path (P) of the group-forming conveyor (4); and a second push device (7) which is located alongside the group-forming conveyor (4), on the opposite side with respect to the first push device (6) and, to expel the flawed group (2) of cigarettes from the pocket (5), pushes the rest of the cigarettes in the group (2) in an expulsion direction (D) opposite to that of the first push device (6).



Description

TECHNICAL FIELD

[0001] The present invention relates to a reject station and method for expelling a flawed group of cigarettes from a pocket of a cigarette packing machine group-forming conveyor.

PRIOR ART

[0002] A cigarette packing machine comprises a group-forming unit for groups of cigarettes. Generally, the group-forming unit comprises a hopper containing a mass of cigarettes and is provided with at least one lower outlet mouth, a group-forming conveyor which is located in front of the hopper lower outlet mouth and supports a number of group-forming pockets, and a pusher which cyclically extracts a group of cigarettes from the hopper lower outlet mouth and inserts the group of cigarettes in a pocket of the group-forming conveyor. Normally, the group-forming conveyor is provided with a control station which is arranged downstream from the hopper and performs a filling optical control of the cigarette tips (i.e. verify if the cigarette tips contain an adequate amount of tobacco). In addition, the group-forming conveyor is provided with a reject station which is arranged downstream from the control station and is operated by the control station itself to eliminate from the corresponding pocket a flawed group of cigarettes (i.e. containing at least one flawed cigarette, that is at least a cigarette having an insufficient filling of the tip).

[0003] The known reject stations normally comprise a pusher, which is movable perpendicularly to the group-forming conveyor and is operated to be inserted inside a pocket so as to push out from the pocket itself a flawed group of cigarettes to be rejected; a bin is located underneath the group-forming conveyor and at the reject station, inside which the rejected group of cigarettes (i.e. expelled from the pocket by the pusher of the reject station) falls by gravity. The rejected cigarettes in the bin are not normally discharged, but treated to recuperate the tobacco content therein which may be re-introduced in the packaging process.

[0004] A pack of cigarettes has been proposed containing a group of cigarettes formed by cigarettes being different one from the other, i.e. formed by a mixture of two different types of cigarettes (which normally differ from each other by the type of tobacco). To put together a group of cigarettes formed by cigarettes being different one from the other a hopper divided into two areas and independent one from the other is used, each of which houses a corresponding type of cigarette. However, when a group of cigarettes formed by cigarettes being different one from the other is rejected by using a reject station of a known type and of the type described above, the cigarettes are mixed in a disorderly manner in the bin thus making it complicated to recuperate the tobacco

from the rejected cigarettes in the bin (as two different types of cigarettes containing different tobaccos are enclosed in bulk in the same bin). In this regard it is important to observe that the rejected cigarettes along the group-forming conveyor can reach an average amount to 55-65% of the total of the cigarettes that are rejected in the packing machine, therefore the reject station located along the group-forming conveyor represents the first source of rejected cigarettes in the packing machine.

DESCRIPTION OF THE INVENTION

[0005] The object of the present invention is to provide a reject station and method for expelling a flawed group of cigarettes from a pocket of a cigarette packing machine group-forming conveyor, in which reject station and method are free from the drawbacks described above and are, at the same time, easy and inexpensive to manufacture.

[0006] According to the present invention, a reject station and method for expelling a flawed group of cigarettes from a pocket of a cigarette packing machine group-forming conveyor, are provided as claimed in the attached claims.

BRIEF DESCRIPTION OF DRAWINGS

[0007] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limitative embodiment, wherein:

- Figure 1 is a schematic front view of a group-forming unit of cigarette groups, which is part of a cigarette packing machine and is provided with a reject station for flawed groups of cigarettes obtained according to the present invention;
- Figures 2, 4 and 5 are three plan and schematic views in three different operating moments of the reject station for flawed groups of cigarettes of Figure 1;
- Figure 3 is a schematic front view of two push devices of the reject station for flawed groups of cigarettes of Figure 1; and
- Figures 6 and 7 are two perspective and schematic views in two different operating moments of the reject station for flawed groups of cigarettes of Figure 1.

PREFERRED EMBODIMENTS OF THE INVENTION

[0008] In Figure 1 number 1 indicates as a whole a unit for forming groups 2 of cigarettes for a cigarette packing machine (not shown). In the illustrated embodiment, each group 2 of cigarettes has a standard type shape and comprises twenty cigarettes distributed on three rows of 7-6-7 cigarettes each. Each group 2 of cigarettes is formed by cigarettes A and B being different from each other, or formed by a mixture of two different types of cigarettes A and B (which normally differ from each other for the

type of tobacco). In particular, the cigarettes A entirely constitute the top layer and the intermediate layer of each group 2 of cigarettes and partially constitute the lower layer of each group 2 of cigarettes, while the cigarettes B partially constitute the lower layer of each group 2 of cigarettes. Obviously, according to other and perfectly equivalent embodiments not illustrated, the proportion and/or the arrangement of the cigarettes A and B within each group 2 of cigarettes may be different (for example, the cigarettes B could be completely the lower layer of each group 2 of cigarettes, or the cigarettes B may also partly constitute the intermediate layer and/or the top layer of each group 2 of cigarettes).

[0009] The group-forming unit 1 comprises a hopper 3 provided with three outlet mouths (known and not illustrated in detail) each having a number of substantially vertical grooves along which respective rows of cigarettes descend by gravity. To form each group 2 of cigarettes formed by cigarettes A and B being different from each other, the hopper 3 is (in known manner) divided into two areas separated and independent from each other, each of which houses a corresponding type of cigarette A or B.

[0010] In front of the hopper 3 a group-forming conveyor 4 is arranged which travels along a rectilinear path P and by an intermittent rule of motion (or "stepwise") a number of pockets (or drawers) 5, each of which is suited to receive and contain a corresponding group 2 of cigarettes. In other words, the group-forming conveyor 4 cyclically alternates a feeding step and a rest or stopping step and feeds each pocket 5 by one feeding step every one feeding step.

[0011] Three pushers (known and not illustrated) are coupled to the hopper 3, each of which has a comb shape and is inserted cyclically inside an outlet mouth of the hopper 3 to extract from the outlet mouth a corresponding layer of cigarettes which forms, together with the other two layers, a group 2 of cigarettes, and then to insert the layer of cigarettes inside a corresponding pocket 5 of the group-forming conveyor 4. Consequently, from the hopper 3 the three pushers simultaneously feed three layers of cigarettes A or B to corresponding three pockets 5 of the group-forming conveyor 4 arranged at rest in front of the outlet mouths of the hopper 3.

[0012] The group-forming conveyor 5 comprises a control station S1 (of known type), which is arranged downstream from the hopper 3 and performs an optical control of the filling of the cigarette tips (i.e. verify if the cigarette tips contain an adequate amount of tobacco). Furthermore, the group-forming conveyor 5 comprises a reject station S2 which is arranged downstream from the control station S1 and is actuated by the control station S1 itself to eliminate from the corresponding pocket 5 a flawed group 2 of cigarettes (i.e. containing at least one flawed cigarette, that is at least a cigarette having an insufficient filling of the tip). Finally, the group-forming conveyor 5 comprises a transfer station S3 (of known type), which is arranged downstream from the reject sta-

tion S2 and cyclically transfers the groups 2 of cigarettes from the pockets 5 of the group-forming conveyor to an inlet of a packing line (known and not illustrated) of the packing machine.

[0013] As shown in Figure 2, the reject station S2 comprises a push device 6 located alongside the group-forming conveyor 4 and, to expel a corresponding flawed group 2 of cigarettes from a pocket 5, pushes the cigarettes A of the group 2 of cigarettes (i.e. the rest of the cigarettes in the group 2) in an expulsion direction D perpendicular to the feeding path P of group-forming conveyor 4. In addition, the reject station S2 comprises a push device 7, which is located alongside the group-forming conveyor 4 on the opposite side with respect to the push device 6 and, to expel a corresponding flawed group 2 of cigarettes from a pocket 5, pushes the cigarettes B in the group 2 of cigarettes (i.e. the rest of the cigarettes in the group 2) along the expulsion direction D with a movement direction opposite to the push device 6.

[0014] The push device 6 comprises a movable pusher 8 that is initially located alongside the group-forming conveyor 4 and, to expel a corresponding flawed group 2 of cigarettes from a pocket 5, is inserted inside the pocket 5 moving along the expulsion direction D under the thrust of an actuator (electric or pneumatic). In other words, to expel a corresponding flawed group 2 of cigarettes from a pocket 5, the actuator 8 moves the pusher back and forth (i.e., along the expel direction D performing a forward stroke and subsequently a return stroke) to make the pusher 8 enter inside the pocket 5, and then push progressively out of the pocket 5 the flawed group 2 of cigarettes.

[0015] The push device 7 comprises a fixed supporting body 9 that is located (fixed position) alongside the group-forming conveyor 4 and supports a number of blow nozzles 10, each for blowing air in the expulsion direction D onto the group 2 of cigarettes. Each blow of air is able to push a corresponding cigarette B along the expulsion direction D out of the pocket 5 with a corresponding movement direction opposite to the movement direction imparted by the pusher 8 of the push device 6.

[0016] In the embodiment illustrated in the attached figures, the push device 6 is mechanical (i.e. comprises the movable pusher 8 physically entering into a pocket 5 of the group-forming conveyor 4). According to a different embodiment not illustrated, the push device 6 is pneumatic (i.e. wholly similar to the push device 7 illustrated in the attached figures and provided with blow nozzles 10); in this embodiment, the push device 6 comprises a number of blow nozzles, each for blowing air in the expulsion direction D onto the group 2 of cigarettes and is carried by a fixed supporting body which is located alongside the group-forming conveyor 4.

[0017] In the embodiment illustrated in the attached figures, the push device 7 is pneumatic (i.e. comprises the blow nozzles 10). According to a different embodiment not illustrated, the push device 7 is mechanical (i.e. wholly similar to the push device 6 illustrated in the at-

tached figures and provided with the movable pusher 8 that physically enters into a pocket 5 of the group-forming conveyor 4); in this embodiment, the push device 7 comprises a movable pusher initially located alongside the group-forming conveyor 4 and, for expelling a corresponding flawed group 2 of cigarettes from a pocket 5, it is inserted inside the pocket 5 moving along the expulsion direction D.

[0018] As better illustrated in Figure 3, the two push devices 6 and 7 are complementary in shape, so that each cigarette A or B of the group 2 of cigarettes is always engaged by one and only one of the two push devices 6 and 7 (i.e. so that each cigarette A or B of the group 2 of cigarettes is always pushed by one of the two push devices 6 and 7 and only by one of the two push devices 6 and 7). In particular, the pusher 8 of the push device 6 and the supporting body 9 of the push device 7 are complementary in shape, so that each cigarette A or B of the group 2 of cigarettes is always engaged by one and only one of two push devices 6 and 7. Consequently, the push device 6 (i.e. the pusher 8 of the push device 6) has a through opening (located at the bottom right in Figure 3) through which the push device 7 moves without interference (i.e. the supporting body 9 of the push device 7).

[0019] The reject station S2 comprises a bin 11, located beneath the group-forming conveyor 4 and on the opposite side with respect to the push device 6 to receive the cigarettes A pushed out by the push device 6 from a corresponding pocket 5. In addition, the reject station S2 comprises a bin 12, located beneath the group-forming conveyor 4 and on the opposite side with respect to the push device 7 to receive the cigarettes B pushed out by the second push device 7 from a corresponding pocket 5.

[0020] Finally, the reject station S2 comprises a control unit 13, which receives the signal to reject a group 2 of flawed cigarettes from the control station S1, and then following said signal received from the control station S1 activate both push devices 6 and 7 to reject a flawed group 2 of cigarettes (i.e. to expel a flawed group 2 of cigarettes from the corresponding pocket 5 of the group-forming conveyor 4). According to a preferred embodiment visible in Figure 4, the control unit 13 activates the pushing action of the push device 6 slightly before the thrust action of the push device 7 (i.e., the push device 6 starts pushing the cigarettes A out of the pocket 5 before the push device 7 starts to push the cigarettes B out of the pocket 5). In other words, the control unit 13 activates the pushing action of the push device 7 when the cigarettes A pushed by the push device 6 are already partially expelled from the pocket 5. According to a preferred embodiment, the control unit 13 activates the pushing action of the push device 7 when the cigarettes A pushed by the push device 6 are expelled from the pocket 5 by at least a third of their length, and preferably by half of their length.

[0021] The fact of activating the push device 7 with a certain delay with respect to the push device 6 (i.e. to activate the push device when the cigarettes A pushed

by the push device 6 are already partially expelled from the pocket 5) allows to avoid that part of the cigarettes A of the intermediate and upper layer can fall by gravity (in the absence of an adequate support for the cigarettes B of the lower layer) being arranged transversely to the pocket 5 of the group-forming conveyor 4, and therefore hindering the expulsion thereof from the pocket 5 itself. Moreover, one should not wait too long to activate the push device 7 (i.e. the push device 7 must be activated when the cigarettes A pushed by the push device 6 are still partially inside the pocket 5), so as to use (initially) the cigarettes A pushed by the push device 6 as a "guide" for handling the cigarettes B pushed by the push device 7.

[0022] In Figure 2 (and in Figure 6 which shows the same situation of Figure 2), the two push devices 6 and 7 are in the inactive condition, i.e. not exerting any action on the group 2 of cigarettes contained inside the pocket 5 of the group-forming conveyor 4 waiting at the reject station S2; starting from this situation, the push devices 6 and 7 can remain inactive (therefore without rejecting the group 2 of cigarettes), or may be activated to reject the group 2 of cigarettes. In Figure 4, the push device 6 has been activated, the pusher 8 of the push device 6 is located inside the pocket 5 of the group-forming conveyor 4, and therefore the cigarettes in group 2 have already been pushed partially out of the pocket 5 itself; instead the push device 7 is still inactive, and therefore the cigarettes B are still completely inside the pocket 5. In Figure 5 (and in Figure 7 which shows the same situation of Figure 5), the push device 6 has almost completed the expulsion of the cigarettes A from the pocket 5 of the group-forming conveyor 4 and the push device 7 has begun the expulsion of the cigarettes B from the pocket 5 itself.

[0023] The reject station S2 described above has numerous advantages.

[0024] In the first place, the reject station S2 described above allows to differentiate the rejected cigarettes A and B of different types forming each group 2 of cigarettes that is rejected; in this way, it is possible to collect in a differentiated way cigarettes A and B of a different type greatly facilitating the subsequent reuse of the tobacco thereof.

[0025] In addition, the reject station S2 described above is particularly compact, therefore easy to install even on an existing packing machine.

[0026] Finally, the reject station S2 described above is also easy and inexpensive to manufacture, as it is formed by structurally simple elements with little and easy handling (it is important to observe that in a cigarette packing machine a source of compressed air is normally provided and available in all areas).

Claims

1. A reject station (S2) for expelling a flawed group (2) of cigarettes from a pocket (5) of a cigarette packing

machine group-forming conveyor (4);
the reject station (S2) comprises a first push device (6) located alongside the group-forming conveyor (4) and which, to expel the flawed group (2) of cigarettes from the pocket (5), pushes some of the cigarettes in the group (2) in an expulsion direction (D) perpendicular to the path (P) of the group-forming conveyor (4);

the reject station (S2) is **characterized by** comprising a second push device (7) located alongside the group-forming conveyor (4), on the opposite side to the first push device (6), and which, to expel the flawed group (2) of cigarettes from the pocket (5), pushes the rest of the cigarettes in the group (2) in an expulsion direction (D) opposite to that of the first push device (6).

2. A reject station (S2) according to Claim 1, wherein the first push device (6) comprises a movable first pusher (8) initially located alongside the group-forming conveyor (4) and which, to expel the flawed group (2) of cigarettes from the pocket (5), is inserted inside the pocket (5) in the expulsion direction (D).

3. A reject station (S2) according to Claim 1, wherein the first push device (6) comprises a number of first blow nozzles, each for blowing air in the expulsion direction (D) onto the group (2) of cigarettes.

4. A reject station (S2) according to Claim 3, wherein the first push device (6) comprises a fixed first supporting body located alongside the group-forming conveyor (4) and supporting the first blow nozzles.

5. A reject station (S2) according to one of Claims 1 to 4, wherein the second push device (7) comprises a movable second pusher initially located alongside the group-forming conveyor (4) and which, to expel the flawed group (2) of cigarettes from the pocket (5), is inserted inside the pocket (5) in the expulsion direction (D).

6. A reject station (S2) according to one of Claims 1 to 4, wherein the second push device (7) comprises a number of second blow nozzles (10), each for blowing air in the expulsion direction (D) onto the group (2) of cigarettes.

7. A reject station (S2) according to Claim 6, wherein the second push device (7) comprises a fixed second supporting body (9) located alongside the group-forming conveyor (4) and supporting the second blow nozzles (10).

8. A reject station (S2) according to one of Claims 1 to 7, wherein the two push devices (6, 7) are complementary in shape, so that each cigarette (A, B) in the group (2) is always engaged by one and only one of

the two push devices (6, 7).

9. A reject station (S2) according to one of Claims 1 to 8, wherein the first push device (6) has a through window, through which the second push device (7) moves with no interference.

10. A reject station (S2) according to one of Claims 1 to 9, and comprising a control unit (13) which activates the first push device (6) before the second push device (7).

11. A reject station (S2) according to Claim 10, wherein the control unit (13) activates the second push device (7) when the cigarettes (A) pushed by the first push device (6) are partly expelled from the pocket (5).

12. A reject station (S2) according to Claim 11, wherein the control unit (13) activates the second push device (7) when the cigarettes (A) pushed by the first push device (6) are expelled from the pocket (5) by at least a third of their length.

13. A reject station (S2) according to Claim 11 or 12, wherein the control unit (13) activates the second push device (7) when the cigarettes (A) pushed by the first push device (6) are expelled from the pocket (5) by half their length.

14. A reject station (S2) according to one of Claims 1 to 13, and comprising:

a first bin (11) located beneath the group-forming conveyor (4), on the opposite side to the first push device (6), to receive the cigarettes (A) expelled by the first push device (6); and
a second bin (12) located beneath the group-forming conveyor (4), on the opposite side to the second push device (7), to receive the cigarettes (B) expelled by the second push device (7).

15. A reject method for expelling a flawed group (2) of cigarettes from a pocket (5) of a cigarette packing machine group-forming conveyor (4);
to expel the flawed group (2) of cigarettes from the pocket (5), the reject method comprises the step of pushing some of the cigarettes in the group (2) in an expulsion direction (D) perpendicular to the path (P) of the group-forming conveyor (4), by means of a first push device (6) located alongside the group-forming conveyor (4);
the reject method is **characterized by** comprising, to expel the flawed group (2) of cigarettes from the pocket (5), the further step of pushing the rest of the cigarettes in the group (2) in an expulsion direction (D) opposite to that of the first push device (6), by means of a second push device (7) located alongside the group-forming conveyor (4), on the opposite side

to the first push device (6).

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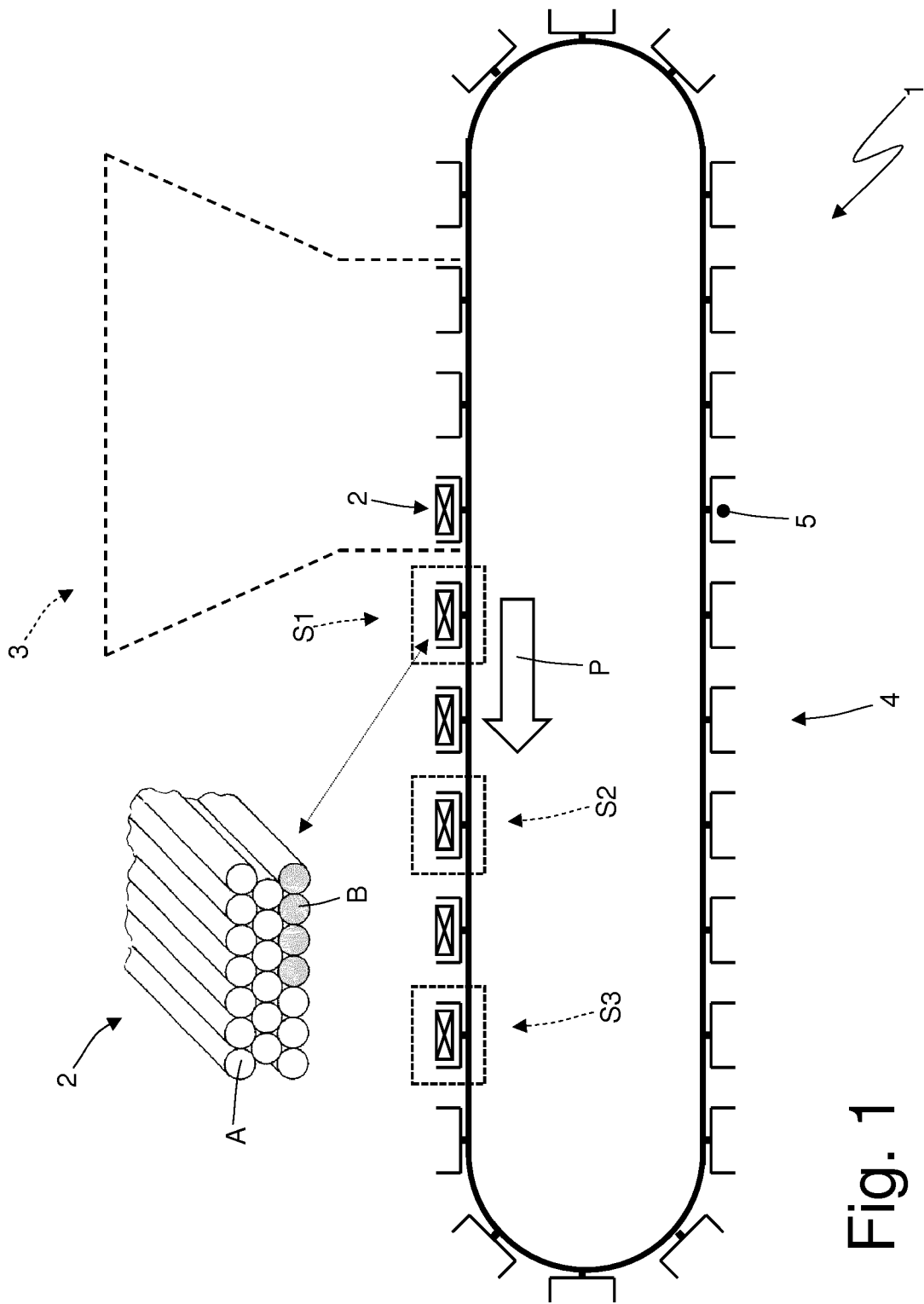


Fig. 1

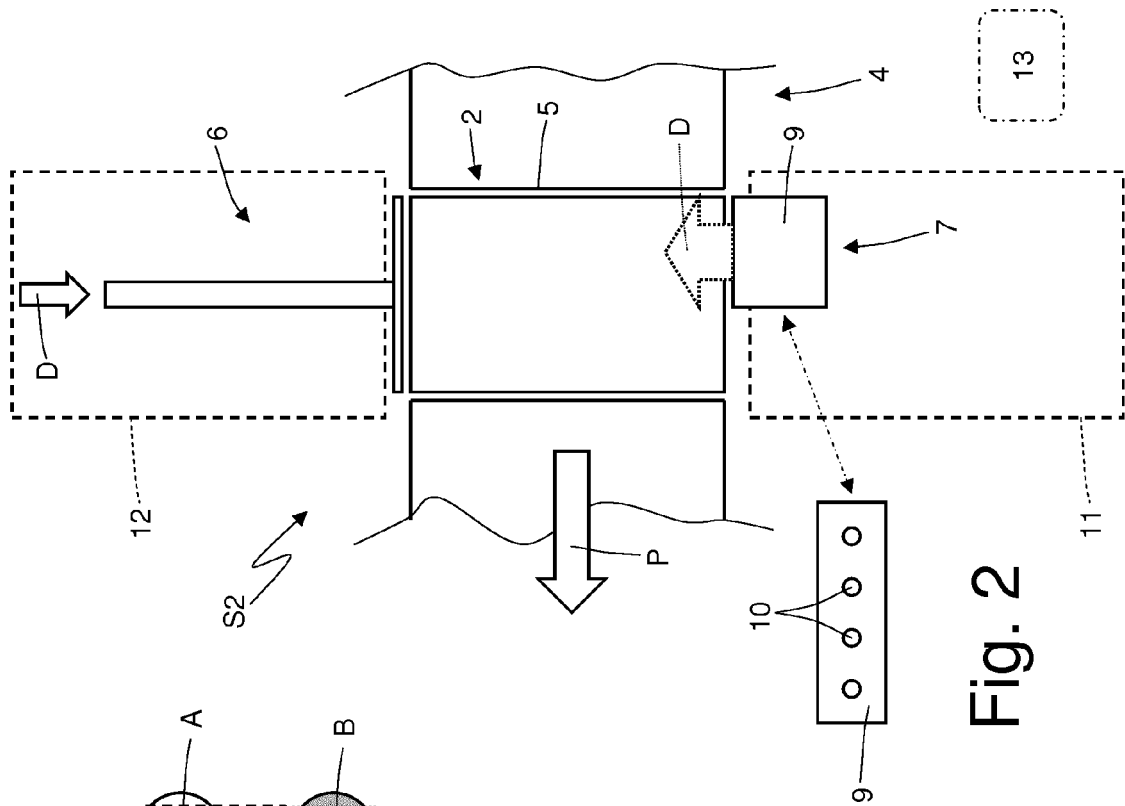


Fig. 2

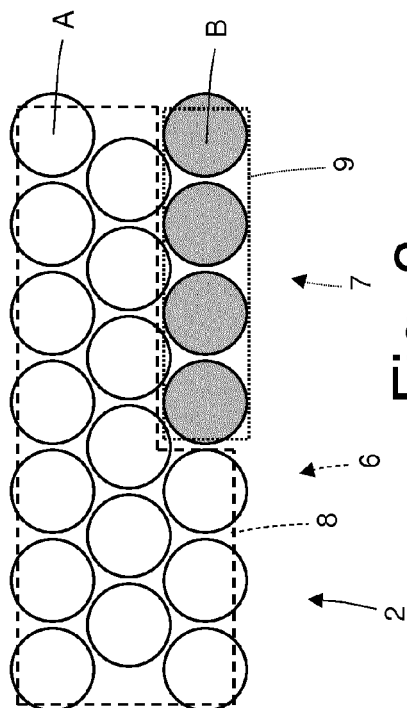
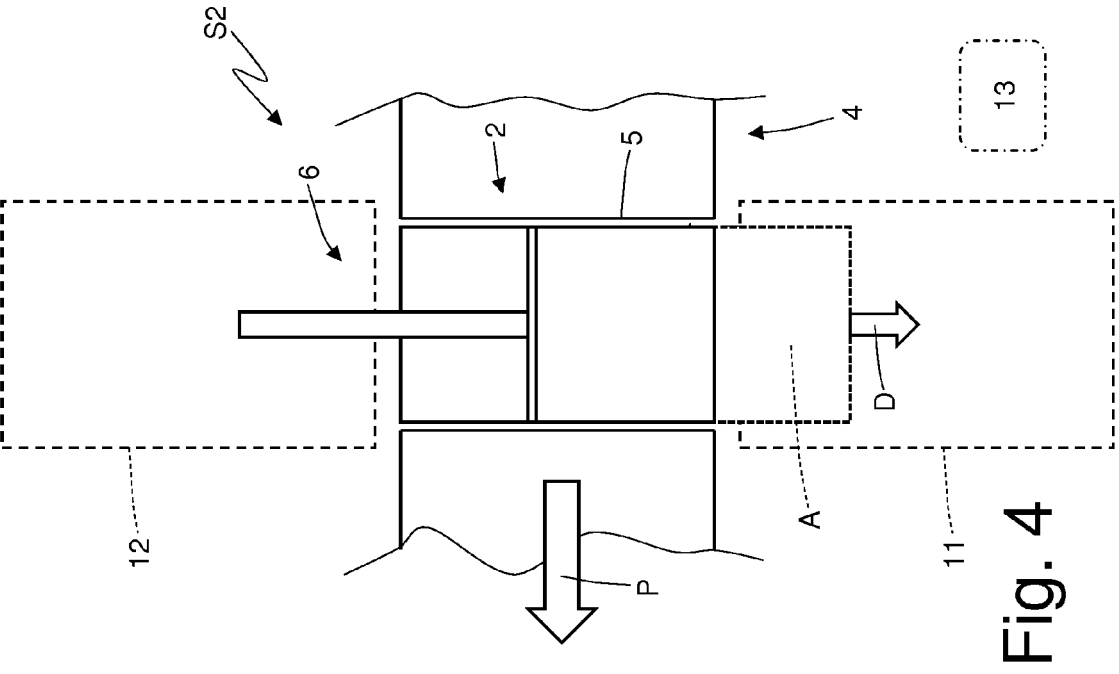
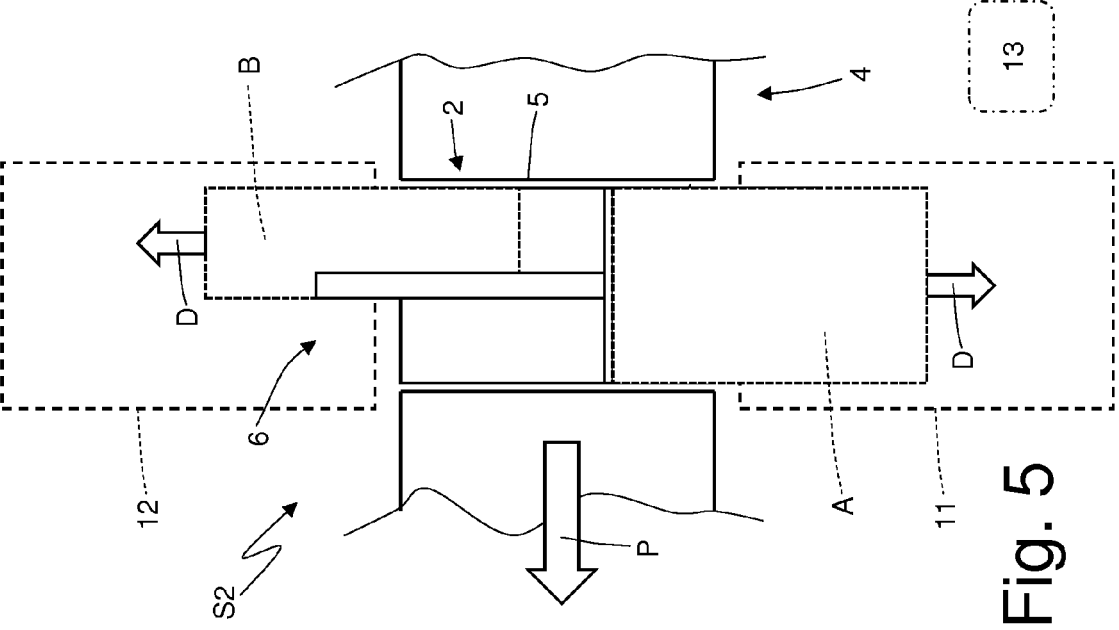
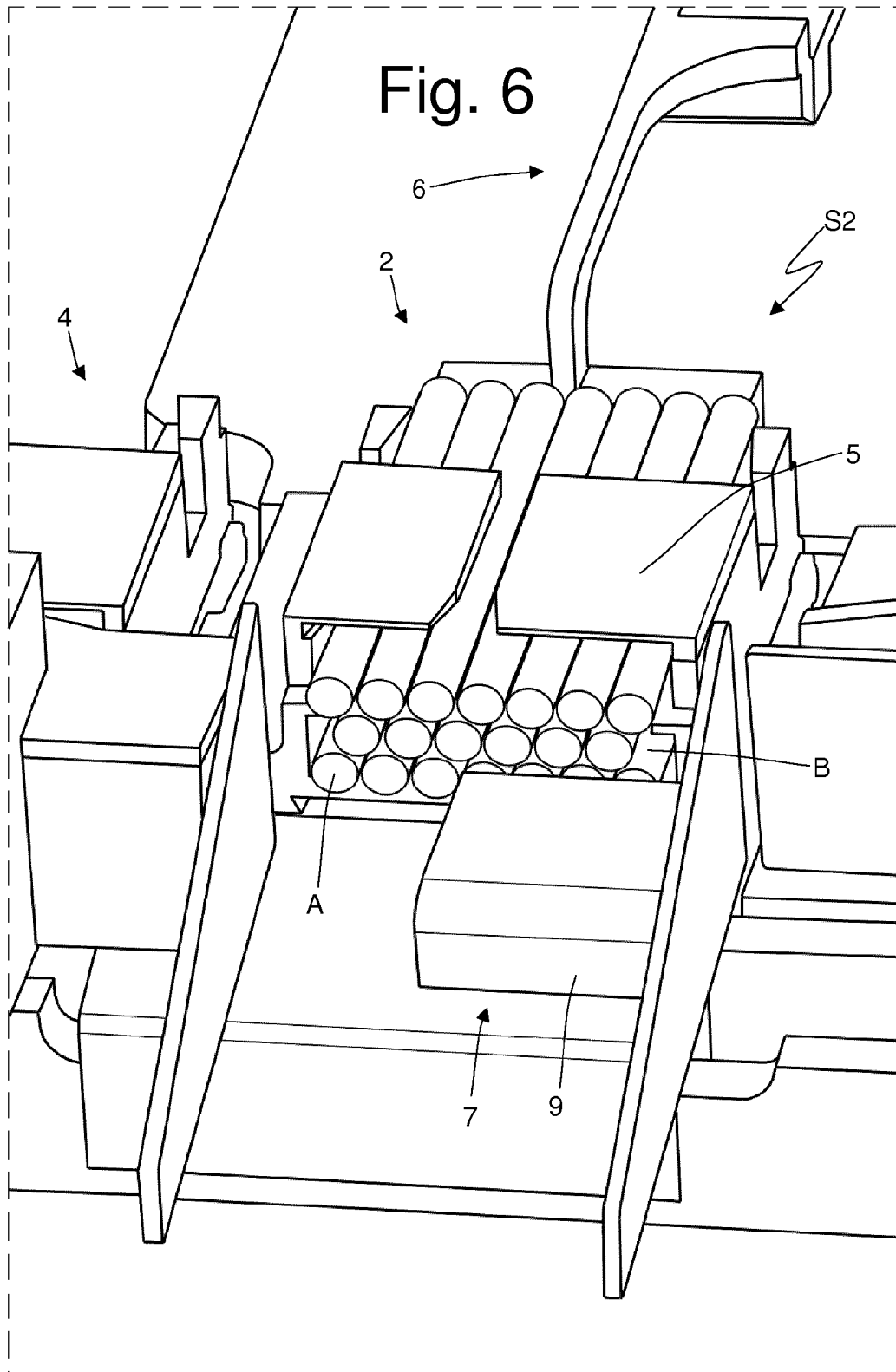
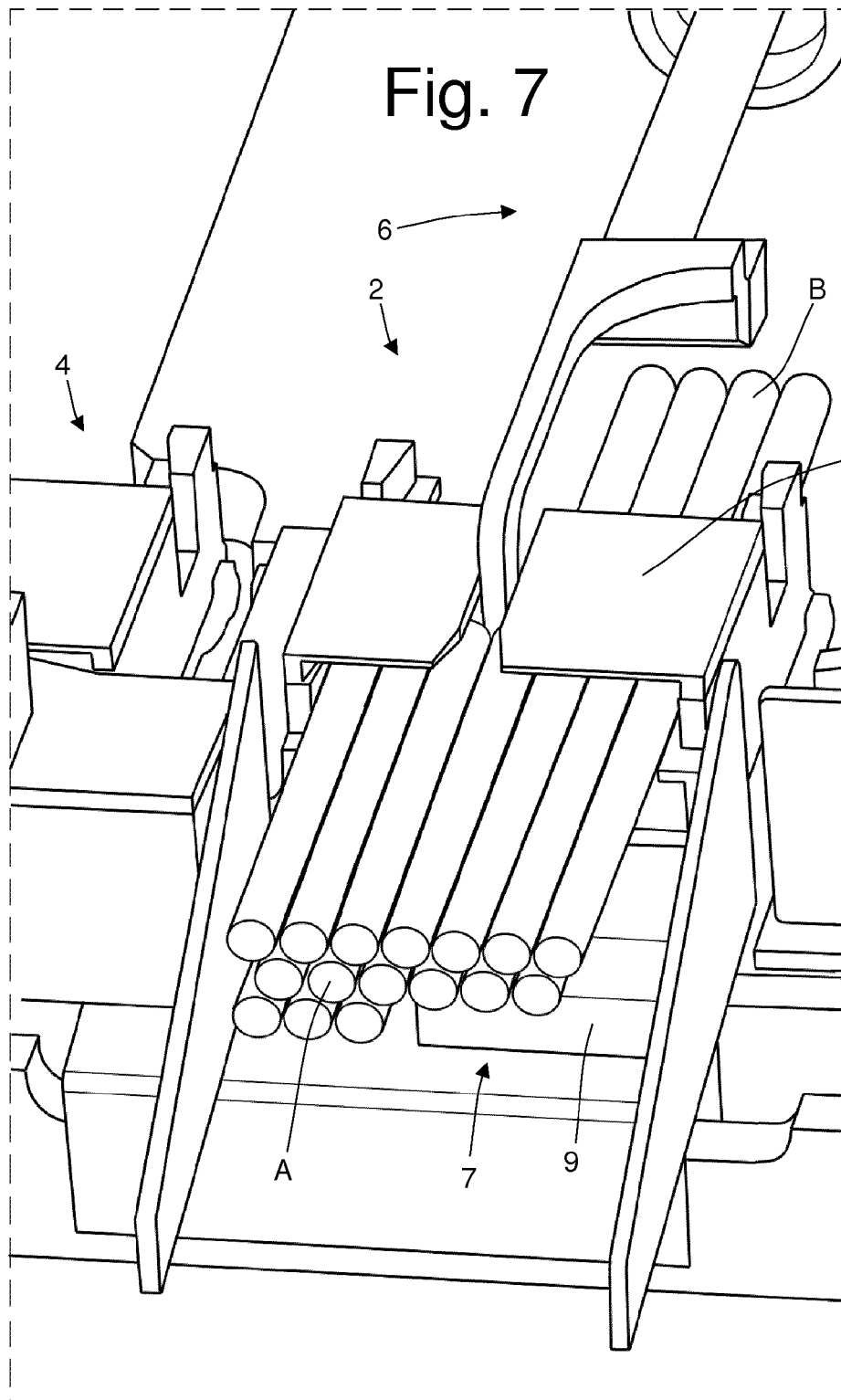


Fig. 3









EUROPEAN SEARCH REPORT

Application Number
EP 15 16 0931

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Place of search Munich		Date of completion of the search 16 July 2015	Examiner Schmitt, Michel
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