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(54) Unit and method for feeding additive elements to fibrous material on a machine for producing smoking articles

(57) On a machine (1) for producing smoking articles, such as cigarette filters, a feed unit (24) for feeding additive elements (25), such as menthol capsules, into fibrous material, such as filtering material, has at least one hopper (26) containing a mass of additive elements (25); and a transfer device (28) which, at the input, withdraws the additive elements (25) successively from an outlet (27) of the hopper (26), and, at the output, deposits the additive elements (25) successively into the fibrous material. Between the input and output, the transfer device (28) increases the spacing between consecutive additive elements (25), so as to withdraw the additive elements (25) from the hopper (26) with a pickup spacing (PI), and deposit the additive elements (25) into the fibrous material with an out-feed spacing (P2) greater than the pickup spacing (P1).

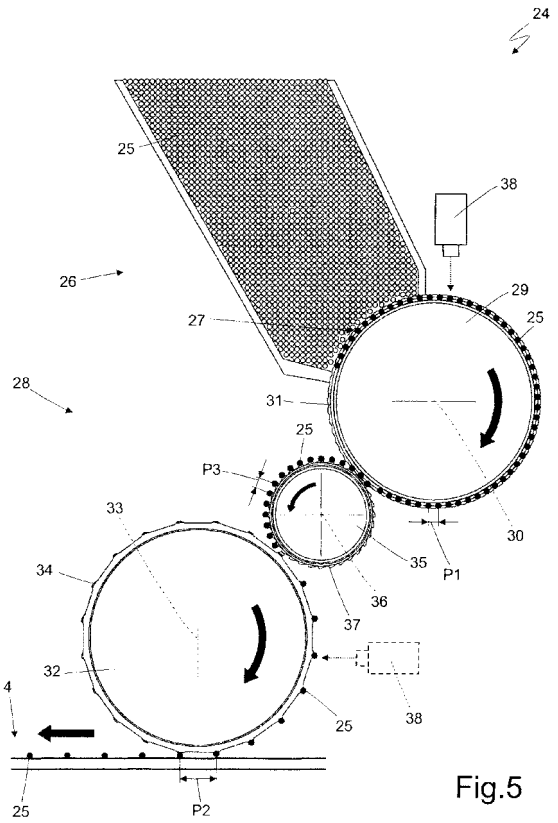

Fig.5

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Description

TECHNICAL FIELD

[0001] The present invention relates to a unit and method for feeding additive elements to fibrous material on a machine for producing smoking articles.

[0002] In the following description, the term *'fibrous material'* is intended to mean either tobacco fibres, from which to form a continuous tobacco rod on a one- or two-line machine for producing smoking articles, such as cigarettes, or filtering material fibres (e.g. cellulose acetate), from which to form a continuous filter rod on a one- or two-line machine for producing smoking articles, such as cigarette filters.

[0003] The present invention is particularly advantageous for use on a two-line cigarette filter manufacturing machine, to which the following description refers purely by way of example.

BACKGROUND ART

[0004] Two examples of a two-line cigarette filter manufacturing machine are described in Patent Applications DE4308093A1 and WO2007087848A2.

[0005] A two-line cigarette filter manufacturing machine comprises two forming beams for forming respective continuous filter rods; and a filtering material feed line for each beam. The feed lines are supplied with filtering material by a conveyor line extending between a feed line input station and a store containing two bales of filtering material. Respective threads are unwound off the bales and fed along the conveyor line to a suction device located at the input station to distend the threads widthwise into two flat-section strips. Downstream from the suction device, the two strips are fed, along the respective feed lines, through a pressing unit; an inflating device, which blows air into the strips to swell them; and, finally, a processing unit, which adds chemical substances to the strips to plasticize the filtering material. Each feed line is connected to the forming beam by a forming unit for forming a respective rope of filtering material. The forming unit is supplied by each feed line with a strip of filtering material, gathers it transversely into a rope, and feeds the rope onto a strip of gummed paper on the forming beam to form a continuous filter rod, from which a succession of filter portions are cut by a cutting device at the end of the forming beam.

[0006] For many years, filter portions have been produced containing additive elements embedded in the filtering material - typically flavouring (e.g. menthol) tablets, or capsules containing flavouring substances releasable by the user crushing the capsules. The additive elements are inserted into the filtering material using a feed unit located at the forming unit, and which inserts the additive elements into the filtering material at a rate depending on the travelling speed of the filtering material, so that each filter portion contains a given number of additive elements.

[0007] Patent Application GB1585761 proposes an additive element feed unit for a cigarette filter manufacturing machine. The feed unit comprises a hopper containing a mass of additive elements and having a bottom outlet; and a drum, which rotates at a speed depending on the travelling speed of the filtering material, and has a number of peripheral suction seats, each for housing a respective additive element. The top portion of the drum engages the outlet of the hopper to successively withdraw the additive elements, while the bottom portion of the drum is inserted inside the filtering material to successively release the additive elements.

[0008] The additive element feed unit described in Patent Application GB1585761 works fine at relatively low filtering material travelling speeds (i.e. low output speeds of the filter manufacturing machine), but has been found to pose problems at high filtering material travelling speeds (i.e. high output speeds of the filter manufacturing machine). More specifically, over and above certain filtering material travelling speeds, the additive elements become more difficult to withdraw from the hopper outlet, and more and more frequently are not withdrawn at all, i.e. the seats on the drum leave the hopper outlet without withdrawing any additive elements, thus resulting in the formation of filter portions with no additive elements, and which must be rejected.

DESCRIPTION OF THE INVENTION

[0009] It is an object of the present invention to provide a unit and method, for feeding additive elements into fibrous material on a machine for producing smoking articles, designed to eliminate the above drawbacks, and which at the same time are cheap and easy to implement.

[0010] According to the present invention, there are provided a unit and method for feeding additive elements into fibrous material on a machine for producing smoking articles, as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic front view of a two-line filter manufacturing machine;

Figure 2 shows a schematic plan view of the Figure 1 machine;

Figure 3 shows a schematic of a portion of a continuous filter rod produced on the Figure 1 machine;

Figure 4 shows a view in perspective of an additive element feed unit of the Figure 1 machine;

Figure 5 shows a front view of the Figure 4 additive element feed unit;

Figure 6 shows a view in perspective of a different embodiment of an additive element feed unit of the

Figure 1 machine;

Figure 7 shows a front view of the Figure 6 additive element feed unit;

Figure 8 shows a view in perspective of a further embodiment of an additive element feed unit of the Figure 1 machine;

Figure 9 shows a front view of the Figure 8 additive element feed unit;

Figure 10 shows a front view of a further embodiment of an additive element feed unit of the Figure 1 machine.

PREFERRED EMBODIMENTS OF THE INVENTION

[0012] Number 1 in Figures 1 and 2 indicates as a whole a two-line cigarette filter manufacturing machine comprising two beams 2a, 2b for forming respective continuous filter rods 3a, 3b; and, for each beam 2a, 2b, a respective filtering material feed line 4a, 4b. Feed lines 4a, 4b are supplied with filtering material by a conveyor line 5 forming part of machine 1 and extending between an input station 6 of feed lines 4a, 4b, and a store 7 containing two bales 8a, 8b of filtering material.

[0013] As shown in Figures 1 and 2, respective threads 9a, 9b are unwound off bales 8a, 8b and drawn along conveyor line 5 by a roller traction unit 10a at input station 6.

[0014] Conveyor line 5 comprises a guide device 11 located over bales 8a, 8b to guide threads 9a, 9b; and a strip-forming device 12 located at input station 6, immediately upstream from traction unit 10a, to draw threads 9a, 9b out widthwise, by jets of compressed air, into respective flat-section strips 13a, 13b, which are then fed to roller traction unit 10a.

[0015] Downstream from traction unit 10a, strips 13a and 13b are fed, along respective feed lines 4a, 4b and in a substantially horizontal direction 14, through a pressing unit 15 comprising two roller traction units lOb, 10c similar to unit 10a; through an inflating device 16, which blows air into strips 13a, 13b to increase their volume; through a processing unit 17, where chemical substances (typically triacetin) are added to strips 13a, 13b to plasticize the filtering material; and, finally, through a roller traction unit 10d similar to units 10a, lOb, 10c and defining an output portion of feed lines 4a, 4b. Feed lines 4a, 4b are connected to forming beams 2a, 2b by a unit 18 for forming two ropes of filtering material. Unit 18 is located immediately downstream from roller traction unit 10d, receives strips 13a, 13b from feed lines 4a, 4b, gathers strips 13a, 13b transversely into respective ropes of filtering material, and feeds the ropes to forming beams 2a, 2b. On each forming beam 2a, 2b, the rope of filtering material is fed onto a paper strip 19a, 19b gummed beforehand at a gumming station 20 and subsequently wound transversely about the rope of filtering material to form a continuous filter rod 3a, 3b.

[0016] At the output of forming beams 2a, 2b, a control station 21 checks the density of filter rods 3a, 3b, and a cutting head 22 cuts rods 3a, 3b transversely into respective successions of filter portions 23 (shown in Figure 3).

[0017] A feed unit 24 is located at forming unit 18 to supply additive elements 25 (Figure 3) defined by substantially spherical, roughly 3 mm diameter capsules containing flavouring substances (such as menthol) releasable by the user crushing the capsules.

[0018] Feed unit 24 inserts additive elements 25 evenly into the filtering material, with a spacing and at a speed depending on the travelling speed of the filtering material.

[0019] Feed unit 24 inserts additive elements 25 evenly into the filtering material, so that each filter portion 23 contains a given number of additive elements 25. The given number, for example, may equal the number of filters eventually cut from portion 23 on a filter assembly machine, so that each cigarette filter contains only one additive element 25; or may equal a multiple of the number of filters eventually cut from portion 23 on the filter assembly machine, so that each cigarette filter contains two or more additive elements 25.

[0020] In an alternative embodiment not shown, additive elements 25 may be shaped differently (i.e. be other than spherical). In another embodiment not shown, additive elements 25 are defined by cylindrical or parallelepiped-shaped tablets of flavouring substances.

[0021] As shown in Figures 4 and 5, for each feed line 4, feed unit 24 comprises a hopper 26 containing a mass of additive elements 25 and having a bottom outlet 27; and a transfer device 28 which, at the input, withdraws additive elements 25 successively from outlet 27 of hopper 26, and, at the output, deposits additive elements 25 successively into the filtering material of the corresponding feed line 4.

[0022] Between the input and output, transfer device 28 increases the spacing between consecutive additive elements 25, so as to withdraw additive elements 25 from hopper 26 with a pickup spacing P1 (Figure 5), and deposit additive elements 25 into the filtering material with an out-feed spacing P2 (Figure 5) greater than pickup spacing P1. Additive elements 25 are withdrawn from outlet 27 of hopper 26 with a very short pickup spacing P1, and therefore slowly (i.e. much more slowly than the speed at which they are deposited into the filtering material), and at the same time are deposited into the filtering material with a long out-feed spacing P2, so they can be deposited into the filtering material with the correct spacing, even when the filtering material is travelling at high speed. In other words, additive elements 25 can be withdrawn slowly from outlet 27 of hopper 26, and at the same time deposited quickly into the filtering material.

[0023] In the Figure 4 and 5 embodiment, for each feed line 4, transfer device 28 comprises a pickup drum 29, which engages outlet 27 of hopper 26, rotates continuously about an axis of rotation 30, and has a number of peripheral suction seats 31 for housing additive elements 25 and equally spaced with pickup spacing Pl; and an out-feed drum 32, which engages the filtering material, rotates continuously about an axis of rotation 33 parallel

to axis of rotation 30, and has a number of peripheral suction seats 34 for housing additive elements 25 and equally spaced with out-feed spacing P2. The rotation speeds of drums 29 and 32 are strictly related: the ratio between the peripheral speed of out-feed drum 32 and the peripheral speed of pickup drum 29 equals the ratio between out-feed spacing P2 and pickup spacing P1 (i.e. out-feed drum 32 rotates much faster than pickup drum 29). Moreover, the peripheral speed of out-feed drum 32 is directly proportional to the travelling speed of the filtering material, so that each filter portion 23 contains the target number of additive elements 25.

[0024] Obviously, to switch production over to filter portions 23 of a different length, this can be done by simply changing drum 32 for one with a different spacing P2 of seats 34.

[0025] The peripheral speed of out-feed drum 32 is preferably substantially equal to the travelling speed of the filtering material, to prevent the filtering material from accelerating or decelerating additive elements 25 as they are inserted, and so resulting in position errors of additive elements 25 in filter portions 23.

[0026] In other words, out-feed drum 32 must rotate relatively fast to keep up with the travelling speed of the filtering material; and, at the same time, by adjusting the spacing, pickup drum 29 rotates much more slowly than out-feed drum 32, to effectively withdraw additive elements 25 from outlet 27 of hopper 26.

[0027] For each feed line 4, transfer device 28 also comprises an intermediate drum 35, which is interposed between pickup drum 29 and out-feed drum 32, rotates continuously about an axis of rotation 36 parallel to axes of rotation 30 and 33, and has a number of peripheral suction seats 37 for housing additive elements 25. In the Figure 4 and 5 embodiment, peripheral suction seats 37 of each intermediate drum 35 are spaced apart with an intermediate spacing P3 equal to pickup spacing P1 (i.e. are spaced apart with pickup spacing PI), so the increase from pickup spacing P1 to out-feed spacing P2 is made solely when transferring additive elements 25 from intermediate drum 35 to out-feed drum 32.

[0028] In an alternative embodiment not shown, peripheral suction seats 37 of each intermediate drum 35 are spaced apart with an intermediate spacing P3 between pickup spacing P1 and out-feed spacing P2, so the increase from pickup spacing P1 to out-feed spacing P2 is made partly when transferring additive elements 25 from pickup drum 29 to intermediate drum 35, and partly when transferring additive elements 25 from intermediate drum 35 to out-feed drum 32.

[0029] In a different embodiment, transfer device 28 comprises two or three cascaded intermediate drums 35 for each feed line 4. In another embodiment not shown, transfer device 28 has no intermediate drums 35, and the increase from pickup spacing P1 to out-feed spacing P2 is made as each pickup drum 29 transfers additive elements 25 directly to out-feed drum 32. In the Figure 4 and 5 embodiment, seats 31, 34 and 37 are all fixed, i.e. perform no relative movement, with respect to corresponding drums 29, 32 and 35, which means additive elements 25 undergo relatively sharp acceleration when transferring from pickup spacing P1 on intermediate drum 35 to out-feed spacing P2 on out-feed drum 32. The degree of acceleration, however, is sufficiently below the break strength of additive elements 25 as to have no serious effect (as they are transferred, additive elements 25 simply deform elastically with no permanent damage).

[0030] Nevertheless, to reduce acceleration of additive elements 25 as they are transferred from intermediate drum 35 to out-feed drum 32, the Figure 6 and 7 embodiment is proposed, in which each peripheral suction seat 34 on each out-feed drum 32 is mounted to rotate with respect to out-feed drum 32 about a respective axis of rotation parallel to axis of rotation 33 of out-feed drum 32; and each out-feed drum 32 comprises cam actuating means for rotating each peripheral suction seat 34 with respect to out-feed drum 32 as additive element 25 is transferred to peripheral suction seat 34, so as to slow peripheral suction seat 34 down before receiving additive element 25, and accelerate it after receiving additive element 25.

[0031] In the Figure 8 and 9 embodiment, transfer device 28 comprises two cascaded intermediate drums 35a, 35b for each feed line 4; each pickup drum 29 comprises three side by side rows (or arrays) of peripheral suction seats 31; and each hopper 26 comprises three independent, side by side chambers spaced roughly 10-20 mm apart, and each having a bottom outlet 27 for feeding additive elements 25 to a respective row of peripheral suction seats 31 on pickup drum 29. Each intermediate drum 35a comprises three side by side, circumferentially aligned rows of peripheral suction seats 37a; each intermediate drum 35b comprises three side by side, circumferentially offset rows of peripheral suction seats 37b; and some of peripheral suction seats 34 on each out-feed drum 32 are designed to pneumatically move additive elements 25 axially (i.e. by means of sir jets and/or suction) to align additive elements 25 axially before they are deposited into the filtering material.

[0032] In actual use, each pickup drum 29 continuously withdraws three side by side rows of additive elements 25 from hopper 26, and transfers three side by side rows of additive elements 25 to intermediate drum 35a. Each intermediate drum 35b withdraws one additive element 25 at a time from intermediate drum 35a, so as to circumferentially offset the three rows of additive elements 25. And each out-feed drum 32 receives one additive element 25 at a time from intermediate drum 35b, and aligns additive elements 25 axially before depositing them into the filtering material.

[0033] In this embodiment, the spacing increase is made when transferring from intermediate drum 35a to intermediate drum 35b, so peripheral suction seats 31 and 37a on drums 29 and 35a have the same pickup spacing P1, and peripheral suction seats 34 and 37b on drums 32 and 35b have the same out-feed spacing P2.

[0034] The Figure 8 and 9 embodiment provides for reducing the withdrawal rate of additive elements 25 from each outlet 27 to a third of that of the Figure 4 and 5 embodiment.

[0035] In the Figure 10 embodiment, for each feed line 4, feed unit 24 comprises two separate, independent, widely spaced hoppers 26, each containing a mass of additive elements 25 and having a bottom outlet 27; and transfer device 28 combines a first succession of additive elements 25, withdrawn from a first hopper 26, with a second succession of additive elements 25, withdrawn from a second hopper 26, by alternating additive elements 25 in the first succession with additive elements 25 in the second succession. For each feed line 4, transfer device 28 comprises two separate, independent pickup drums 29, each engaging the outlet 27 of a corresponding hopper 26; and one out-feed drum 32 supplied with additive elements 25 from both pickup drums 29. More specifically, each pickup drum 29 feeds additive elements 25 to an intermediate drum 35a, which in turn feeds them to an intermediate drum 35b, from which they are transferred to feed-out drum 32 by alternating one additive element 25 from one hopper with an additive element 25 from the other hopper.

[0036] It is important to note that, in this case too, with regard to each hopper 26 and each succession of additive elements 25 withdrawn from hopper 26 by transfer device 28, device 28 increases the spacing between consecutive additive elements 25 to withdraw them from hopper 26 with a pickup spacing, and deposit them into the filtering material with an out-feed spacing greater than the pickup spacing.

[0037] Obviously, when transferring additive elements 25 from the two intermediate drums 35b to out-feed drum 32, the spacing is reduced, i.e. halved. Though the out-feed spacing of each succession of additive elements 25 is, as stated, greater than the respective pickup spacing, the out-feed spacing of the two successions of additive elements 25 as a whole may equal or be greater than, and is preferably greater than, the pickup spacings.

[0038] In this embodiment, the two hoppers 26 may contain identical or different additive elements 25 (in terms of shape, size and/or content).

[0039] In one embodiment shown in the drawings, for each feed line 4, transfer device 28 comprises an optical control device 38 (typically a television camera) connected to pickup drum 29, downstream from outlet 27 of hopper 26, to determine whether or not the peripheral suction seats 31 downstream from outlet 27 contain respective additive elements 25. In another embodiment shown by a dash line in the drawings, optical control device 38 is connected to out-feed drum 32. Alternatively, optical control device 38 may be connected to an intermediate drum 35.

[0040] Optical control device 38 may be used to control rejection of filter portions 23 containing no additive elements 25 downstream from cutting head 22. More specifically, optical control device 38 controls a reject device (not shown) located downstream from cutting head 22 to reject any filter portions 23 with no additive elements 25. Optical control device 38 may also be used to determine problems in hopper 26: in the event of an unusual number of peripheral suction seats 31 with no additive elements 25, a problem in hopper 26 (such as clogging) is diagnosed, and maintenance requested (in the event of a large number of peripheral suction seats 31 with no additive elements 25, machine 1 may even be shut down to avoid rejecting an excessive number of filter portions 23). The presence of additive elements 25 may also be checked at control station 21. Optical control device 38, however, provides for double checking the presence of additive elements 25 (i.e. the findings of optical control device 38 must be confirmed later by control station 21; otherwise, in the event of conflicting findings by optical control device 38 and control station 21, a control problem is diagnosed). Optical control device 38 also provides for quickly diagnosing clogging of hopper 26, so machine 1 can be shut down quickly to avoid rejecting large numbers of filter portions 23.

[0041] Feed units 24 described, for supplying additive elements 25 upstream from beams 2a, 2b, are preferably independent of one another.

[0042] In another embodiment not shown, machine 1 described above is a one-line machine, and so comprises one beam 2 for forming one continuous filter rod 3, and one filtering material feed line 4.

[0043] Feed unit 24 described has numerous advantages.

[0044] In particular, it provides for withdrawing additive elements 25 slowly (and therefore effectively) from outlet 27 of hopper 26, while at the same time depositing them rapidly into the filtering material, as required by the travelling speed of the filtering material. Being withdrawn slowly from outlet 27 of hopper 26, additive elements 25 have enough time to be drawn properly into peripheral suction seats 31, thus safeguarding against peripheral suction seats 31 leaving outlet 27 of hopper 26 without withdrawing additive elements 25 (and so forming filter portions 23 with no additive elements 25).

[0045] Feed unit 24 described is also cheap and easy to produce, by reproducing and improving the design, and so incorporating the know-how gathered from, known feed units.

[0046] As will be clear from the above description, the scope of the present invention also extends to a unit and method for feeding additive elements into a rope of tobacco on a cigarette manufacturing machine. In which case, as will be clear from the above description, feed unit 24 supplying additive elements 25 is still located immediately upstream from the continuous cigarette rod forming beam, so as to deposit additive elements 25 into the rope of tobacco just before it is wrapped in paper.

Claims

1. A feed unit (24) for feeding additive elements (25) to fibrous material on a machine (1) for producing smoking articles; the feed unit (24) comprising:

   a hopper (26) containing a mass of additive elements (25) and having a bottom outlet (27); and
   a transfer device (28) which, at the input, withdraws the additive elements (25) successively from the outlet (27) of the hopper (26), and, at the output, deposits the additive elements (25) successively into the fibrous material;
   the feed unit (24) being **characterized in that,** between the input and output, the transfer device (28) increases the spacing between consecutive additive elements (25), so as to withdraw the additive elements (25) from the hopper (26) with a pickup spacing (PI), and deposit the additive elements (25) into the fibrous material with an out-feed spacing (P2) greater than the pickup spacing (P1).

2. A feed unit (24) as claimed in Claim 1, wherein the transfer device (28) comprises:

   a pickup drum (29), which engages the outlet (27) of the hopper (26), and has a number of first peripheral suction seats (31) for housing the additive elements (25) and spaced apart with the pickup spacing (PI); and
   an out-feed drum (32), which engages the fibrous material, and has a number of second peripheral suction seats (34) for housing the additive elements (25) and spaced apart with the out-feed spacing (P2).

3. A feed unit (24) as claimed in Claim 2, wherein the ratio between the peripheral speed of the out-feed drum (32) and the peripheral speed of the pickup drum (29) equals the ratio between the out-feed spacing (P2) and the pickup spacing (P1).

4. A feed unit (24) as claimed in Claim 2 or 3, wherein the pickup drum (29) transfers the additive elements (25) directly to the out-feed drum (32), and the increase from the pickup spacing (P1) to the out-feed spacing (P2) is made during said transfer.

5. A feed unit (24) as claimed in Claim 2 or 3, wherein the transfer device (28) comprises at least one intermediate drum (35) interposed between the pickup drum (29) and the out-feed drum (32) and having a number of third peripheral suction seats (37) for housing the additive elements (25).

6. A feed unit (24) as claimed in Claim 5, wherein:

   the third peripheral suction seats (37) of the intermediate drum (35) are spaced apart with an intermediate spacing (P3) between the pickup spacing (P1) and the out-feed spacing (P2); and
   the increase from the pickup spacing (P1) to the out-feed spacing (P2) is made partly when transferring the additive elements (25) from the pick-up drum (29) to the intermediate drum (35), and partly when transferring the additive elements (25) from the intermediate drum (35) to the out-feed drum (32).

7. A feed unit (24) as claimed in Claim 5, wherein:

   the third peripheral suction seats (37) of the intermediate drum (35) are spaced apart with the pickup spacing (PI); and
   the increase from the pickup spacing (P1) to the out-feed spacing (P2) is made solely when transferring the additive elements (25) from the intermediate drum (35) to the out-feed drum (32).

8. A feed unit (24) as claimed in Claim 5, 6 or 7, wherein:

   the pickup drum (29) comprises at least two side by side rows of first peripheral suction seats (31);
   the intermediate drum (35) comprises at least two side by side, circumferentially offset rows of third peripheral suction seats (37); and
   at least some of the second peripheral suction seats (34) of the out-feed drum (32) are designed to move the additive elements (25) axially to align the additive elements (25) axially before depositing the additive elements (25) into the fibrous material.

9. A feed unit (24) as claimed in Claim 8, wherein the hopper (26) comprises at least two side by side, independent chambers with respective bottom outlets (27), each for feeding additive elements (25) to one row of first peripheral suction seats (31) of the pickup drum (29).

10. A feed unit (24) as claimed in one of Claims 2 to 9, wherein each second peripheral suction seat (34) of the out-feed drum (32) is mounted to rotate with respect to the out-feed drum (32); and the out-feed drum (32) comprises cam actuating means for rotating each second peripheral suction seat (34) with respect to the out-feed drum (32) as an additive element (25) is transferred to the second peripheral suction seat (34), so as to slow down the second peripheral suction seat (34) before receiving the additive element (25), and accelerate the second peripheral suction seat (34) after receiving the additive element (25).

11. A feed unit (24) as claimed in one of Claims 2 to 10, and comprising two separate, independent hoppers (26), each containing a mass of additive elements (25) and having a bottom outlet (27); the transfer device (28) combining a first succession of additive elements (25), withdrawn from a first hopper (26), with a second succession of additive elements (25), withdrawn from a second hopper (26), by intercalating additive elements (25) in the first succession with additive elements (25) in the second succession.

12. A feed unit (24) as claimed in Claim 11, wherein the transfer device (28) comprises:

two separate, independent pickup drums (29), each engaging the outlet (27) of a corresponding hopper (26); and
one out-feed drum (32), which receives additive elements (25) from both pickup drums (29).

13. A feed unit (24) as claimed in one of Claims 2 to 12, wherein the transfer device (28) comprises at least one optical control device (38) fitted to a drum (29; 32) to determine whether or not the corresponding peripheral suction seats (31; 34) contain respective additive elements (25).

14. A feed unit (24) as claimed in Claim 13, wherein the optical control device (38) is fitted to the pickup drum (29), downstream from the outlet (27) of the hopper (26), to determine whether or not the first peripheral suction seats (31) downstream from the outlet (27) contain respective additive elements (25).

15. A feed unit (24) as claimed in Claim 13, wherein the optical control device (38) is fitted to the out-feed drum (32).

16. A method of feeding additive elements (25) to fibrous material on a machine (1) for producing smoking articles; the method comprising the steps of:

withdrawing the additive elements (25) successively, by means of a transfer device (28), from a bottom outlet (27) of a hopper (26) containing a mass of additive elements (25); and
depositing the additive elements (25) successively into the fibrous material by means of the transfer device (28);
the method being **characterized by** comprising the further step, between an input and output of the transfer device (28), of increasing the spacing between consecutive additive elements (25), so as to withdraw the additive elements (25) from the hopper (26) with a pickup spacing (P1), and deposit the additive elements (25) into the fibrous material with an out-feed spacing (P2) greater than the pickup spacing (P1).

17. A two-line machine for producing smoking articles, such as cigarettes or cigarette filters, the machine comprising two beams (2a, 2b) for forming respective continuous rods (3a, 3b); and, for each beam (2a, 2b), a respective feed line (4a, 4b) for supplying fibrous material, such as tobacco or filter material; the machine being **characterized by** comprising, upstream from each beam (2a, 2b), a respective feed unit (24) for feeding additive elements (25) and as claimed in any one of Claims 1 to 15.

18. A machine as claimed in Claim 17, **characterized in that** said feed units (24) for feeding additive elements (25) are independent.

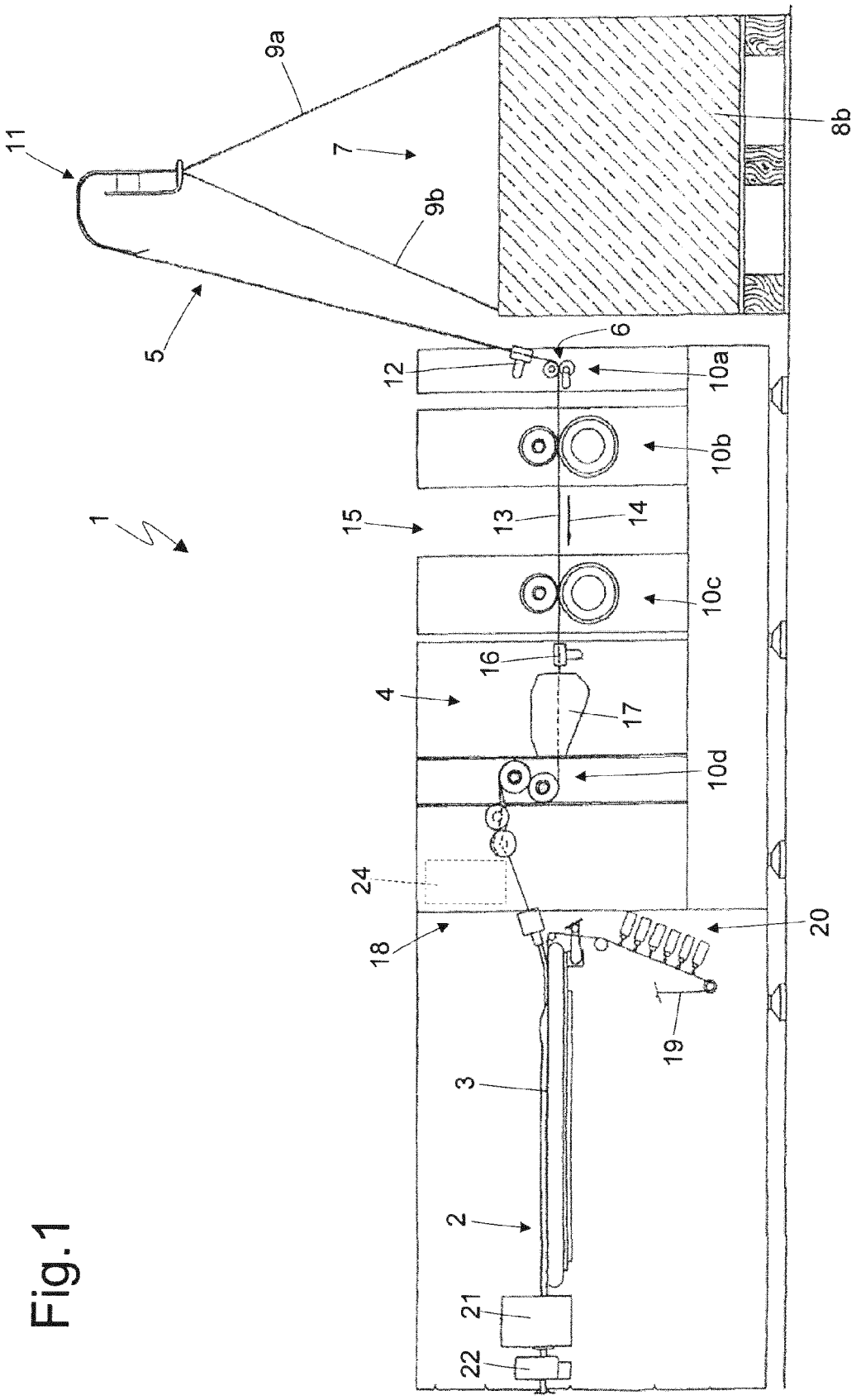
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Fig.1

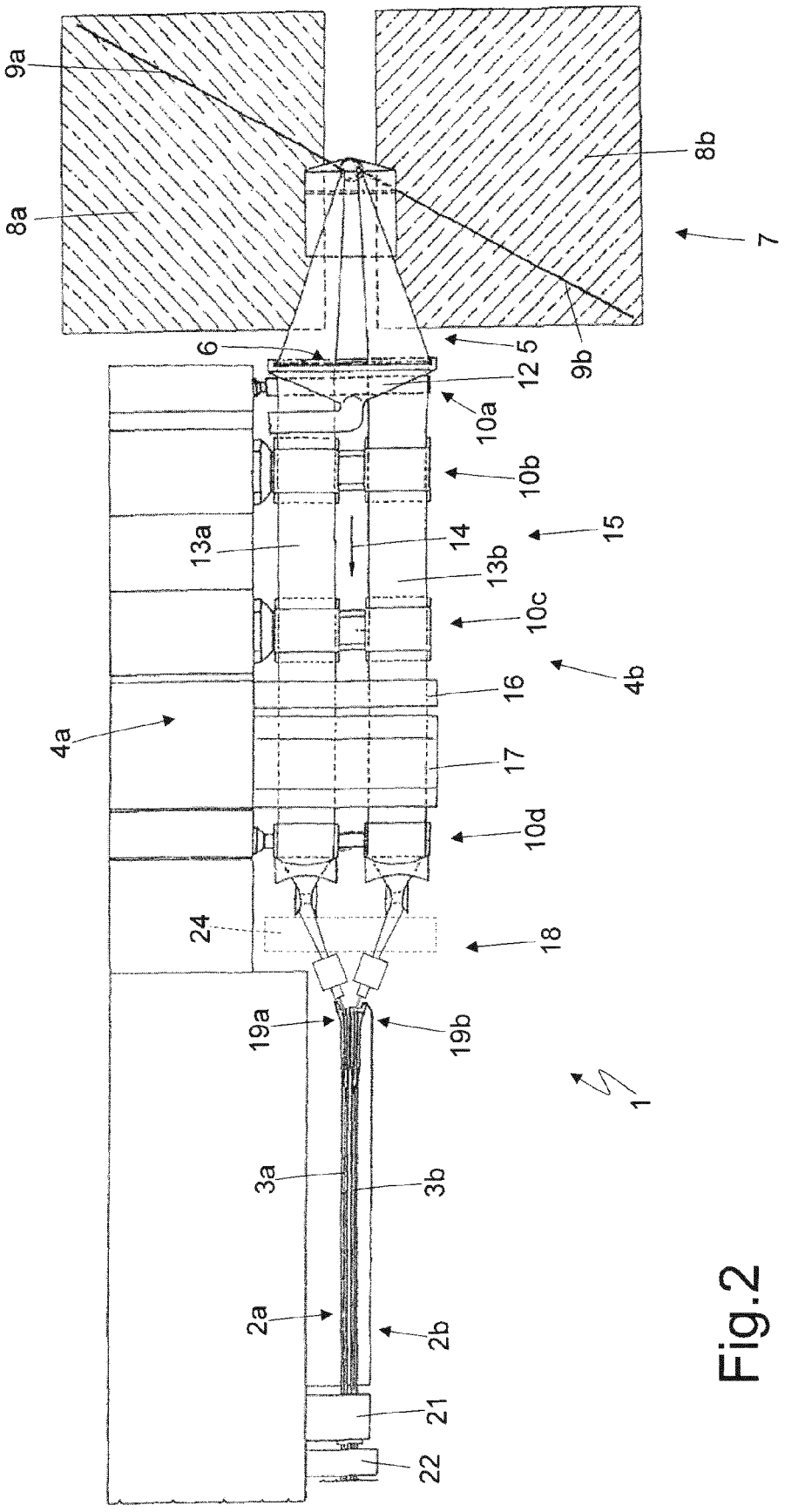
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Fig.2

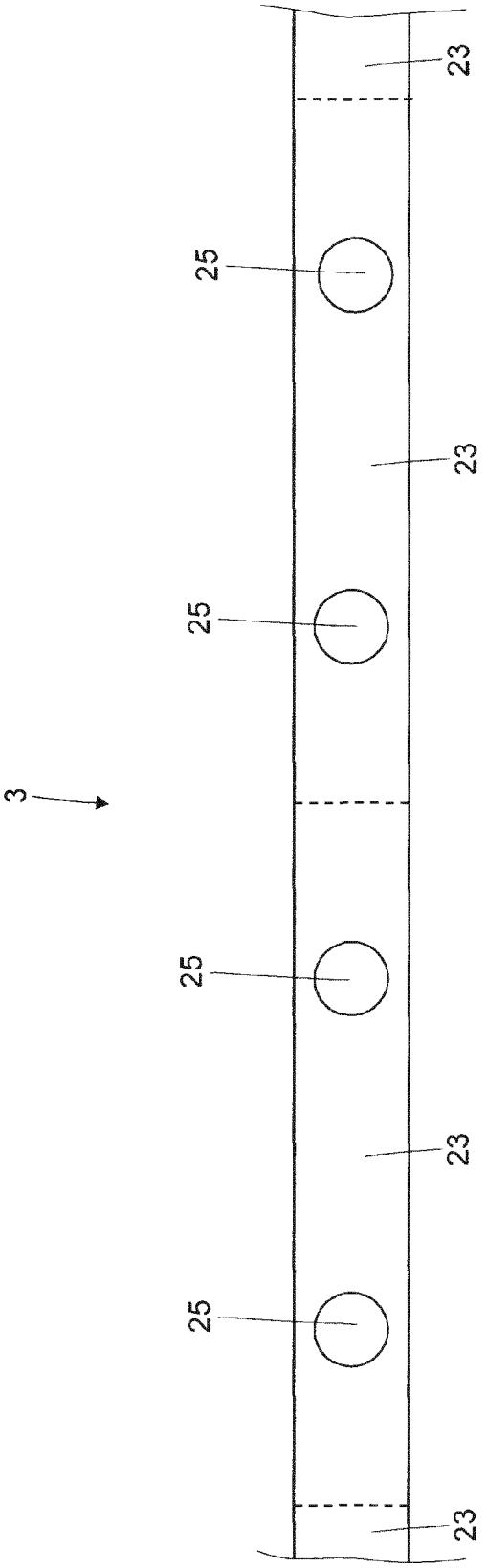


Fig.3

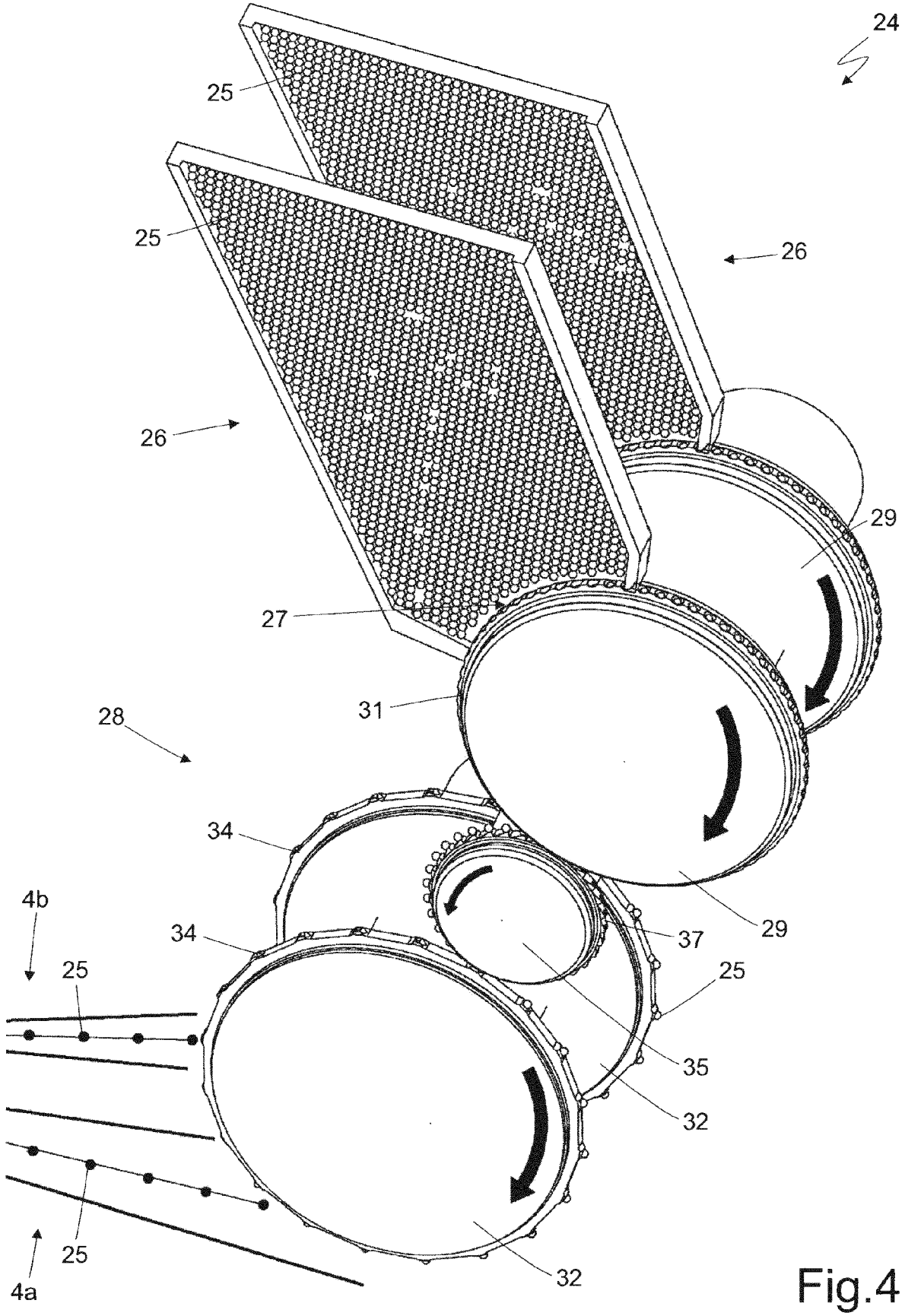


Fig.4

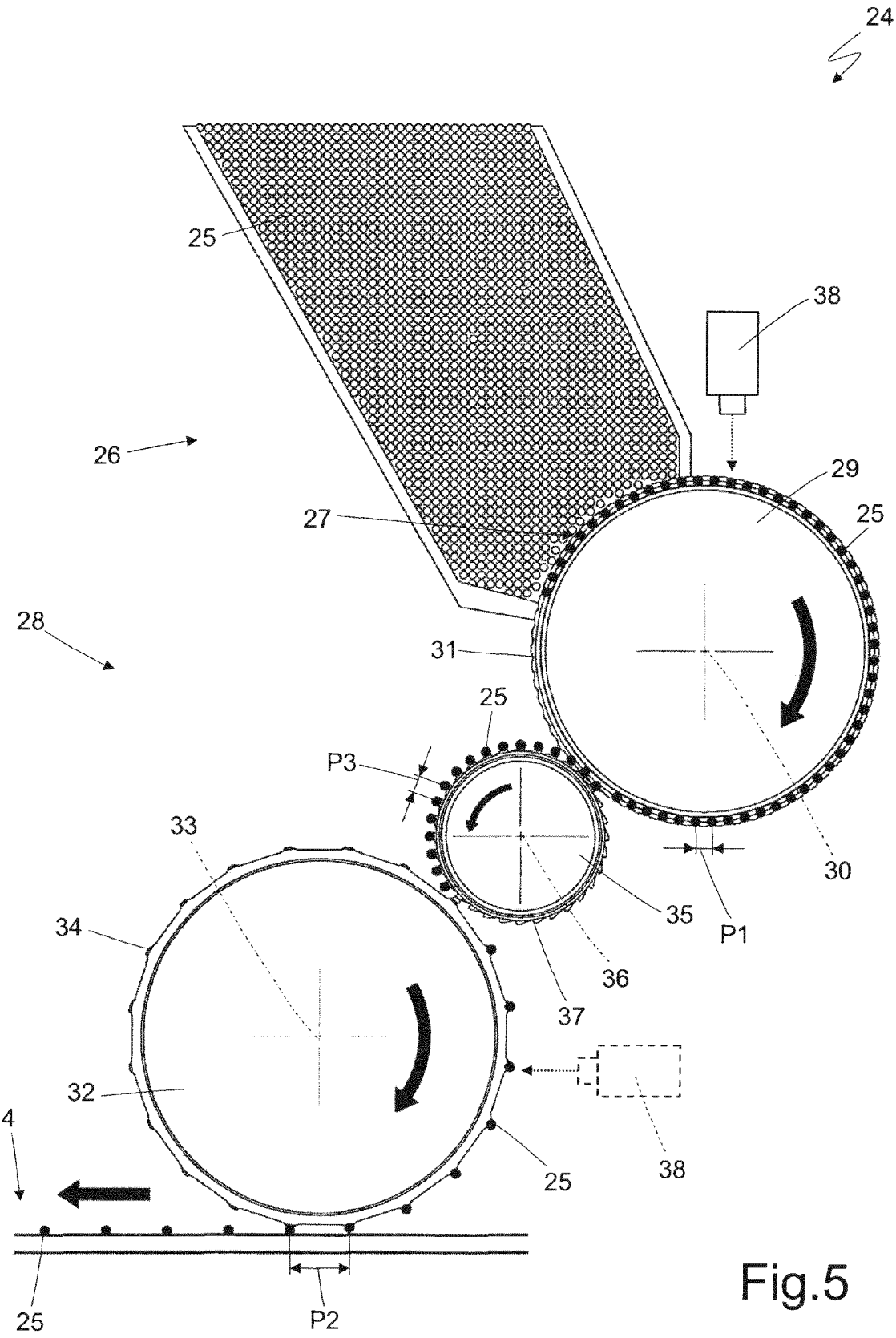


Fig.5

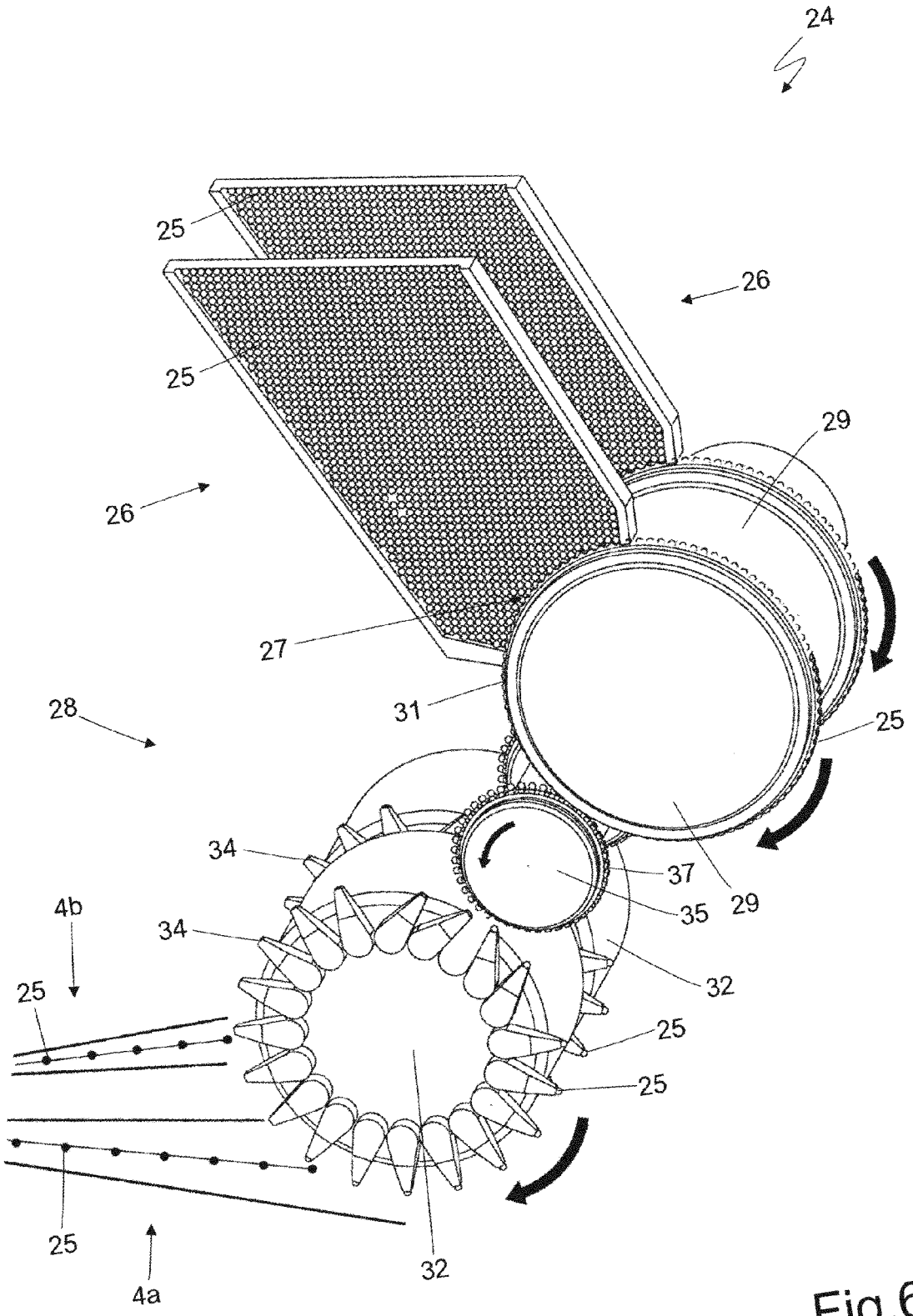


Fig.6

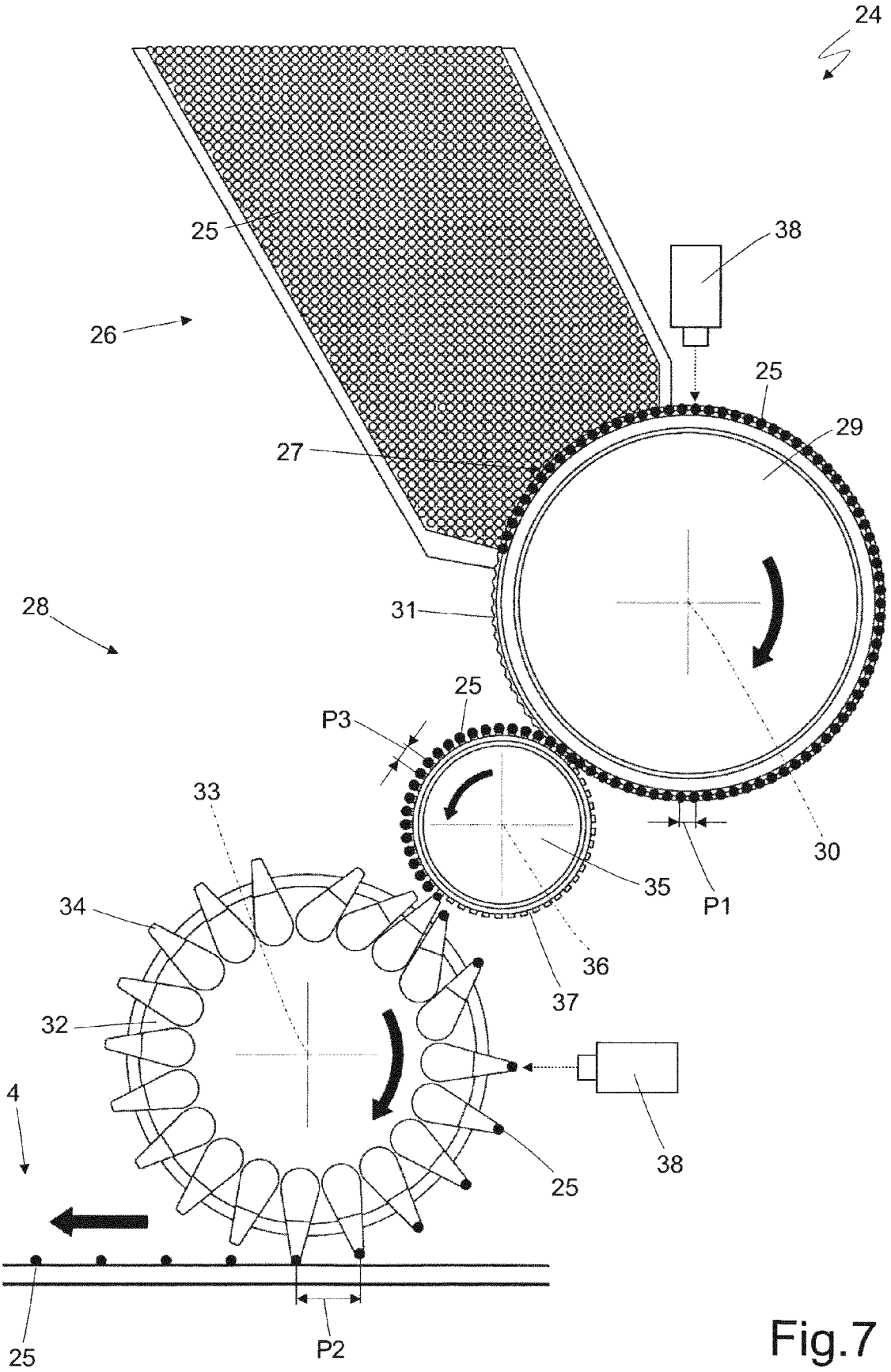
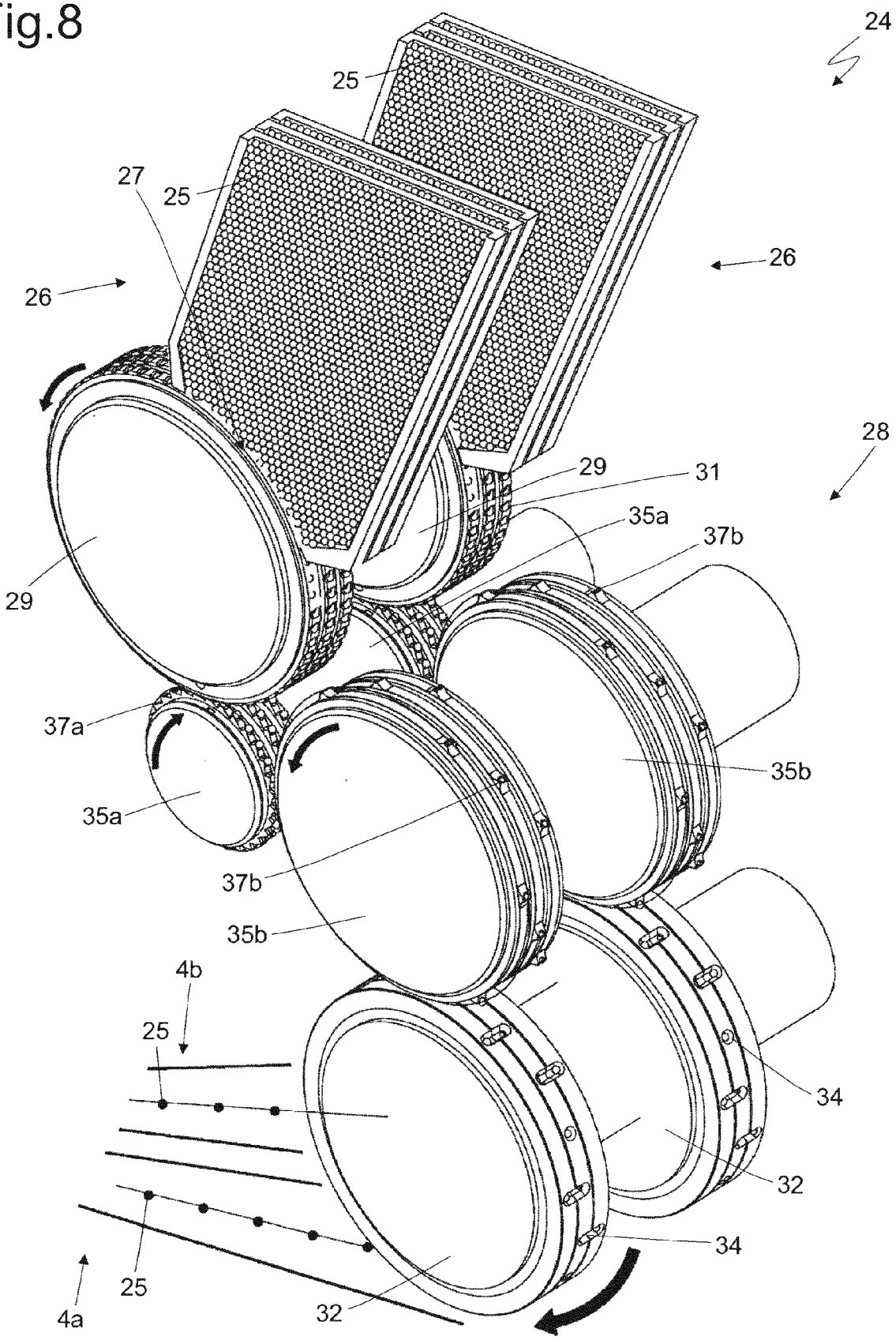


Fig.7

Fig.8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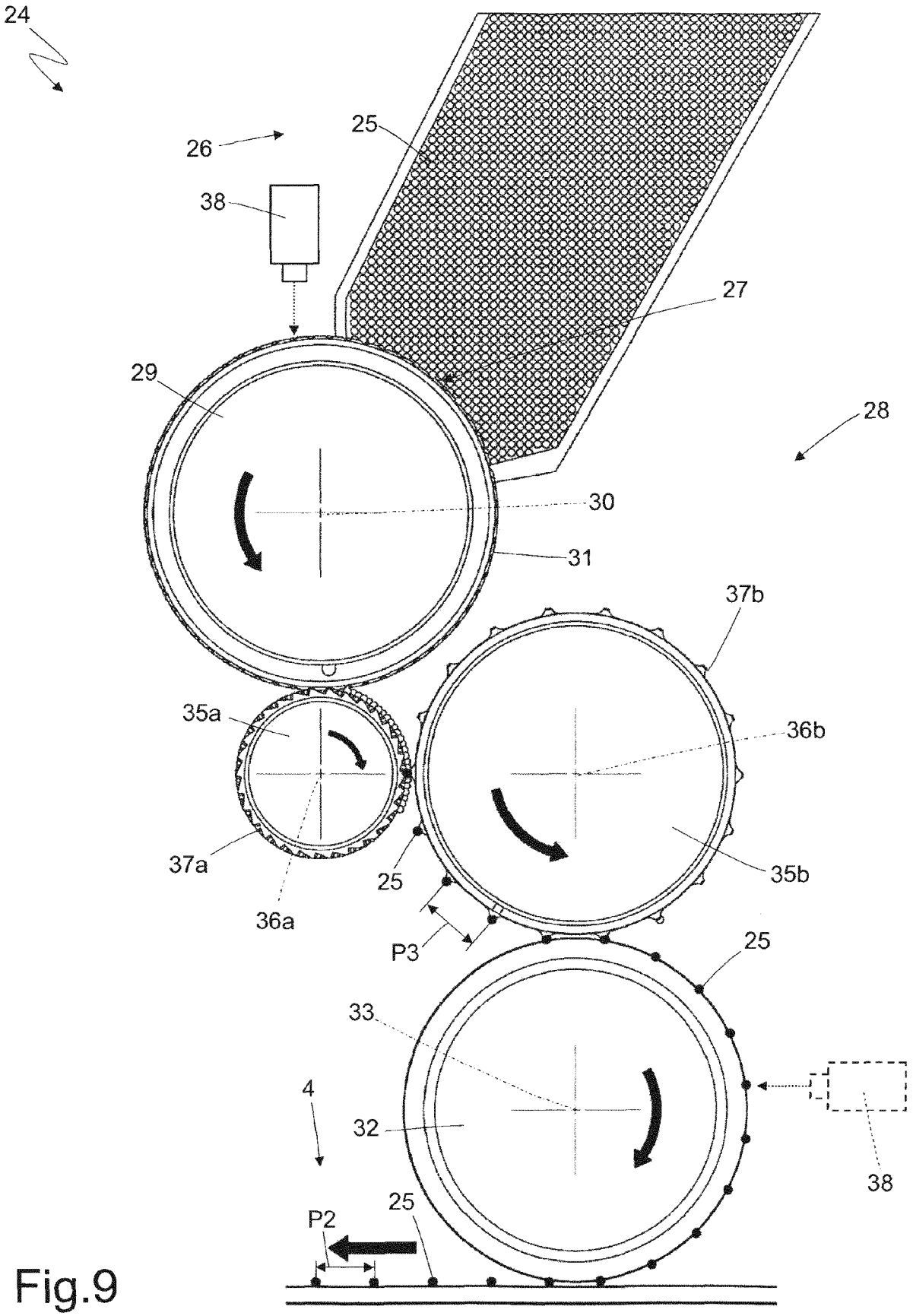
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Fig.9

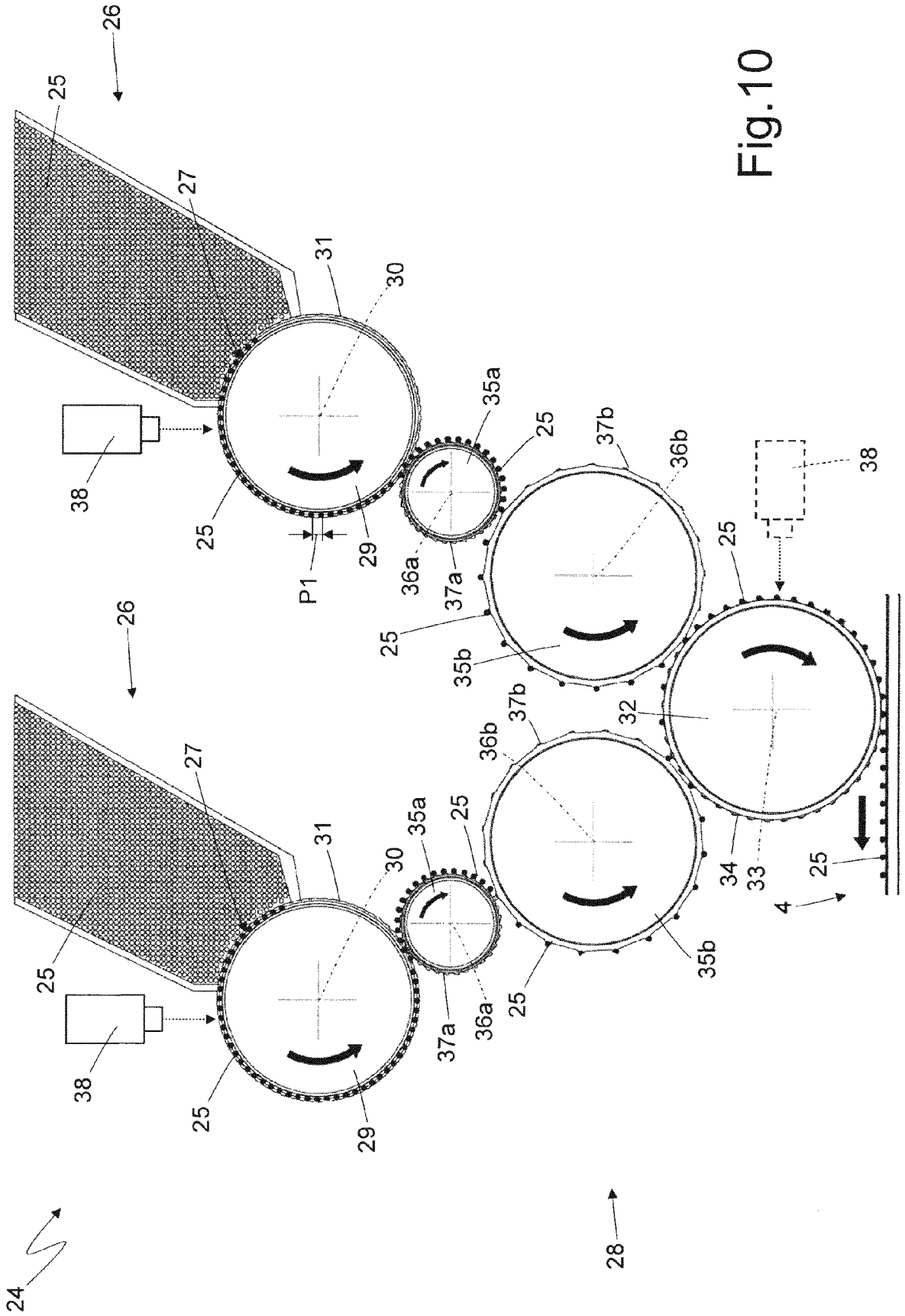
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Fig.10

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
Munich	16 January 2012	Marzano Monterosso

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