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(54) **GROUPING UNIT AND METHOD TO FORM A GROUP CONSISTING OF TWO WRAPS, EACH CONTAINING A GROUP OF SMOKING ARTICLES**

GRUPPENEINHEIT UND VERFAHREN ZUR BILDUNG EINER GRUPPE AUS ZWEI WICKELN, JEDER MIT EINER GRUPPE VON RAUCHARTIKELN

UNITÉ DE GROUPEMENT ET PROCÉDÉ POUR FORMER UN GROUPE COMPOSE DE DEUX ENVELOPPES, CONTENANT CHACUN UN GROUPE D'ARTICLES À FUMER

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102019000019978 filed on 29/10/2019.

TECHNICAL FIELD

[0002] This invention relates to a grouping unit and method to form a group consisting of two wraps each containing a group of smoking articles.

[0003] This invention finds advantageous application in the production of a rigid cigarette pack with a hinged "twin"-type lid containing two twin wraps side by side, to which the following discussion will make explicit reference without any loss of generality thereby.

PRIOR ART

[0004] For several years now, a cigarette pack commercially called a "twin"-pack has been known consisting of a rigid outer container housing two identical cigarette groups (i.e. "twins", hence the commercial name of the cigarette pack), which are arranged side by side and are wrapped in corresponding wrapping sheets.

[0005] Patent EP3362365B1 describes a packaging machine to produce a twin-pack of cigarettes comprising: a forming unit, in which the cigarette groups are formed in succession; a first wrapping unit equipped with horizontal-axis wheels, in which, around each cigarette group, a wrapping sheet is folded to form a corresponding wrap; a grouping (coupling) unit equipped with a wheel, in which the wraps are grouped (coupled) two by two to form the contents of the cigarette packs; and a second wrapping unit equipped with horizontal-axis wheels, in which around each pair of wraps a collar is folded and a blank to form an outer container.

[0006] The US4258528A patent describes a packaging machine to produce a twin-pack of cigarettes comprising: a forming unit, in which the cigarette groups are formed in succession; a first wrapping unit equipped with linear conveyors, in which, around each cigarette group, a wrapping sheet is folded to form a corresponding wrap; a grouping (coupling) unit, in which the inner wraps are grouped (coupled) two by two to form the contents of the cigarette packs; and a second wrapping unit equipped with a vertical-axis wheel, in which, around each pair of wraps, a collar is folded and a blank to form an outer container.

[0007] Patent application EP3070005A1 describes a packaging machine to produce a twin-pack of cigarettes comprising: a forming unit, in which the cigarette groups are formed in succession; a first wrapping unit equipped with linear conveyors, in which, around each cigarette group, a wrapping sheet is folded to form a corresponding wrapping; a grouping (coupling) unit, in which the inner wraps are grouped (coupled) two by two to form the contents of the cigarette packs; and a second wrapping unit equipped with a horizontal-axis wheel, in which, around each pair of wraps, a collar is folded and a blank to form an outer container.

[0008] When the first wrapping unit is equipped with linear conveyors, the known grouping (coupling) units have a complex structure and, above all, require rather long adjustments to be made when the format (i.e. size) of the cigarette pack to be produced is changed.

DESCRIPTION OF THE INVENTION

[0009] The purpose of this invention is to provide a grouping unit and method to form a group consisting of two wraps each containing a group of smoking articles, the units and method of which are simple to produce/implement, enable operation at a high production speed (measured as cigarette packs produced per unit of time), and enable format change operations to be performed quickly.

[0010] In accordance with this invention, a grouping unit and method to form a group consisting of two wraps each containing a group of smoking articles are provided, according to the accompanying claims.

[0011] The claims describe preferred embodiments of this invention, forming an integral part of this description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] This invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment thereof, wherein:

- Figure 1 is a front perspective view in a closed configuration of a rigid cigarette pack;
- Figure 2 is a rear perspective view of the cigarette pack in Figure 1 in a closed configuration;
- Figure 3 is a front perspective view of the cigarette pack in Figure 1 in an open configuration;
- Figure 4 is a front perspective view of a wrap of the pack in Figure 1;
- Figure 5 is a perspective view of a cigarette group contained in the wrap in Figure 4;
- Figure 6 is a plan view of a wrapping sheet used to produce the wrap in Figure 4;
- Figure 7 is a plan view of a collar for the cigarette pack in Figure 1;
- Figure 8 is a plan view of a blank used to form an outer container with a hinged lid for the cigarette pack in Figure 1;
- Figure 9 is a perspective, schematic view with some parts removed for clarity of a packaging machine that produces the cigarette pack in Figure 1 and is produced in accordance with this invention;
- Figure 10 is a plan, schematic view of part of the packaging machine in Figure 9;
- Figure 11 is a schematic, side view of part of the

packaging machine in Figure 9:

- Figure 12 is a front view of a hopper of the packaging machine in Figure 9;
- Figure 13 is a front view, on an enlarged scale, of a detail of the hopper in Figure 13;
- Figure 14 is a perspective view of a pocket of a forming conveyor of the packaging machine in Figure 9;
- Figures 15 and 16 are two different perspective views of a grouping unit of the packaging machine in Figure 9 with some parts removed for clarity; and
- Figures 17-25 schematically illustrate the operation of the grouping unit in Figures 15 and 16.

PREFERRED EMBODIMENTS OF THE INVENTION

[0013] In Figures 1, 2, and 3 the reference number 1 globally denotes a rigid, twin-pack of cigarettes. The cigarette pack 1 comprises an outer container 2 consisting of rigid cardboard or thin cardboard and shaped like a cup and a pair of wraps 3 (one of which is better illustrated in Figure 4) housed side by side inside the container 2.

[0014] The outer container 2 has an open top end and is provided with a lid 4, which is shaped like a cup and hinged to the outer container 2 along a hinge 5 (illustrated in Figure 2) to rotate, in relation to the outer container 2, between an open position (illustrated in Figure 3) and a closed position (illustrated in Figures 1 and 2) of the open top end. The outer container 2 has a basically rectangular parallelepiped shape oriented in a main vertical extension direction. It is cup-shaped and has: an open top end 3; a bottom wall 6 opposite the open top end; a front wall 7 and a rear wall 8 (in which the hinge 5 is made), parallel to and opposite each other; and two side walls 9, which are parallel and opposite to each other. Four longitudinal edges are defined between the front 7, rear 8, and side 9 walls of the outer container 2, while four transverse edges are defined between the walls 7, 8, and 9 and the bottom wall 6 of the outer container 2.

[0015] The lid 4 has a basically rectangular, parallelepiped shape, is shaped like a cup, and has an open bottom end (facing the open top end of the outer container 2 when the lid 4 is in the closed position); a top wall 10 (which is parallel and opposite the bottom wall 6 of the container 2 when the lid 4 is in the closed position); a front wall 11 (which is parallel and aligned with the front wall 7 of the outer container 2 when the lid 4 is in the closed position); a rear wall 12 (which is parallel and aligned with the rear wall 8 of the outer container 2 when the lid 4 is in the closed position and is hinged to the rear wall 8 of the outer container 2 along the hinge 5); and two side walls 13, which are parallel and opposite to each other (which are parallel and aligned, in particular coplanar and adjacent, to the side walls 9 of the outer container 2 when the lid 4 is in the closed position). Four longitudinal edges are defined between the front 11, rear 12, and side 13 walls of the lid 4, while four transverse edges are defined between the walls 11, 12, and 13 and the top wall 10 of the lid 4. The longitudinal and transverse edges of the lid 4 are parallel and aligned with the corresponding longitudinal and transverse edges of the outer container 2 when the lid 4 is in the closed position.

[0016] Each wrap 3 encloses a cigarette group 14 (illustrated in Figure 5) that is parallelepiped in shape. In addition, each wrap 3 has a removable portion 15 at the top and at the front that is separated from the rest of the wrap 3 by a pre-weakened tear line 16. When the cigarette pack 1 is first opened, the user grasps and tears the removable portion 15 to access the cigarettes below of the cigarette group 14.

[0017] As illustrated in Figures 3 and 7, the cigarette pack 1 comprises, in addition, a rigid collar 17, which is connected (by means of gluing), folded in a "U" shape, to the inside of the outer container 2 so that it projects partially outside of the open top end of the outer container 2 and engages a corresponding inner surface of the lid 4 when the lid 4 is arranged in the closed position. The collar 17 comprises a front wall 18, which is connected to the front wall 7 of the container 2 and is arranged in contact with the front wall 11 of the lid 4 when the lid 4 is in the closed position, and two side walls 19, which are connected to the side walls 9 of the container 2 and are arranged in contact with the side walls 13 of the lid 4 when the lid 4 is in the closed position. According to the embodiment illustrated in the attached figures, the front wall 18 of the collar 17 is provided with a pair of claws 20 that project sideways to engage, by interference, the side walls 13 of the lid 4 when the lid 4 is in the closed position so as to keep the lid 4 in the closed position. According to a different embodiment that is not illustrated, the front wall 18 of the collar 17 does not have any claws 20.

[0018] As illustrated in Figure 6, each wrap 3 is created by folding a wrapping sheet 21 around the cigarette group 14, the sheet being provided with the tearable line 16, on one side, that delimits the removable portion 15.

[0019] As illustrated in Figure 8, the outer container 2 and the lid 4 are made by folding a conventional blank 28.

[0020] In Figure 9, the number 29 globally denotes a packaging machine that is designed to produce the cigarette pack 1 described above and functions with intermittent motion (i.e. a motion that involves a cyclical alternating of motion phases and rest phases).

[0021] The packaging machine 29 comprises a frame 30 that rests on the ground by means of a plurality of cm (feet) (not illustrated) and consists of the union of two bodies 31 and 32 arranged side by side; in particular, the body 31 has a front wall and a side wall on which the operating members (partially described below) are arranged, while the body 32 has (only) one front wall on which the operating members (partially described below) are arranged.

[0022] The packaging machine 29 comprises a forming unit A in which the cigarette groups 14 are formed in succession, a wrapping unit B in which a corresponding wrapping sheet 21 is wrapped around each cigarette group 2 to create a wrap 3, a grouping (coupling) unit C

in which the wraps 3 are grouped (coupled) side by side to form the contents of the cigarette pack 1, and a wrapping unit D in which a collar 17 is wrapped around each pair of grouped (coupled) wraps 3, and a blank 28 to create an outer container 2 provided with a lid 4.

[0023] The forming unit A for forming cigarette groups 14 comprises a hopper 33 equipped with three outlets 34 to simultaneously feed three pairs of cigarette groups 14 (i.e. six cigarette groups 14) to three respective pockets 35 of a forming conveyor 36 supporting a plurality of pockets 35 (each of which, as better described below, accommodates two cigarette groups 14 at a time). The forming conveyor 36 comprises a ring-shaped conveyor belt, which is wrapped around two end pulleys (one of which is motorised), supports the pockets 35, and moves at the right pace to cyclically move the pockets 35 along a forming path P1 (illustrated in Figure 10). According to what is better illustrated in Figure 10, the forming path P1 extends between one input station S1 in which each cigarette group 14 is extracted from an outlet 34 of the hopper 33 and enters a corresponding pocket 35 and a transfer station S2 in which each cigarette group 14 is extracted from the corresponding pocket 35.

[0024] As illustrated in Figure 10, the wrapping unit B comprises a wrapping conveyor 37 designed to advance two cigarette groups 14 side by side (extracted together from the same pocket 35 of the forming conveyor 36 in the transfer station S2) along a straight, horizontal wrapping path P2. In particular, the wrapping path P2 extends from the transfer station S2 in which the wrapping conveyor 37 extracts two cigarette groups 14 at a time from the corresponding pocket 35 of the forming conveyor 36, through a feeding station S3 in which each cigarette group 14 couples to a corresponding wrapping sheet 21 that is folded in a "U" shape around the cigarette group 14, and ends up at a transfer station S5 in which two wraps 3 arranged side by side (each formed from a wrapping sheet 21 folded around a cigarette group 14) leave the wrapping conveyor 37 (to enter the grouping unit C).

[0025] As illustrated in Figure 11, the wrapping conveyor 37 comprises a ring-shaped conveyor belt 38, which is wrapped around two end pulleys (one of which is motorised) and supports a number of pairs of pushers 39, each of which is connected to the conveyor belt 38 by means of a support column (narrow, or narrower than the pusher 39) and is designed to engage a rear part of a corresponding cigarette group 14 to push the cigarette group 14 itself along the wrapping path P2. In other words, the wrapping conveyor 37 comprises two horizontal, twin channels, which are parallel and arranged side by side, each of which is delimited at least below and to the side (preferably also above in the initial part), is arranged along the wrapping path P2, and contains each cigarette group 14 inside while the cigarette group 14 itself advances along the wrapping path P2 pushed from behind by a corresponding pusher 39.

[0026] Along the wrapping path P2 (and, thus, on the wrapping conveyor 37), there is a feeding station S3 in which each wrapping sheet 21 is arranged to be intercepted by a corresponding cigarette group 14 around which the wrapping sheet 21 itself is folded in a "U" shape; in other words, each cigarette group 14 advancing along the wrapping path P2 intercepts a corresponding wrapping sheet 21 arranged in the feeding station S3 determining the "U"-shaped folding of the wrapping sheet 21 itself.

[0027] The packaging machine 29 comprises a feeding device 40 that cyclically feeds pairs of wrapping sheets 21 into the feeding station S3, i.e. arranges each pair of wrapping sheets 21 in the feeding station S3 so that the wrapping sheets 21 are intercepted by two corresponding cigarette groups 14 that advance along the wrapping path P2. As illustrated in Figure 9, the feeding device 40 comprises an unwinding station in which a strip 41 of wrapping material is unwound from a reel 42 and is advanced (passing by the hopper 33) towards a cutting component 43 of a known type that is arranged above the feeding station S3 and cyclically performs both a longitudinal cut of the strip 41 of material, and a transverse cut of the strip 41 of wrapping material to separate pairs of wrapping sheets 21 from the strip 41 of wrapping material. The feeding device 40 could also comprise a processing component (for example an embosser) that is arranged between the unwinding station and the cutting component 43 and processes (for example, embosses) the strip 41 of wrapping material in some way.

[0028] As illustrated in Figure 10, the wrapping unit B comprises a pair of folding devices 44 that are arranged along the wrapping path P2 downstream of the feeding station S3 and are designed to fold two open side ends of each wrapping unit 21 folded in a "U" around a corresponding cigarette group 14 to form a tubular wrapping having an open rear end. Each folding device 44 preferably only comprises folding profiles (i.e. folding helices) that are fixed (i.e. without any moving parts) and are arranged on opposite sides of the wrapping path P2.

[0029] As illustrated in Figure 10, the wrapping unit B comprises a pair of folding devices 45 that are arranged along the wrapping path P2 downstream of the folding devices 44 and are designed to complete the folding of each wrapping sheet 21 around the corresponding cigarette group 14 (and, thus, complete the production of the wrap 3) to close the open rear end (i.e. the end previously left open by the corresponding folding device 44).

[0030] The wrapping path P2 begins in the transfer station S2 (where the cigarette groups 14 enter the wrapping conveyor 37 two by two) and ends in the transfer station S5 (where the wraps 3 leave the wrapping conveyor 37 two by two to enter the grouping unit C). As illustrated in Figure 9, the packaging machine 29 comprises a transfer conveyor 46 that receives the wraps 3 from the grouping unit C (as better described below) and moves the wraps 3 themselves along a transfer path P3 that is straight and perpendicular to the wrapping path P2 until a transfer station S6 (where the wraps 3 leave the transfer conveyor 46). The transfer conveyor 46 comprises a ring-shaped

conveyor belt, which is wrapped around two end pulleys (one of which is motorised), supports a number of pockets 47 each of which is designed to house a corresponding pair of wraps 3 arranged side by side (grouped), and moves at the right pace to cyclically move the pockets 47 along the transfer path P3 from the grouping unit C to the transfer station S6.

[0031] As illustrated in Figures 12 and 13, the hopper 33 is designed to contain a compact mass of cigarettes (not illustrated) fed to a single inlet 48 above the hopper 33 by means of a horizontal feeding channel ending at a cigarette packaging machine (not illustrated). The hopper 33, within which the cigarettes, arranged side by side horizontally, advance transversely to their corresponding axes, comprise a top part 49 and a bottom part 50, which are both delimited at the front and at the rear by corresponding fixed vertical walls (i.e. without any moving parts).

[0032] The bottom part 50 of the hopper 33 comprises three equidistant bottom outlets 51 (better illustrated in Figure 13), which are closed below by respective horizontal bottom plates, are delimited at the sides by corresponding side walls, and are internally subdivided by a plurality of walls or baffles defining channels 52 within which the cigarettes are arranged in essentially vertical stacks. Each outlet 51 is designed to form two cigarette groups 14 arranged side by side that are extracted together from the outlet 51 itself.

[0033] The top part 49 of the hopper 33 is divided, beginning from the top inlet 48, in two independent channels 53 that are set apart, separated, and arranged side by side (the two channels 53 are arranged parallel to each other and side by side along the whole extension thereof); the channels 53 have two corresponding initial sections 54 that are parallel to each other and arranged side by side proceeding downwards, and two respective final sections 55 that are parallel and arranged side by side proceeding downwards. As a result, one wall of one channel 53 is adjacent to one wall of the other channel 53 along the whole length of the channels 53. In other words, each channel 53, has a "V" shape arranged horizontally (i.e. rotated by 90°), in which the two branches of the "V" consist of the corresponding initial section 54 and the corresponding final section 55. According to the (non-limiting) embodiment illustrated in Figure 12, in each channel 53 the initial section 54 is tilted by 45° in relation to the vertical and the final section 55 is tilted by 45° in relation to the vertical opposite the inclination of the initial section 54; as a result, in each channel 53 the initial section 54 is perpendicular (i.e. at an angle of 90°) in relation to the final section 55.

[0034] The final sections 55 lead into a chamber 56 that belongs to the bottom part 50 of the hopper 33 and is arranged immediately above the outlets 51.

[0035] To sum up, the structure of the top part 49 of the hopper 33 has a basically "zig-zag" shape (i.e. both channels 53 together form a vertical structure in a "zig-zag" shape), in which the two channels 53 are arranged parallel to each other and side by side along their entire length from the single top inlet 48 (common to both channels 53) to the chamber 56.

[0036] Each section 54 and 55 is delimited by two opposite (i.e. facing each other) belt conveyors 57, wherein one conveyor 57 is arranged above the other conveyor 57, and positioned at a certain distance from each other (i.e. the two belt conveyors 57 of each section 54 or 55 are preferably parallel and one of them is arranged in a higher position and the other in a lower position). Each pair of belt conveyors 57 defines the opposite side walls of the corresponding section 54 or 55 of the channel 53 against which the cylindrical side walls of the cigarettes rest.

[0037] Between the various belt conveyors 57, fixed profiles 58 (i.e. fixed edges that guide the forward movement of the cigarettes), which are more or less triangular in shape and preferably consist of a stiff metal or plastic section bar, may be interposed.

[0038] Each belt conveyor 57 comprises two end pulleys (one of which is in a higher position and the other in a lower position) and a conveyor belt that is wrapped in a ring around the two end pulleys and is moved by these two end pulleys. According to a preferred (but non-limiting) embodiment, in each belt conveyor 57, an end pulley is motorised (i.e. connected to an actuator to be rotated) while the other end pulley is idle.

[0039] According to one possible embodiment, each belt conveyor 57 comprises an electric motor that is mechanically independent of the electric motors of the other belt conveyors 57; in this way, each belt conveyor 57 can potentially be driven at a different speed from the other belt conveyors 57. According to an alternative embodiment, the two belt conveyors 57 of each section 54 or 55 of the same channel 53 share the same electric motor that drives (by means of suitable mechanical transmissions) both the belt conveyors 57; in this way, each section 54 or 55 can, potentially, be driven at a different speed to the other sections 54 and 55. According to an alternative embodiment, the four belt conveyors 57 for each channel 53 share the same electric motor that drives (by means of suitable mechanical transmissions) all four belt conveyors 57; in this way, each channel 53 can potentially be driven at a different speed to the other channel 53. According to an alternative embodiment, the four belt conveyors 57 for the two initial sections 54 share the same electric motor that drives (by means of suitable mechanical transmissions) all four belt conveyors 57 and the four belt conveyors 57 for the two final sections 55 share the same electric motor that drives (by means of suitable mechanical transmissions) all four belt conveyors 57; in this way, the two initial sections 54 can potentially be driven at a different speed to the two final sections 55. According to an alternative embodiment, the eight belt conveyors 57 for the two channels 53 share the same electric motor that drives (by means of suitable mechanical transmissions) all eight belt conveyors 57; in this way, all eight belt conveyors 57 for the two channels 53 must,

necessarily, be driven at the same speed.

[0040] The belt conveyors 57 preferably have a continuous motion at a variable speed (basically as a function of the hourly productivity of the packaging machine, i.e. of the number of cigarette packs 1 produced per unit of time).

[0041] According to a preferred embodiment, the hopper 33 is provided with two filling sensors 59 (one for each channel 53) that detect the degree to which the hopper 33 is filled (particularly in the transition area between the top part 49 and the bottom part 50, i.e. at the end of the channels 53) and as a function of the degree to which the hopper 33 is filled the forward speed of the belt conveyors 57, consisting of the side walls of the channels 53, is adjusted. In addition, or alternatively, the hopper 33 is provided with speed sensors that detect (directly or indirectly) the descent speed of the cigarettes along the channels 53 and (also) as a function of the descent speed of the cigarettes along the channels 53 the forward speed of the belt conveyors 57, consisting of the side walls of the channels 53, is adjusted.

[0042] Each filling sensor 59 comprises a flexible belt 60 that is fixed (at least at one end) to a fixed edge of the hopper 33 and is free to be deformed by the presence of the cigarettes that descend along the hopper 33. In the embodiment illustrated in Figure 12, each flexible belt 60 is fixed at one fixed edge of the hopper 33 only at one top end while a bottom end of the flexible belt 60, opposite the top end, is entirely free (i.e. has no mechanical bonds that impose a precise, predefined position on it); as a result, the bottom end of each flexible belt 60 tends to descend (fall) downwards, due to gravity, until resting on the cigarettes below (when present). According to a different embodiment that is not illustrated, both the ends of each flexible belt 60 are fixed to a fixed edge of the hopper 33 and, therefore, the flexible belt 60 has less freedom to become deformed.

[0043] Next to each flexible belt, a cavity 61 is formed that is arranged next to the flexible belt 60 and inside of which the flexible belt 60 can be arranged under the thrust of the cigarettes present in the hopper 33; in particular, the upper end of each flexible belt 60 is fixed to an upper edge of the corresponding cavity 61.

[0044] When the chamber 56 is completely full of cigarettes, each flexible belt 60 is pushed inside the corresponding cavity 61 by the cigarettes until (almost) adhering to the wall of the cavity 61. On the other hand, when the chamber 56 is at least partially empty, each flexible belt 60 moves downwards, due to gravity, until giving the flexible belt 60 a basically vertical configuration (as illustrated in Figure 12); obviously, as a function of the degree to which the chamber 56 is filled, each flexible belt 60 can assume all the possible configurations between the two extreme configurations corresponding to the completely empty chamber 56 and to the completely full chamber 56.

[0045] Each flexible belt 60 can consist, for example, of a net of metallic material (typically a mesh net), of a net of plastic material, i.e. of a strip of plastic material; more generally, the flexible belt 60 can be made in any way that allows the flexible belt 60 to have enough flexibility to become deformed under the thrust of the cigarettes contained in a chamber 6 without, at the same time, the flexible belt 60 interfering with the downwards movement of the cigarettes or the flexible belt 60 being able to deform (damage) the cigarettes. In other words, it is the flexible belt 60 that must adapt to the conformation of the cigarettes and not the other way around (i.e. the cigarettes must not change their shape under the thrust of the flexible belt 60).

[0046] Each filling sensor 59 comprises a detector 62 (for example, of the optical or proximity type) that is coupled to a corresponding flexible belt 60 and is designed to detect the position of the flexible belt 60 itself.

[0047] The hopper 33 comprises a control unit that manages the operation of the hopper 33 and drives both the belt conveyors 57 that comprise the side walls of the two channels 53 and the conveyors that adjust the entry of the cigarettes from above into the hopper 33 to keep the degree to which the chamber 56 is filled (detected in real time by filling sensors 59) around a desired (optimal) value. In other words, the control unit adjusts, in feedback, the degree to which the chamber 56 is filled, using as feedback variable, that measured using the filling sensors 59.

[0048] It is important to observe that the desired (optimal) value of the degree to which the chamber 56 is filled may not be constant, but may vary according to the effective speed of the packaging machine 29: generally (but not necessarily) the desired (optimal) value of the degree to which the chamber 56 is filled is smaller when the packaging machine 29 is slower and is bigger when the packaging machine 29 is faster.

[0049] Figure 14 illustrates, in detail, a pocket 35 of the forming conveyor 36; each pocket 35 comprises a support body 63 in which two seats 64 are formed side by side, each designed to house a cigarette group 14. When a pocket 35 is stationary, stopped opposite an outlet 51 of the hopper 33, a comb pusher (driven by a linear electric motor), which moves perpendicularly to the forming path P1, extracts two cigarette groups 14, arranged side by side, from the outlet 51 and inserts them together into the two seats 64 of the pocket 35. Each pocket 35 comprises a base 65 on which the support body 63 is mounted and that is designed to couple by means of a dovetail joint with a track 66 below that is integral to the conveyor belt of the forming conveyor 36. There is a locking system that binds the base 65 to the track 66 below so as to prevent the sliding of the base along the track 66 when the base 65 reaches the desired position; this locking system can be deactivated by acting on corresponding side levers 67 to remove the base 65. In this way, during a format change operation, the disassembly of the pockets 35 suitable for the old format and the successive assembly of the pockets 35 suitable for the new format is particularly quick and simple.

[0050] As mentioned above, the grouping unit C is arranged between the wrapping conveyor 37 and the transfer conveyor 46. It cyclically receives a pair of wraps 3 arranged between them at an input distance I (illustrated in Figure 17) from the wrapping conveyor 37 and in the transfer station S5, draws together (i.e. groups, couples) the two wraps 3 to arrange them at an output distance O (illustrated in Figure 17) that is smaller than the input distance I, and then releases the two grouped (coupled) wraps 3 into a pocket 47 of the transfer conveyor 46. In particular, the wrapping conveyor 37 cyclically advances a pair of wraps 3 along the wrapping path P2, the wraps 3 being arranged between them at the input distance I, while the transfer conveyor 46 advances the pockets 47 containing each pair of grouped (i.e. arranged between them at the output distance O) wraps 3 along the transfer path P3.

[0051] As illustrated in Figure 17, the grouping unit C comprises four pockets 68, 69, 70, and 71 each of which is designed to house a respective wrap 3. In addition, the grouping unit C comprises two output stations S8 and S9 and an input station S7 arranged between the two output stations S8 and S9 (and arranged at the transfer station S5).

[0052] The grouping unit C comprises an insertion device 72 (schematically illustrated in Figure 17) that is designed to insert two wraps 3 at the same time that are received together from the wrapping conveyor 37 and arranged between them at the input distance I in the pockets 68 and 69 that are located together in the input station S7 (as illustrated in Figures 17, 18, and 19) or in the pockets 70 and 71 that are located together in the input station S7 (as illustrated in Figures 21, 22, 23, and 24).

[0053] The grouping unit C comprises an extraction device 73 (schematically illustrated in Figure 17) that is designed to simultaneously extract two wraps 3 arranged between them at the output distance O from the pockets 68 and 69 that are located together in the output station S8 (as illustrated in Figures 21, 22, 23, and 24) or from the pockets 70 and 71 that are located together in the output station S9 (as illustrated in Figures 17, 18, and 19) that is opposite the output station S8 in relation to the input station S7.

[0054] The grouping unit C comprises a moving device 74 (illustrated in Figure 15 and partially in Figure 16) that is designed to move the pockets 68 and 69 along a horizontal moving direction D1 between the input station S7 and the output station S8 and, at the same time, is designed to move the pockets 70 and 71 between the output station S9 and the input station S7. Obviously, when the pockets 68 and 69 are located together in the input station S7 (as illustrated in Figures 17, 18, and 19), the pockets 70 and 71 are located together in the output station S9 while when the pockets 68 and 69 are located together in the output station S8 (as illustrated in Figures 21, 22, 23, and 24) the pockets 70 and 71 are located together in the input station S7.

[0055] As is well illustrated in Figure 17, the input station S7 and the output stations S8 and S9 are aligned with each other along the moving direction D1 and, as mentioned above, the input station S7 is located in the middle of the two output stations S8 and S9. As is well illustrated in Figure 17, the four pockets 68, 69, 70, and 71 are aligned with each other along the moving direction D1. In addition, the pockets 68 and 69 are arranged on one side while the pockets 70 and 71 are arranged on the opposite side so that the pockets 69 and 70 are arranged between the pockets 68 and 71 (i.e. the pockets 69 and 70 are located in the middle, while the pockets 68 and 71 are located at the ends).

[0056] As illustrated in Figure 15, the moving device 74 comprises a rigid support element 75 (basically a bar arranged horizontally along the moving direction D1) that is axially mounted so it can slide to alternately move forward and backward along the moving direction D1; the support element 75 supports the pockets 69 and 70, i.e. the pockets 69 and 70 are rigidly fixed to the rigid support element 70 and, thus, move together with the rigid support element 75 (i.e. the two pockets 69 and 70 always move in a synchronous manner between them). In addition, the moving device 74 comprises a rigid support element 76 (basically a bar arranged horizontally along the moving direction D1) that is separated from and independent of the support element 75, is axially mounted so it can slide to alternately move forward and backward along the moving direction D1, and is arranged parallel and beside the support element 75; the support element 76 supports the pockets 68 and 71, i.e. the pockets 68 and 71 are rigidly fixed to the rigid support element 76 and, therefore, move together with the rigid support element 76 (i.e. the two pockets 68 and 71 always move in a synchronous manner between them). Summing up, the two pockets 69 and 70 always have the same law of motion (imposed by the support element 75) that is different from the law of motion (imposed by the support element 76) of the two pockets 68 and 71 (that always have the same law of motion).

[0057] The moving device 74 always moves the two support elements 75 and 76 along the moving direction D1 in the same way and making the two support elements 75 and 76 run along respective, differentiated paths C1 and C2 (illustrated in Figures 20 and 25), or making the support elements 75 and 76 cover different distances. In particular, the moving device 74 makes the support element 75 (and, thus, the pockets 69 and 70) run along a path C 1 that is always longer in both directions compared to a path C2 that the support element 76 (and, thus, the pockets 68 and 71) runs along.

[0058] As illustrated in Figure 15, the moving device 74 comprises an operating member 77 that moves the support element 75 along the moving direction D1 alternately in both directions, and an operating member 78 (basically the twin of the operating member 77) that moves the support element 76 along the moving direction D1 alternately in both directions.

[0059] The moving device 74 comprises a single, com-

mon electric motor 79: the operating member 77 transmits the motion from the common electric motor 79 to the support element 75 and, similarly, the operating member 78 transmits the motion from the common electric motor 79 to the support element 76. According to the (non-limiting) embodiment illustrated in Figure 15, the operating member 77 comprises a rocker arm 80 that is centrally hinged to a fixed frame 81 to rotate around a rotation axis 82 that is horizontal and is connected (hinged) at a top end to the support element 75; similarly, the operating member 78 comprises a rocker arm 83 that is arranged next to the rocker arm 80, is centrally hinged to the fixed frame 81 to rotate around a horizontal rotation axis 84 (parallel to the rotation axis 82) and is connected (hinged) at a top end to the support element 76. The two rocker arms 80 and 83 are connected to each other by means of a connection arm 85 to rotate together about the respective rotation axes 82 and 84; i.e., the connection arm 85 is hinged to the bottom ends of the two rocker arms 80 and 83 (on the opposite side of the support elements 75 and 76 in relation to the rotation axes 82 and 84) to make the two rocker arms 80 and 83 angularly join each other. In particular, the common electric motor 79 transmits the rotation movement to the rocker arm 80 only (that, in turn, transmits the rotation movement to the other rocker arm 83 through the connection arm 85) by means of an eccentric arm 86 that is hinged to a lever 87 angularly joined to the rocker arm 80.

[0060] As illustrated in Figure 15, one sees that the extension of the rocker arm 80 (i.e. the arm of the rocker arm 80 in relation to the rotation axis 82) is greater than the extension of the rocker arm 83 (i.e. the arm of the rocker arm 83 in relation to the rotation axis 84); in this way, with equal rotation, the rocker arm 80 impresses to the support element 75 (that bears the pockets 69 and 70) the path C 1 that is above the path C2 impressed by the rocker arm 83 to the support element 76 (that bears the pockets 68 and 71).

[0061] When a format change operations requires the modification of the paths C1 and C2 of the support elements 75 and 76 (i.e. of the pockets 68, 69, 70, and 71) it may be necessary to replace the operating members 77 and 78 (for example, the rocker arms 80 and 83); this operation is, however, relatively simple and fast.

[0062] According to another embodiment not illustrated, the first operating member 77 comprises a first electric motor and the second operating member 78 comprises a second electric motor, which is separate from and independent of the first electric motor. In this way, when a format change operation requires that the paths C1 and C2 of the support elements 75 and 76 (i.e. the pockets 68, 69, 70, and 71) be modified, it is enough to update the control software for the two electric motors without any need to replace physical components.

[0063] As illustrated in Figure 17, the insertion device 72 comprises two pushers 88 that are arranged at the input station S7 and can be moved perpendicularly to the moving direction D1 along a main, horizontal direction D2; in addition, the extraction device 73 comprises two pairs of pushers 89 that are arranged at the output stations S8 and S9 and can be moved perpendicularly to the moving direction D1 along the main, horizontal direction D2.

[0064] As illustrated in Figure 16, the grouping unit C comprises: a common, rigid support element 90 that supports both the pushers 88 of the input station S7 and the two pairs of pushers 89 of the output stations S8 and S9; in this way, all the pushers 88 and 89 always move together with the same law of motion. Finally, the grouping unit C comprises a moving device 91 (partially illustrated in Figure 16 and using a four-bar linkage) that alternately moves the support element 90 both along the main, horizontal direction D2, which is perpendicular to the moving direction D1, and along a secondary, vertical direction D3, which is perpendicular to the main direction D2 and perpendicular to the moving direction D1. In particular, the moving device 91 makes the support element 90 (and, thus, the pushers 88 and 89 brought by the support element 90) complete a work travel (wherein the pushers 88 and 89 push respective wraps 3) moving the support element 90 only along the main direction D2 and makes the support element 90 complete a return travel (wherein the pushers 88 and 89 do not touch any wrap 3) moving the support element 90 in the secondary direction D3 and downwards, then in the main direction D2 in the opposite direction to the work travel, and, finally, in the secondary direction D3 and upwards. In other words, in the return travel, the support element 90 (thus, to the pushers 88 and 89 brought by the support element 90) is lowered so as not to interfere with the wraps 3.

[0065] It should be noted that, as illustrated in Figure 15, the pockets 68, 69, 70, and 71 have a slit below through which a thin stem passes that connects the pushers 88 and 89 to the rest of the support element 90.

[0066] According to a possible embodiment, the movement that the moving device 91 impresses on the support element 90 could also be used to complete the folding of the wraps 3; i.e. folding elements that, due to the movement of the support element 90, perform final folding operations on the wraps 3, are also connected to the support element 90.

[0067] With reference to Figures 17-25, the operation of the grouping unit C is described below. Initially, and as illustrated in Figure 17, the pockets 68 and 69 are stationary and are located in the input station S7 aligned with the wrapping conveyor 37 and, thus, ready to receive two wraps 3 that come from the wrapping conveyor 37 itself and are arranged between them at the input station I; at the same time, the pockets 70 and 71 are stationary and are located in the output station S9 aligned with a pocket 47 of the transfer conveyor 46 and, thus, ready to cede two grouped wraps 3 to the pocket 47.

[0068] At this point, and as illustrated in the Figures 18 and 19, while the pockets 68, 69, 70, and 71 are stationary, the pushers 88 and 89 complete their work travel: the pushers 88 insert two wraps 3 that are arranged be-

tween them at the input distance I in the pockets 68 and 69 that are located in the input station S7 and, at the same time, the pushers 89 extract two wraps 3 that are arranged between them at the output distance O from the pockets 70 and 71 that are located in the output station S9 and insert the two wraps 3 in a pocket 47 of the transfer conveyor 46. At this stage, the two pushers 89 of the output station S8 also complete their work travel that is, however, done on empty in that the pockets 68 and 69 are not at the output station S8.

[0069] Subsequently, and as illustrated in Figure 19, all the pockets 68, 69, 70, and 71 move in the same direction along the moving direction D1: the pockets 68 and 71 complete the shortest path C1 while the other pockets 69 and 70 complete the longest path C2 to move the pockets 68 and 69 from the input station S7 to the output station S8 and to move the pockets 70 and 71 from the output station S9 to the input station S7. Due to the differentiated paths C1 and C2, while the pockets 68 and 69 moving from the input station S7 to the output station S8 reduce their mutual distance (from the input distance I to the output distance O as the difference between the two paths C2 and C1 is obviously equal to the difference between the input distance I and the output distance O), the other pockets 70 and 71 moving from the output station S9 to the input station S7 increase their mutual distance (from the output distance O to the input distance I as the difference between the two paths C2 and C1 is obviously equal to the difference between the input distance I and the output distance O).

[0070] As illustrated in Figures 21 and 22, at the end of the movement, the pockets 70 and 71 are stationary and are located at the input station aligned with the wrapping conveyor 37 and, therefore, ready to receive two wraps 3 that are placed between them at the input distance I and come from the wrapping conveyor 37 itself; at the same time, the pockets 68 and 69 are stationary and are located at the output station S8 aligned with a pocket 47 of the transfer conveyor 46 and, therefore, ready to cede two wraps 3 grouped at the pocket 47 (i.e. two wraps 3 that are arranged at the output distance O).

[0071] At this point, and as illustrated in the Figures 23 and 24, while the pockets 68, 69, 70, and 71 are stationary, the pushers 88 and 89 complete their work travel: the pushers 88 insert two wraps 3 that are arranged between them at the input distance I in the pockets 70 and 71 that are located in the input station S7 and, at the same time, the pushers 89 extract two wraps 3 that are arranged between them at the output distance O from the pockets 68 and 69 that are located in the output station S8 and insert the two wraps 3 in a pocket 47 of the transfer conveyor 46. At this stage, the two pushers 89 of the output station S9 also complete their work travel that is, however, done on empty as the pockets 70 and 71 are not at the output station S8.

[0072] Subsequently, and as illustrated in Figure 25, all the pockets 68, 69, 70, and 71 move in the same direction along the moving direction D1: the pockets 68 and 71 complete the shortest path C1 while the other pockets 69 and 70 complete the longest path C2 to move the pockets 70 and 71 from the input station S7 to the output station S9 and to move the pockets 68 and 69 from the output station S8 to the input station S7. Due to the differentiated paths C1 and C2, while the pockets 70 and 71 moving from the input station S7 to the output station S9 reduce their mutual distance (from the input distance I to the output distance O), the pockets 68 and 69 moving from the output station S8 to the input station S7 increase their mutual distance (from the output distance O to the input distance I).

[0073] At this point, the grouping unit C is in the situation illustrated in Figure 17 and the cycle described above begins again.

[0074] Obviously, during the movements of the pockets 68, 69, 70, and 71, the transfer conveyor 46 also takes its own steps forward to move the full pockets 47 (i.e. containing groups of two wraps 3) from the output stations S8 and S9 towards the transfer station S6 and to replace the full pockets 47 with as many empty pockets 47 at the output stations S8 and S9.

[0075] According to a preferred, but not binding, embodiment, the handling of the various components (wrapping wheels, feed conveyors, pushers, mobile folders, etc.) of the packaging machine 29 is carried out by means of respective electric motors that are mechanically independent from each other and are synchronised (i.e. moved in phase) in a virtual way (i.e. not by any physical constraint, but by a control constraint). Normally, an electric motor is considered as a reference ("master") and all other electric motors ("slaves") follow the position of the reference electric motor ("master"). In order to obtain linear movements (i.e. that involve a movement along a straight trajectory), generally a rotating electric motor is used to rotate a pinion that engages with a rack; i.e. a "rack-and-pinion" mechanism is used to transform the rotary movement generated by the electric motor into a linear movement.

[0076] The embodiments described herein may be combined with each other without departing from the scope of protection of this invention as defined by the claims.

[0077] Numerous advantages are achieved with the hopper 33 described above.

[0078] Firstly, the hopper 33 described above has particularly small transverse dimensions.

[0079] In addition, the hopper 33 described above ensures a high average descent speed of the cigarettes (i.e. a high number of cigarette groups 14 that can be extracted per unit of time) while presenting a low risk of flooding (i.e. cigarettes being misplaced inside the hopper 33 with consequent slowing down or blocking of the descent of the other cigarettes). Finally, the hopper 33 described above is simple and economical to construct compared to a similar known hopper, as it requires few and easy modifications that do not involve significant cost increases to be produced.

[0080] The grouping unit C described above also has numerous advantages.

[0081] First of all, the grouping unit C described above makes it possible to operate at a high production speed (i.e. with a high number of wraps 3 produced per unit of time) without damaging the wraps 3 themselves.

[0082] In addition, the grouping unit C described above makes it possible to change the format of cigarette packs 1 relatively easily and quickly.

[0083] Finally, the grouping unit C described above is compact and all its components are optimally accessible (a particularly useful feature when performing a format change).

[0084] The embodiment illustrated in the attached figures refers to the manufacture of a cigarette pack, but this invention is also applicable, without substantial modification, to the production of any other type of pack of smoking articles (e.g. a cigar pack, a pack for electronic cigarettes of the liquid vaporisation type, a pack of new generation cigarettes without tobacco combustion, etc.).

Claims

1. A grouping unit (C) to form a group consisting of two wraps (3), each containing a group (14) of smoking articles; the grouping unit (C) comprises:

   four pockets (68, 69, 70, 71), each designed to house a respective wrap (3);
   two output stations (S8, S9);
   an input station (S7) arranged between the two output stations (S8, S9);
   an insertion device (72), which is designed to simultaneously insert two wraps (3) arranged at an input distance (I) from one another into a first pocket (68) and into a second pocket (69), which are, together, in the input station (S7), or into a third pocket (70) and into a fourth pocket (71), which are, together, in the input station (S7);
   an extraction device (73), which is designed to simultaneously extract two wraps (3) arranged at an output distance (O) from one another, which is smaller than the input distance (I), from the first pocket (68) and from the second pocket (69), which are, together, in a first output station (S8), or from the third pocket (70) and from the fourth pocket (71), which are, together, in a second output station (S9), which is opposite the first output station (S8) relative to the input station (S7); and
   a first moving device (74), which is designed to move, along a moving direction (D1), the first pocket (68) and the second pocket (69) between the input station (S7) and the first output station (S8) and, simultaneously, is designed to move the third pocket (70) and the fourth pocket (71) between the second output station (S9) and in the input station (S7).

2. The grouping unit (C) according to claim 1, wherein the input station (S7) and the output stations (S8, S9) are aligned with one another along the moving direction (D1).

3. The grouping unit (C) according to claim 1 or 2, wherein the four pockets (68, 69, 70, 71) are aligned with one another along the moving direction (D1).

4. The grouping unit (C) according to claim 1, 2 or 3, wherein the first pocket (68) and the second pocket (69) are arranged on one side, whereas the third pocket (70) and the fourth pocket (71) are arranged on the opposite side so that the second pocket (69) and the third pocket (70) are arranged between the first pocket (68) and the fourth pocket (71).

5. The grouping unit (C) according to one of the claims from 1 to 4, wherein the first moving device (74) comprises a first rigid support element (75), on which the second pocket (69) and the third pocket (70) are mounted, which, hence, always move in a synchronous manner, and a second rigid support element (76), which is separate from and independent of the first support element (75) and on which the first pocket (68) and the fourth pocket (71) are mounted, which, hence, always move in a synchronous manner.

6. The grouping unit (C) according to claim 5, wherein the first moving device (74) always moves, along the moving direction (D1), the two support elements (75, 76) in the same sense and causing the two support elements (75, 76) to cover differentiated travels (C1, C2).

7. The grouping unit (C) according to claim 6, wherein the first moving device (74) causes the first support element (75) to cover a first travel (C1), which is always greater, in both senses, than a second travel (C2) covered by the second support element (76).

8. The grouping unit (C) according to claim 5, 6 or 7, wherein the first moving device (74) comprises:

   a first operating member (77), which moves the first support element (75) along the moving direction (S1) alternatively in both senses; and
   a second operating member (78), which moves the second support element (76) along the moving direction (S1) alternatively in both senses.

9. The grouping unit (C) according to claim 8, wherein the first operating member (77) comprises a first electric motor and the second operating member (78) comprises a second electric motor, which is sep-

arate from and independent of the first electric motor.

10. The grouping unit (C) according to claim 8, wherein:

the first moving device (74) comprises one single common electric motor (79);
the first operating member (77) transmits the motion from the common electric motor (79) to the first support element (75); and
the second operating member (78) transmits the motion from the common electric motor (79) to the second support element (76).

11. The grouping unit (C) according to claim 9, wherein:

the first operating member (77) comprises a first rocker arm (80), which is hinged at the centre so as to rotate around a first rotation axis (82) and is connected, at an end, to the first support element (75); and
the second operating member (78) comprises a second rocker arm (83), which is hinged at the centre so as to rotate around a second rotation axis (84) and is connected, at an end, to the second support element (76).

12. The grouping unit (C) according to claim 11, wherein:

the two rocker arms (80, 83) are connected to one another by means of a connection arm (85) so as to rotate, together, around the respective rotation axes (82, 84);
the common electric motor (79) transmits the rotation movement only to one of the two rocker arms (80, 83) by means of an eccentric arm (86), which is hinged to a lever (87), which is integral to the rocker arm (80).

13. The grouping unit (C) according to one of the claims from 1 to 12 and comprising a transfer conveyor (47), which moves along a transfer path (P3) parallel to the moving direction (D1) and is provided with a plurality of pockets (47), each designed to house two wraps (3) arranged at a distance from one another and designed to simultaneously receive two wraps (3) in the first output station (S8) or in the second output station (S9).

14. The grouping unit (C) according to one of the claims from 1 to 13, wherein:

the insertion device (72) comprises two first pushers (88), which are arranged in the area of the input station (S7) and are movable perpendicularly to the moving direction (D1); and
the extraction device (73) comprises two pairs of second pushers (89), which are arranged in the area of the output station (S8, S9) and are movable perpendicularly to the moving direction (D1).

15. The grouping unit (C) according to claim 14 and comprising:

a third common rigid support element (90), which supports both the two first pushers (88) and the two pairs of second pushers (89); and
a second moving device (91), which alternatively moves the third support element (90) both along a main horizontal direction (D2), which is perpendicular to the moving direction (D1), and along a secondary vertical direction (D3), which is perpendicular to the main direction (D2) and perpendicular to the moving direction (D1).

16. The grouping unit (C) according to claim 15, wherein the second moving device (91) causes the third support element (90) to cover a work travel by moving the third support element (90) only along the main direction (D2) and causes the third support element (90) to cover a return travel by moving the third support element (90) at first in the secondary direction (D3) and downwards, then in the main direction (D2) with an opposite sense relative to the work travel and, finally, in the secondary direction (D3) and upwards.

17. A grouping method to form a group consisting of two wraps (3), each containing a group (14) of smoking articles; the grouping method comprises the steps of:

simultaneously inserting, by means of an insertion device (72), two wraps (3) arranged at an input distance (I) from one another into a first pocket (68) and into a second pocket (69), which are, together, in the input station (S7), or into a third pocket (70) and into a fourth pocket (71), which are, together, in the input station (S7);
simultaneously extracting, by means an extraction device (73), two wraps (3) arranged at an output distance (O) from one another, which is smaller than the input distance (I), from the first pocket (68) and from the second pocket (69), which are, together, in a first output station (S8), or from the third pocket (70) and from the fourth pocket (71), which are, together, in a second output station (S9), which is opposite the first output station (S8) relative to the input station (S7);
moving, by means of a first moving device (74) and along a moving direction (D1), the first pocket (68) and the second pocket (69) between the input station (S7) and the first output station (S8) and, simultaneously, moving the third pocket (70) and the fourth pocket (71) between the second output station (S9) and in the input station

(S7).

Patentansprüche

1. Gruppierungseinheit (C), um eine Gruppe zu bilden, die aus zwei Umhüllungen (3) besteht, wovon jede eine Gruppe (14) von Rauchartikeln enthält, wobei die Gruppierungseinheit (C) umfasst:

vier Taschen (68, 69, 70, 71), wobei jede entworfen ist, eine jeweilige Umhüllung (3) aufzunehmen;
zwei Ausgabestationen (S8, S9);
eine Eingabestation (S7), die zwischen den beiden Ausgabestationen (S8, S9) angeordnet ist;
eine Einsetzvorrichtung (72), die entworfen ist, zwei Umhüllungen (3), die in einem Eingabeabstand (I) voneinander angeordnet sind, gleichzeitig in eine erste Tasche (68) und in eine zweite Tasche (69), die sich gemeinsam in der Eingabestation (S7) befinden, oder in eine dritte Tasche (70) und eine vierte Tasche (71), die sich gemeinsam in der Eingabestation (S7) befinden, einzusetzen;
eine Extraktionsvorrichtung (73), die entworfen ist, zwei Umhüllungen (3), die in einem Ausgabeabstand (O) voneinander angeordnet sind, der kleiner als der Eingabeabstand (I) ist, aus der ersten Tasche (68) und aus der zweiten Tasche (69), die sich gemeinsam in einer ersten Ausgabestation (S8) befinden, oder aus der dritten Tasche (70) und aus der vierten Tasche (71), die sich gemeinsam in einer zweiten Ausgabestation (S9) befinden, die der ersten Ausgabestation (S8) bezüglich der Eingabestation (S7) gegenüberliegt, gleichzeitig zu extrahieren; und
eine erste Bewegungsvorrichtung (74), die entworfen ist, die erste Tasche (68) und die zweite Tasche (69) entlang einer Bewegungsrichtung (D) zwischen der Eingabestation (S7) und der ersten Ausgabestation (S8) zu bewegen, und die entworfen ist, gleichzeitig die dritte Tasche (70) und die vierte Tasche (71) zwischen der zweiten Ausgabestation (S9) und der Eingabestation (S7) zu bewegen.

2. Gruppierungseinheit (C) nach Anspruch 1, wobei die Eingabestation (S7) und die Ausgabestationen (S8, S9) entlang der Bewegungsrichtung (D1) zueinander ausgerichtet sind.

3. Gruppierungseinheit (C) nach Anspruch 1 oder 2, wobei die vier Taschen (68, 69, 70, 71) entlang der Bewegungsrichtung (D1) zueinander ausgerichtet sind.

4. Gruppierungseinheit (C) nach Anspruch 1, 2 oder 3, wobei die erste Tasche (68) und die zweite Tasche (69) auf einer Seite angeordnet sind, während die dritte Tasche (70) und die vierte Tasche (71) auf der gegenüberliegenden Seite angeordnet sind, so dass die zweite Tasche (69) und die dritte Tasche (70) zwischen der ersten Tasche (68) und der vierten Tasche (71) angeordnet sind.

5. Gruppierungseinheit (C) nach einem der Ansprüche 1 bis 4, wobei die erste Bewegungsvorrichtung (74) ein erstes starres Tragelement (75), an dem die zweite Tasche (69) und die dritte Tasche (70) angebracht sind, die sich folglich immer in einer synchronen Weise bewegen, und ein zweites starres Tragelement (76), das von dem ersten Tragelement (75) separat und unabhängig ist und an dem die erste Tasche (68) und die vierte Tasche (71) angebracht sind, die sich folglich immer in einer synchronen Weise bewegen, umfasst.

6. Gruppierungseinheit (C) nach Anspruch 5, wobei die erste Bewegungsvorrichtung (74) die beiden Tragelemente (75, 76) immer entlang der Bewegungsrichtung (D1) in der gleichen Richtung bewegt und bewirkt, dass die beiden Tragelemente (75, 76) unterschiedliche Wege zurücklegen.

7. Gruppierungseinheit (C) nach Anspruch 6, wobei die erste Bewegungsvorrichtung (74) bewirkt, dass das erste Tragelement (75) einen ersten Weg (C1) zurücklegt, der in beiden Richtungen immer größer als ein zweiter Weg (C2) ist, der durch das zweite Tragelement (76) zurückgelegt wird.

8. Gruppierungseinheit (C) nach Anspruch 5, 6 oder 7, wobei die erste Bewegungsvorrichtung (74) umfasst:

ein erstes Betriebselement (77), das das erste Tragelement (75) entlang der Bewegungsrichtung (S1) abwechselnd in beiden Richtungen bewegt; und
ein zweites Betriebselement (78), das das zweite Tragelement (76) entlang der Bewegungsrichtung (S1) abwechselnd in beiden Richtungen bewegt.

9. Gruppierungseinheit (C) nach Anspruch 8, wobei das erste Betriebselement (77) einen ersten Elektromotor umfasst und das zweite Betriebselement (78) einen zweiten Elektromotor umfasst, der von dem ersten Elektromotor separat und unabhängig ist.

10. Gruppierungseinheit (C) nach Anspruch 8, wobei:

die erste Bewegungsvorrichtung (74) einen einzigen gemeinsamen Elektromotor (79) umfasst;

das erste Betriebselement (77) die Bewegung von dem gemeinsamen Elektromotor (79) zu dem ersten Tragelement (75) überträgt; und
das zweite Betriebselement (78) die Bewegung von dem gemeinsamen Elektromotor (79) zu dem zweiten Tragelement (76) überträgt.

11. Gruppierungseinheit (C) nach Anspruch 9, wobei:

das erste Betriebselement (77) einen ersten Kipphebel (80) umfasst, der in der Mitte angelenkt ist, um sich um eine erste Drehachse (82) zu drehen, und an einem Ende mit dem ersten Tragelement (75) verbunden ist; und
das zweite Betriebselement (78) einen zweiten Kipphebel (83) umfasst, der in der Mitte angelenkt ist, um sich um eine zweite Drehachse (84) zu drehen, und an einem Ende mit dem zweiten Tragelement (76) verbunden ist.

12. Gruppierungseinheit (C) nach Anspruch 11, wobei:

die beiden Kipphebel (80, 83) mittels eines Verbindungsarms (85) miteinander verbunden sind, um sich gemeinsam um die jeweiligen Drehachsen (82, 84) zu drehen;
der gemeinsame Elektromotor (79) die Drehbewegung mittels eines Exzenterarms (86), der an einem Hebel (87), der mit dem Kipphebel (80) integral ist, angelenkt ist, nur auf einen der beiden Kipphebel (80, 83) überträgt.

13. Gruppierungseinheit (C) nach einem der Ansprüche 1 bis 12 und umfassend einen Umladeförderer (47), der sich entlang einem Umladeweg (P3) parallel zur Bewegungsrichtung (D1) bewegt und mit mehreren Taschen (47) versehen ist, die jeweils entworfen sind, zwei Umhüllungen (3) aufzunehmen, die in einem Abstand voneinander angeordnet sind, und die entworfen sind, zwei Umhüllungen (3) in der ersten Ausgabestation (S8) oder in der zweiten Ausgabestation (S9) gleichzeitig zu empfangen.

14. Gruppierungseinheit (C) nach einem der Ansprüche 1 bis 13, wobei:

die Einsetzvorrichtung (72) zwei erste Schieber (88) umfasst, die in dem Bereich der Eingabestation (S7) angeordnet sind und senkrecht zu der Bewegungsrichtung (D1) bewegbar sind; und
die Extraktionsvorrichtung (73) zwei Paare von zweiten Schiebern (89) umfasst, die in dem Bereich der Ausgabestation (S8, S9) angeordnet sind und senkrecht zu der Bewegungsrichtung (D1) bewegbar sind.

15. Gruppierungseinheit (C) nach Anspruch 14, und umfassend:

ein drittes gemeinsames starres Tragelement (90), das sowohl die beiden ersten Schieber (88) als auch die zwei Paare von zweiten Schiebern (89) trägt; und
eine zweite Bewegungsvorrichtung (91), die das dritte Tragelement (90) sowohl entlang einer horizontalen Hauptrichtung (D2), die zu der Bewegungsrichtung (D1) senkrecht ist, als auch entlang einer vertikalen Sekundärrichtung (D3), die zu der Hauptrichtung (D2) senkrecht ist und zu der Bewegungsrichtung (D1) senkrecht ist, abwechselnd bewegt.

16. Gruppierungseinheit (C) nach Anspruch 15, wobei die zweite Bewegungsvorrichtung (91) bewirkt, dass das dritte Tragelement (90) einen Arbeitsweg durch Bewegen des dritten Tragelements (90) nur entlang der Hauptrichtung (D2) zurücklegt, und bewirkt, dass das dritte Tragelement (90) einen Rückweg durch Bewegen des dritten Tragelements (90) zuerst in der Sekundärrichtung (D3) und abwärts, dann in der Hauptrichtung (D2) in einer entgegengesetzten Richtung bezüglich des Arbeitswegs und schließlich in der Sekundärrichtung (D3) und aufwärts zurücklegt.

17. Gruppierungsverfahren, um eine Gruppe zu bilden, die aus zwei Umhüllungen (3) besteht, wovon jede eine Gruppe von Rauchartikeln (14) enthält; wobei das Gruppierungsverfahren die Schritte umfasst:

gleichzeitiges Einsetzen mittels einer Einsetzvorrichtung (72) von zwei Umhüllungen (3), die in einem Eingabeabstand (I) voneinander angeordnet sind, in eine erste Tasche (68) und in eine zweite Tasche (69), die sich gemeinsam in der Eingabestation (S7) befinden, oder in eine dritte Tasche (70) und in eine vierte Tasche (71), die sich gemeinsam in der Eingabestation (S7) befinden;
gleichzeitiges Extrahieren mittels einer Extraktionsvorrichtung (73) von zwei Umhüllungen (3), die in einem Ausgabeabstand (O) voneinander angeordnet sind, der kleiner als der Eingabeabstand (I) ist, aus der ersten Tasche (68) und aus der zweiten Tasche (69), die sich gemeinsam in einer ersten Ausgabestation (S8) befinden, oder aus der dritten Tasche (70) und aus der vierten Tasche (71), die sich gemeinsam in einer zweiten Ausgabestation (S9) befinden, die der ersten Ausgabestation (S8) bezüglich der Eingabestation (S7) gegenüberliegt;
Bewegen der ersten Tasche (68) und der zweiten Tasche (69) zwischen der Eingabestation (S7) und der ersten Ausgabestation (S8) und gleichzeitiges Bewegen der dritten Tasche (70)

und der vierten Tasche (71) zwischen der zweiten Ausgabestation (S9) und in der Eingabestation (S7) mittels einer ersten Bewegungsvorrichtung (74) und entlang einer Bewegungsrichtung (D1).

Revendications

1. Unité de groupement (C) pour former un groupe composé de deux enveloppes (3), contenant chacune un groupe (14) d'articles à fumer ; l'unité de groupement (C) comprend :

quatre poches (68, 69, 70, 71) chacune conçues pour loger une enveloppe (3) respective ;
deux stations de sortie (S8, S9) ;
une station d'entrée (S7) agencée entre les deux stations de sortie (S8, S9) ;
un dispositif d'insertion (72) qui est conçu pour insérer simultanément deux enveloppes (3) agencées à une distance d'entrée (I) l'une de l'autre dans une première poche (68) et dans une deuxième poche (69) qui sont ensemble dans la station d'entrée (S7), ou dans une troisième poche (70) et dans une quatrième poche (71) qui sont, ensemble, dans la station d'entrée (S7) ;
un dispositif d'extraction (73) qui est conçu pour extraire simultanément deux enveloppes (3) agencées à une distance de sortie (O) l'une de l'autre, qui est plus petite que la distance d'entrée (I), de la première poche (68) et de la deuxième poche (69) qui sont, ensemble, dans une première station de sortie (S8), ou de la troisième poche (70) et de la quatrième poche (71) qui sont, ensemble, dans une seconde station de sortie (S9), qui est opposée à la première station de sortie (S8) par rapport à la station d'entrée (S7) ; et
un premier dispositif de déplacement (74) qui est conçu pour se déplacer le long d'une direction de déplacement (D1), la première poche (68) et la deuxième poche (69) entre la station d'entrée (S7) et la première station de sortie (S8) et simultanément est conçu pour déplacer la troisième poche (70) et la quatrième poche (71) entre la seconde station de sortie (S9) et dans la station d'entrée (S7).

2. Unité de groupement (C) selon la revendication 1, dans laquelle la station d'entrée (S7) et les stations de sortie (S8, S9) sont alignées entre elles le long de la direction de déplacement (D1).

3. Unité de groupement (C) selon la revendication 1 ou 2, dans laquelle les quatre poches (68, 69, 70, 71) sont alignées entre elles le long de la direction de déplacement (D1).

4. Unité de groupement (C) selon la revendication 1, 2 ou 3, dans laquelle la première poche (68) et la deuxième poche (69) sont agencées d'un côté, alors que la troisième poche (70) et la quatrième poche (71) sont agencées du côté opposé de sorte que la deuxième poche (69) et la troisième poche (70) sont agencées entre la première poche (68) et la quatrième poche (71).

5. Unité de groupement (C) selon l'une des revendications 1 à 4, dans laquelle le premier dispositif de déplacement (74) comprend un premier élément de support rigide (75) sur lequel la deuxième poche (69) et la troisième poche (70) sont montées qui, par conséquent, se déplacent toujours d'une manière synchrone et un deuxième élément de support rigide (76), qui est séparé de et indépendant du premier élément de support (75) et sur lequel la première poche (68) et la quatrième poche (71) sont montées qui, par conséquent, se déplacent toujours d'une manière synchrone.

6. Unité de groupement (C) selon la revendication 5, dans laquelle le premier dispositif de déplacement (74) déplace toujours le long de la direction de déplacement (D1), les deux éléments de support (75, 76) dans le même sens, et amenant les deux éléments de support (75, 76) à couvrir des courses (C1, C2) différenciées.

7. Unité de groupement (C) selon la revendication 6, dans laquelle le premier dispositif de déplacement (74) amène le premier élément de support (75) à couvrir une première course (C1) qui est toujours plus importante, dans les deux sens, qu'une seconde course (C2) couverte par le deuxième élément de support (76).

8. Unité de groupement (C) selon la revendication 5, 6 ou 7, dans laquelle le premier dispositif de déplacement (74) comprend :

un premier élément d'actionnement (77) qui déplace le premier élément de support (75) le long de la direction de déplacement (S1) de manière alternée dans les deux sens ; et
un second élément d'actionnement (78) qui déplace le deuxième élément de support (76) le long de la direction de déplacement (S1) de manière alternée dans les deux sens.

9. Unité de groupement (C) selon la revendication 8, dans laquelle le premier élément d'actionnement (77) comprend un premier moteur électrique et le second élément d'actionnement (78) comprend un second moteur électrique, qui est séparé du et indé-

pendant du premier moteur électrique.

10. Unité de groupement (C) selon la revendication 8, dans laquelle :

le premier dispositif de déplacement (74) comprend un seul moteur électrique (79) commun ;
le premier élément d'actionnement (77) transmet le mouvement du moteur électrique (79) commun au premier élément de support (75) ; et
le second élément d'actionnement (78) transmet le mouvement du moteur électrique (79) commun au deuxième élément de support (76).

11. Unité de groupement (C) selon la revendication 9, dans laquelle :

le premier élément d'actionnement (77) comprend un premier balancier (80) qui est articulé au centre afin de tourner autour d'un premier axe de rotation (82) et est raccordé, au niveau d'une extrémité, au premier élément de support (75) ; et
le second élément d'actionnement (78) comprend un second balancier (83) qui est articulé au centre afin de tourner autour d'un second axe de rotation (84) et est raccordé, au niveau d'une extrémité, au deuxième élément de support (76).

12. Unité de groupement (C) selon la revendication 11, dans laquelle :

les deux balanciers (80, 83) sont raccordés entre eux au moyen d'un bras de raccordement (85) afin de tourner, ensemble, autour des axes de rotation (82, 84) respectifs ;
le moteur électrique (79) commun transmet le mouvement de rotation uniquement à l'un des deux balanciers (80, 83) au moyen d'un bras excentrique (86), qui est articulé à un levier (87), qui est solidaire du balancier (80).

13. Unité de groupement (C) selon l'une des revendications 1 à 12 et comprenant un transporteur de transfert (47) qui se déplace le long d'une trajectoire de transfert (P3) parallèle à la direction de déplacement (D1) et est prévu avec une pluralité de poches (47), chacune conçues pour loger deux enveloppes (3) agencées à une distance l'une de l'autre et conçues pour recevoir les deux enveloppes (3) dans la première station de sortie (S8) ou dans la seconde station de sortie (S9).

14. Unité de groupement (C) selon l'une des revendications 1 à 13, dans laquelle :

le dispositif d'insertion (72) comprend deux premiers poussoirs (88) qui sont agencés dans la zone de la station d'entrée (S7) et sont mobiles perpendiculairement à la direction de déplacement (D1) ; et
le dispositif d'extraction (73) comprend deux paires de seconds poussoirs (89) qui sont agencés dans la zone de la station de sortie (S8, S9) et sont mobiles perpendiculairement à la direction de déplacement (D1).

15. Unité de groupement (C) selon la revendication 14 et comprenant :

un troisième élément de support rigide (90) commun qui supporte à la fois les deux premiers poussoirs (88) et les deux paires de seconds poussoirs (89) ; et
un second dispositif de déplacement (91) qui déplace, de manière alternée, le troisième élément de support (90) à la fois le long d'une direction principale horizontale (D2) qui est perpendiculaire à la direction de déplacement (D1) et le long d'une direction verticale secondaire (D3) qui est perpendiculaire à la direction principale (D2) et perpendiculaire à la direction de déplacement (D1).

16. Unité de groupement (C) selon la revendication 15, dans laquelle le second dispositif de déplacement (91) amène le troisième élément de support (90) à couvrir une course de travail en déplaçant le troisième élément de support (90) uniquement le long de la direction principale (D2) et amène le troisième élément de support (90) à couvrir une course de retour en déplaçant le troisième élément de support (90) dans un premier temps dans la direction secondaire (D3) et vers le bas, ensuite dans la direction principale (D2) avec un sens opposé par rapport à la course de travail et finalement, dans la direction secondaire (D3) et vers le haut.

17. Procédé de groupement pour former un groupe composé de deux enveloppes (3) contenant chacune un groupe (14) d'articles à fumer ; le procédé de groupement comprend les étapes suivantes :

insérer simultanément, au moyen d'un dispositif d'insertion (72), deux enveloppes (3) agencées à une distance d'entrée (I) l'une de l'autre dans une première poche (68) et dans une deuxième poche (69) qui sont ensemble dans la station d'entrée (S7), ou dans une troisième poche (70) et dans une quatrième poche (71) qui sont, ensemble, dans la station d'entrée (S7) ;
extraire simultanément, au moyen d'un dispositif d'extraction (73), deux enveloppées (3) agencées à une distance de sortie (O) l'une de l'autre, qui est plus petite que la distance d'entrée (I) de

la première poche (68) et de la deuxième poche (69), qui sont ensemble dans une première station de sortie (S8), ou de la troisième poche (70) et de la quatrième poche (71) qui sont ensemble dans une seconde station de sortie (S9) qui est opposée à la première station de sortie (S8) par rapport à la station d'entrée (S7) ;
déplacer, au moyen d'un premier dispositif de déplacement (74) et le long d'une direction de déplacement (D1), la première poche (68) et la deuxième poche (69) entre la station d'entrée (S7) et la première station de sortie (S8) et déplacer simultanément la troisième poche (70) et la quatrième poche (71) entre la seconde station de sortie (S9) et dans la station d'entrée (S7).

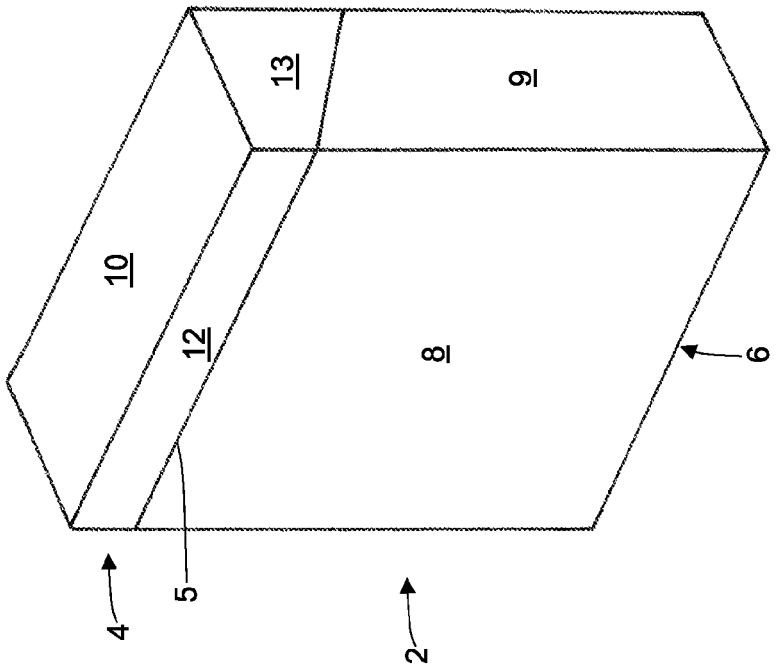


Fig.2

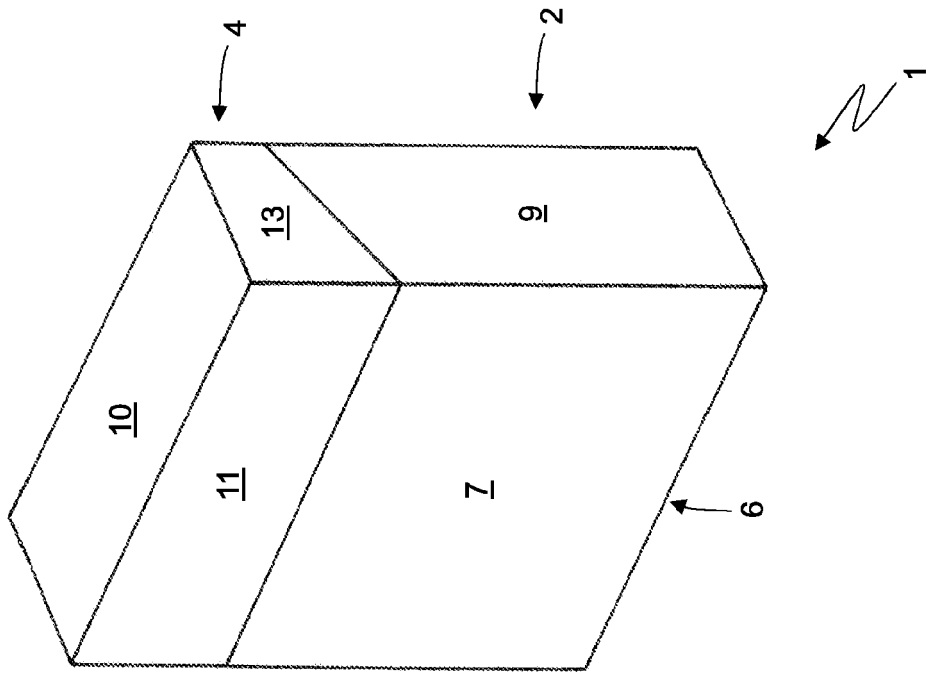


Fig.1

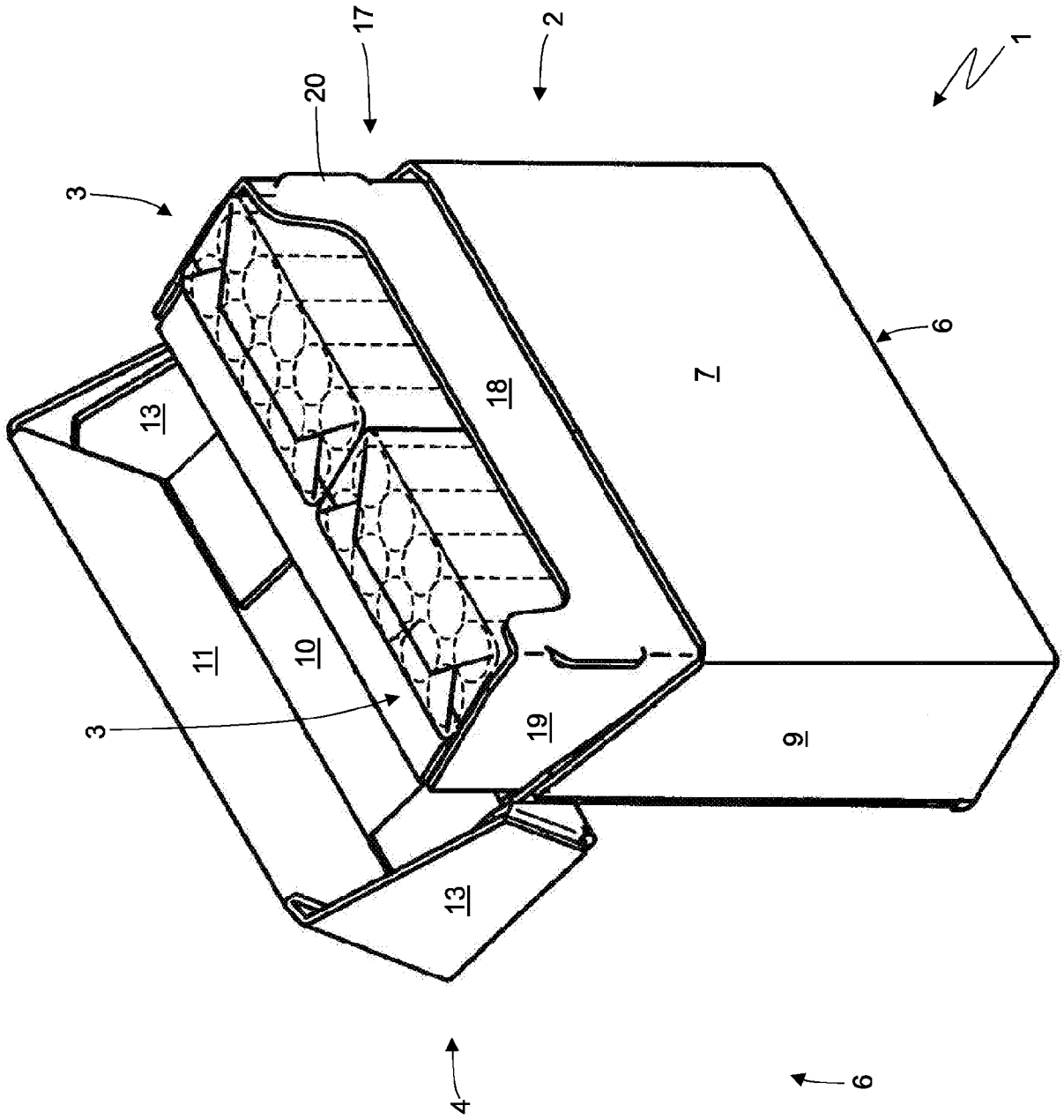


Fig.3

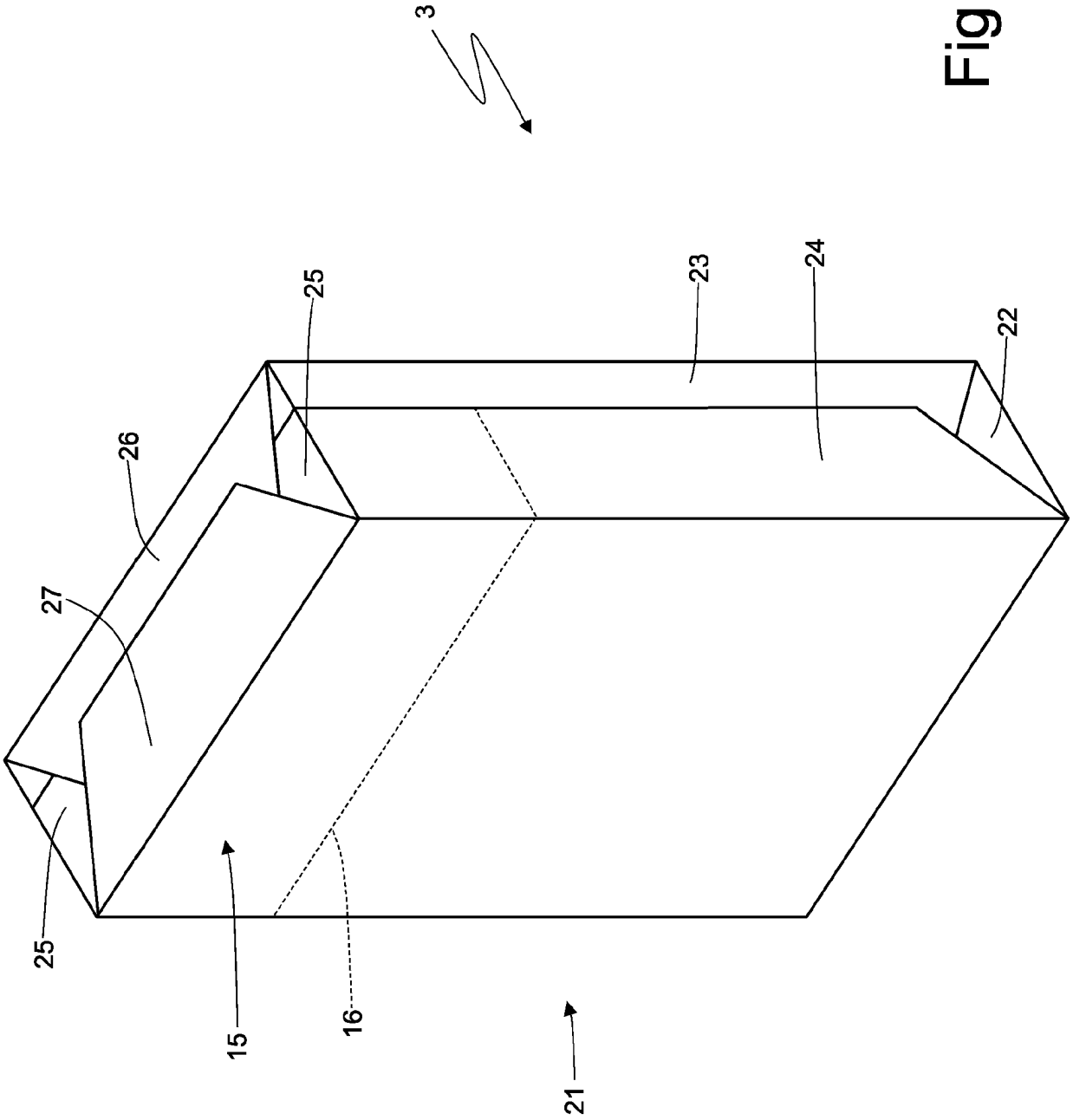
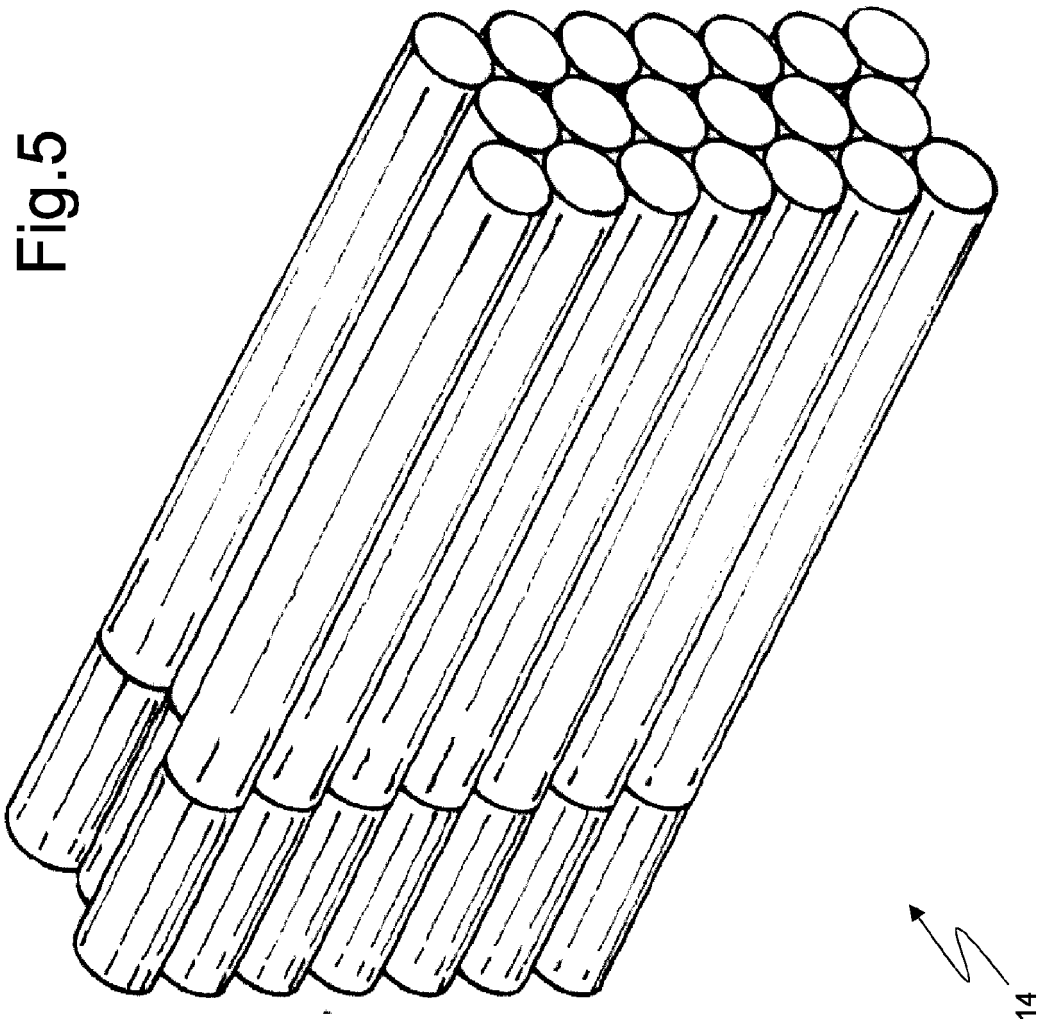


Fig.4

Fig.5



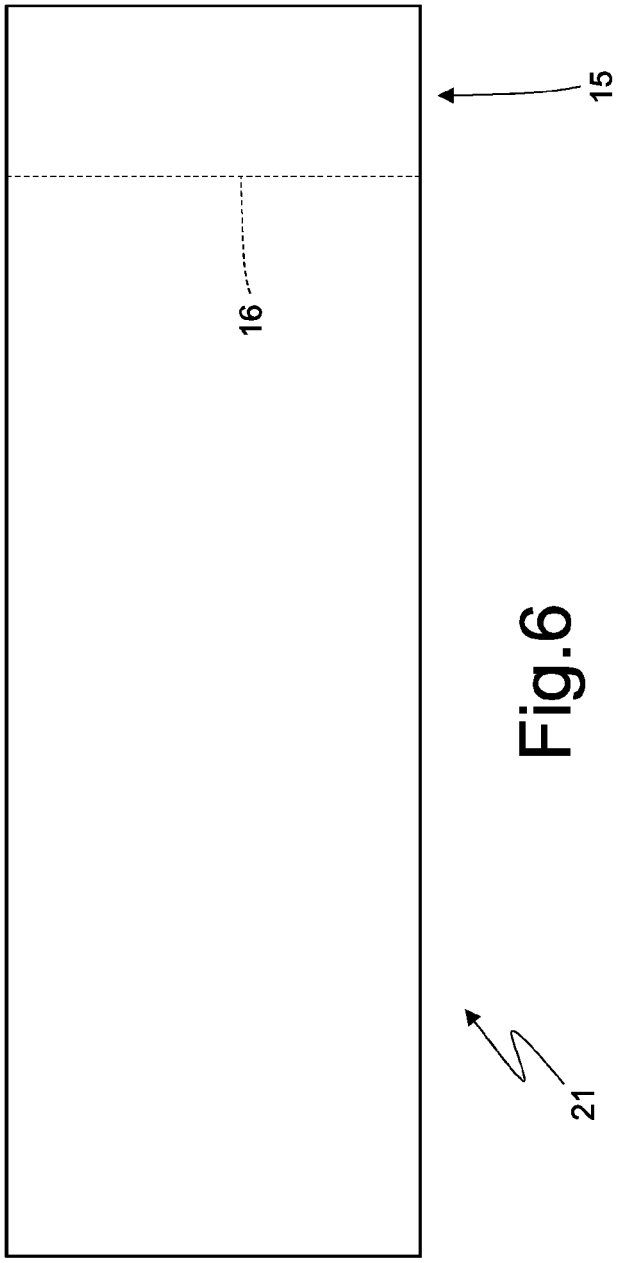


Fig.6

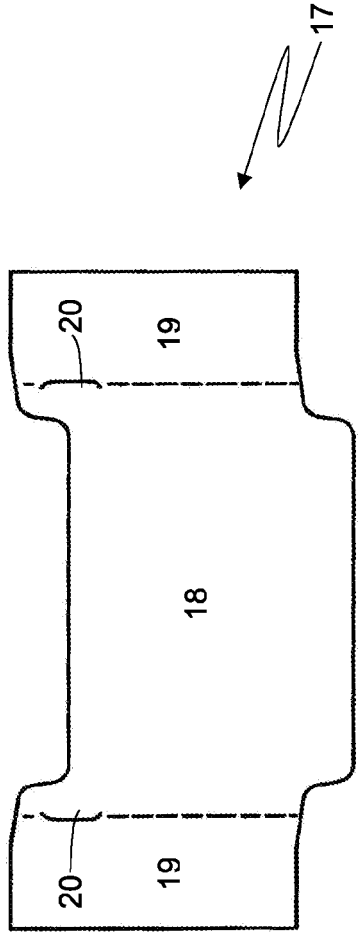


Fig.7

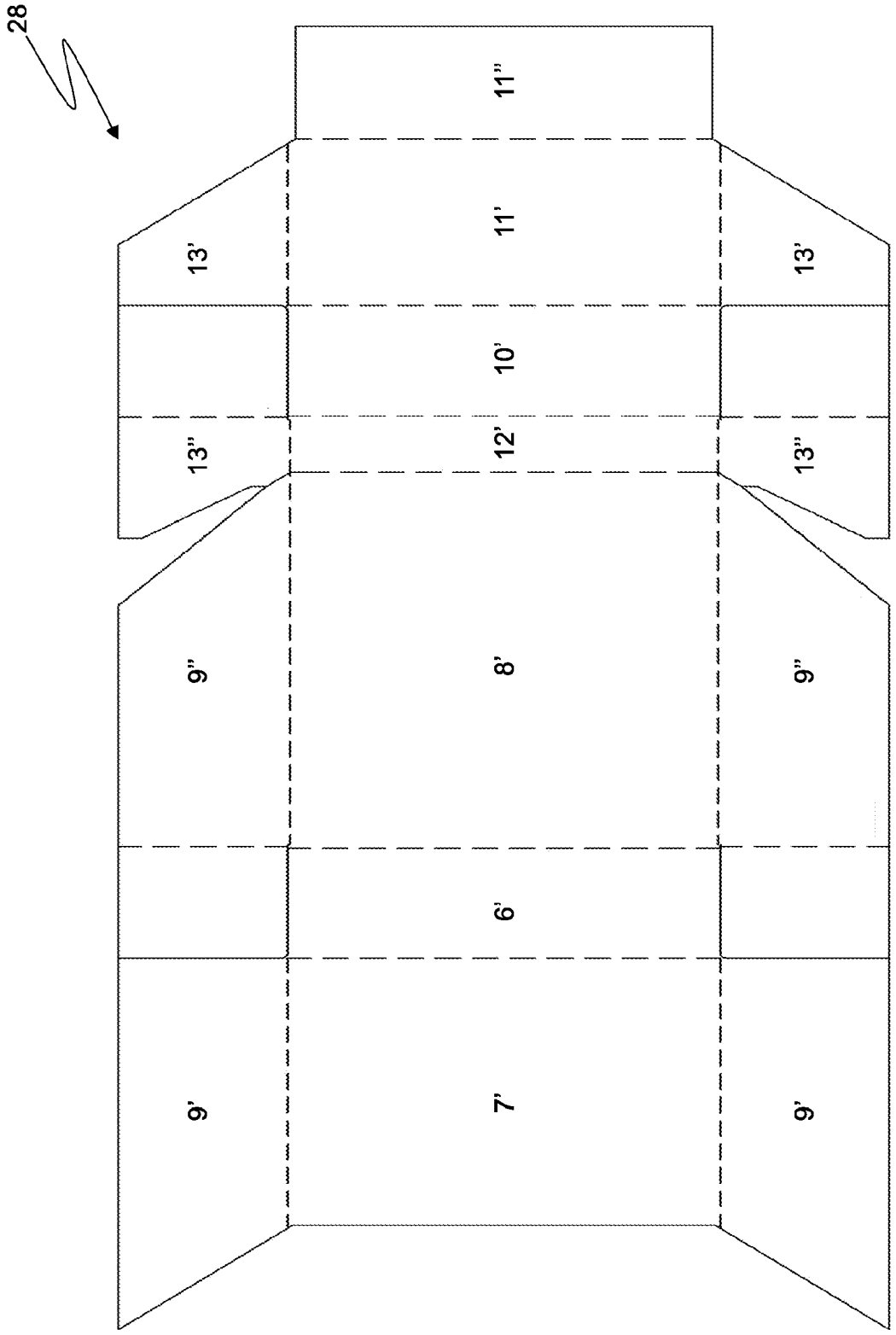


Fig.8

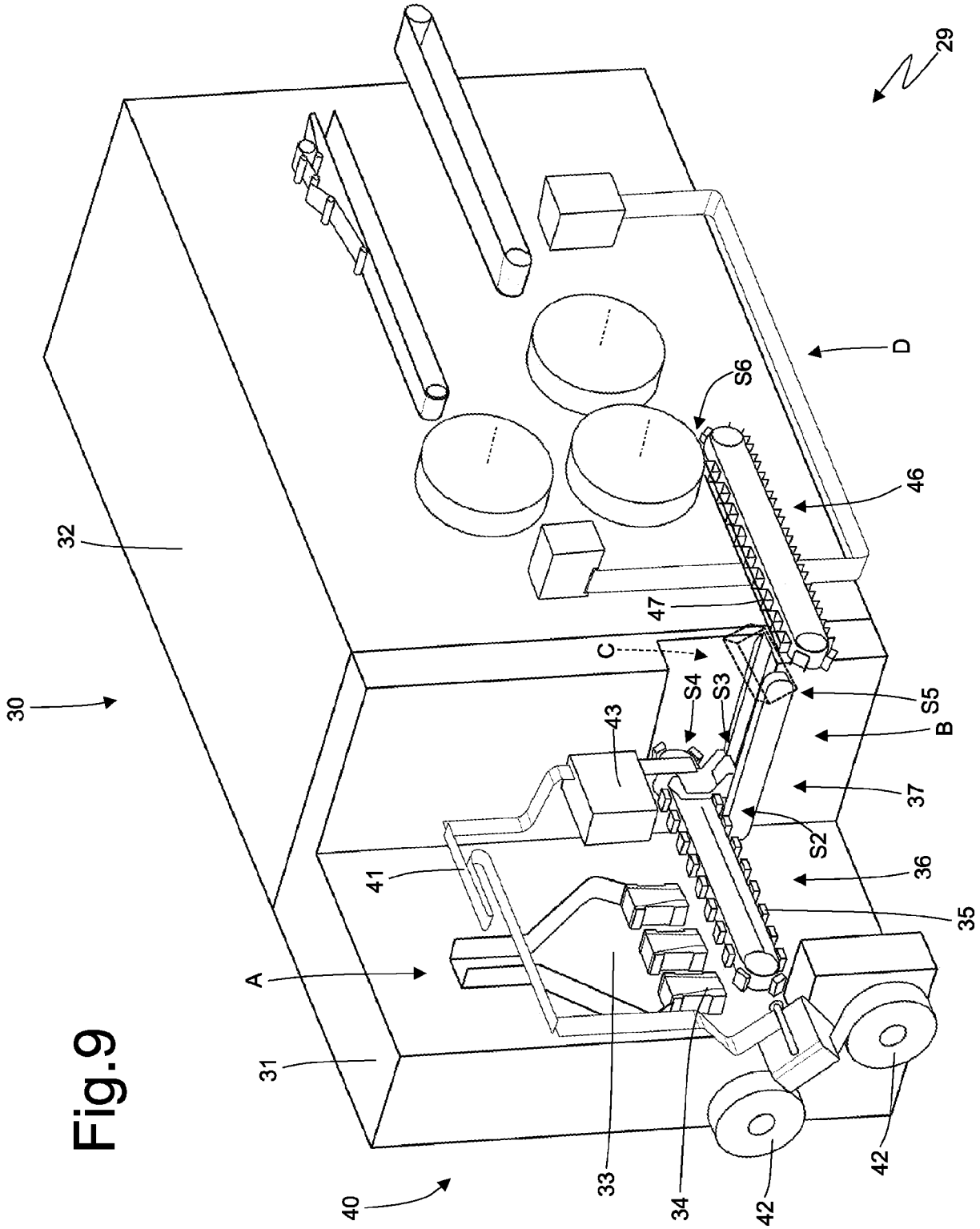


Fig.9

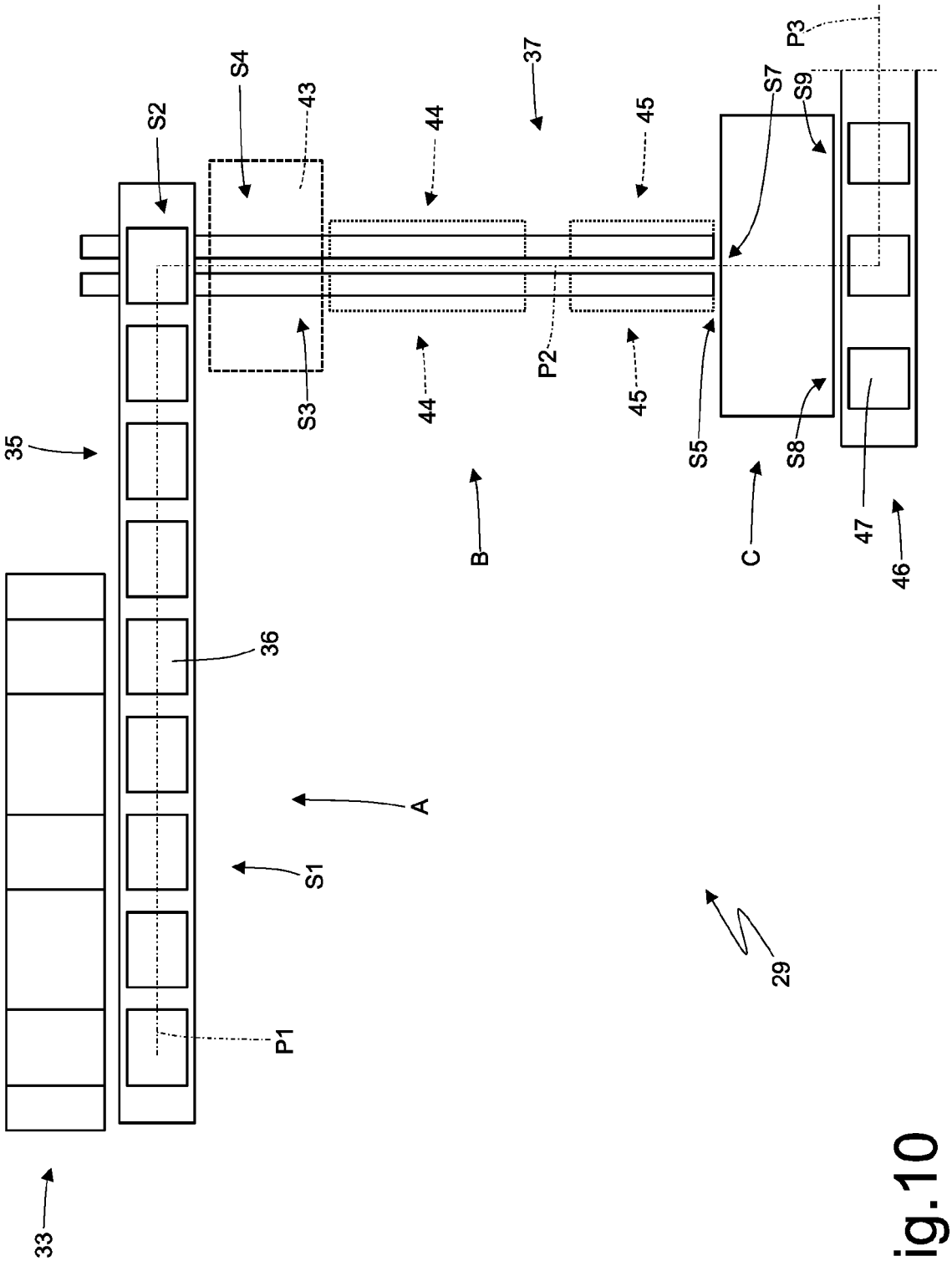


Fig.10

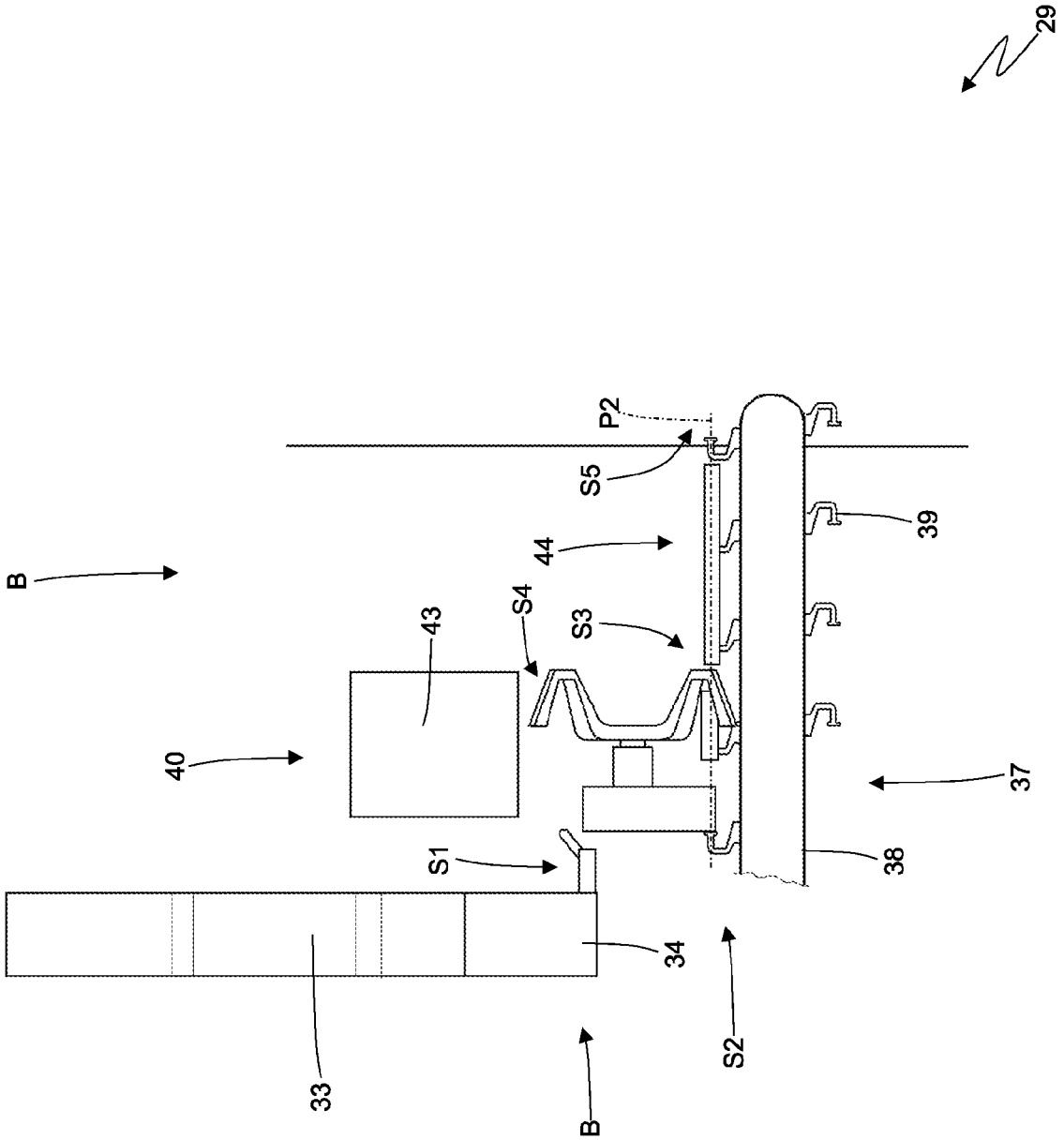


Fig.11

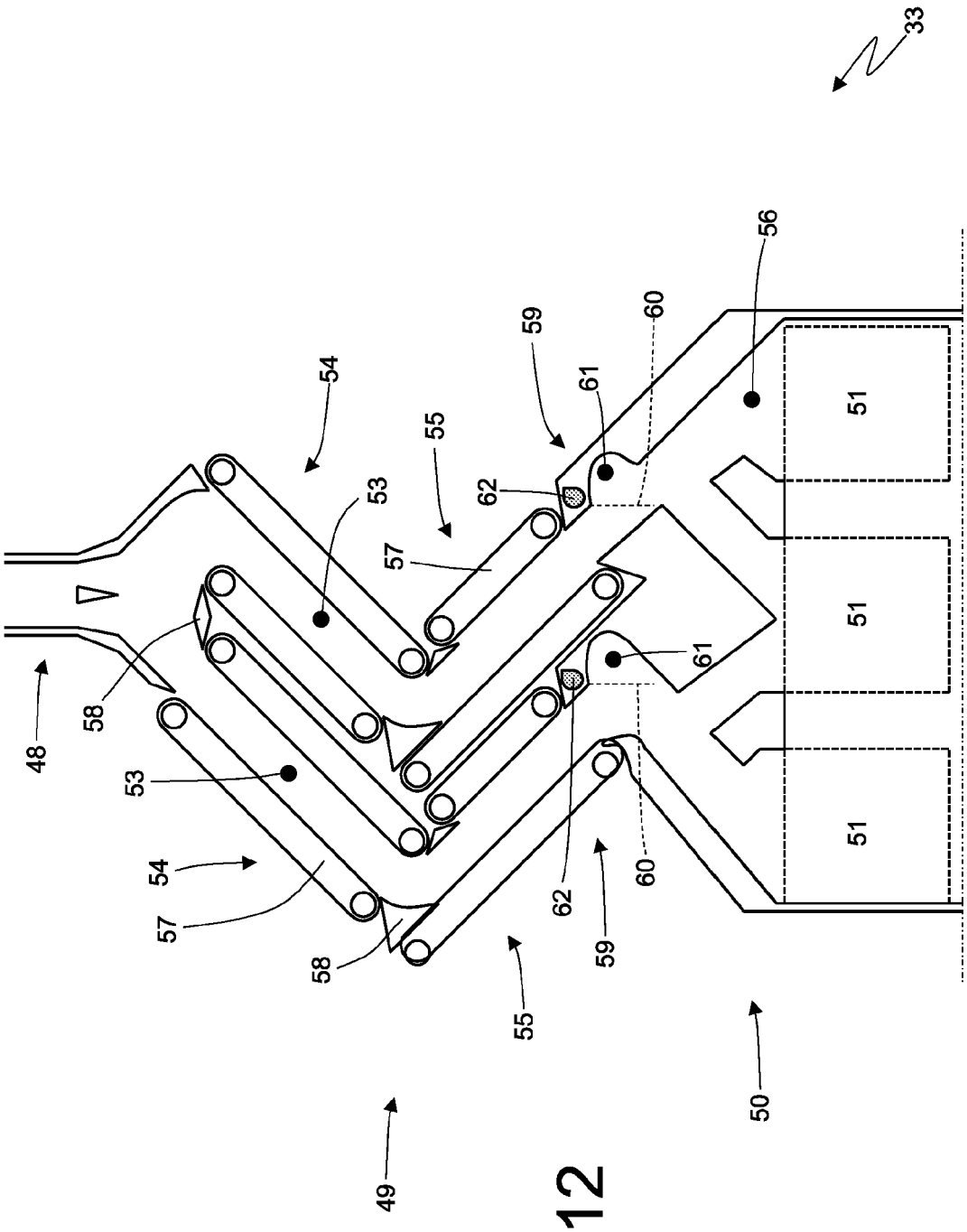

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Fig.12

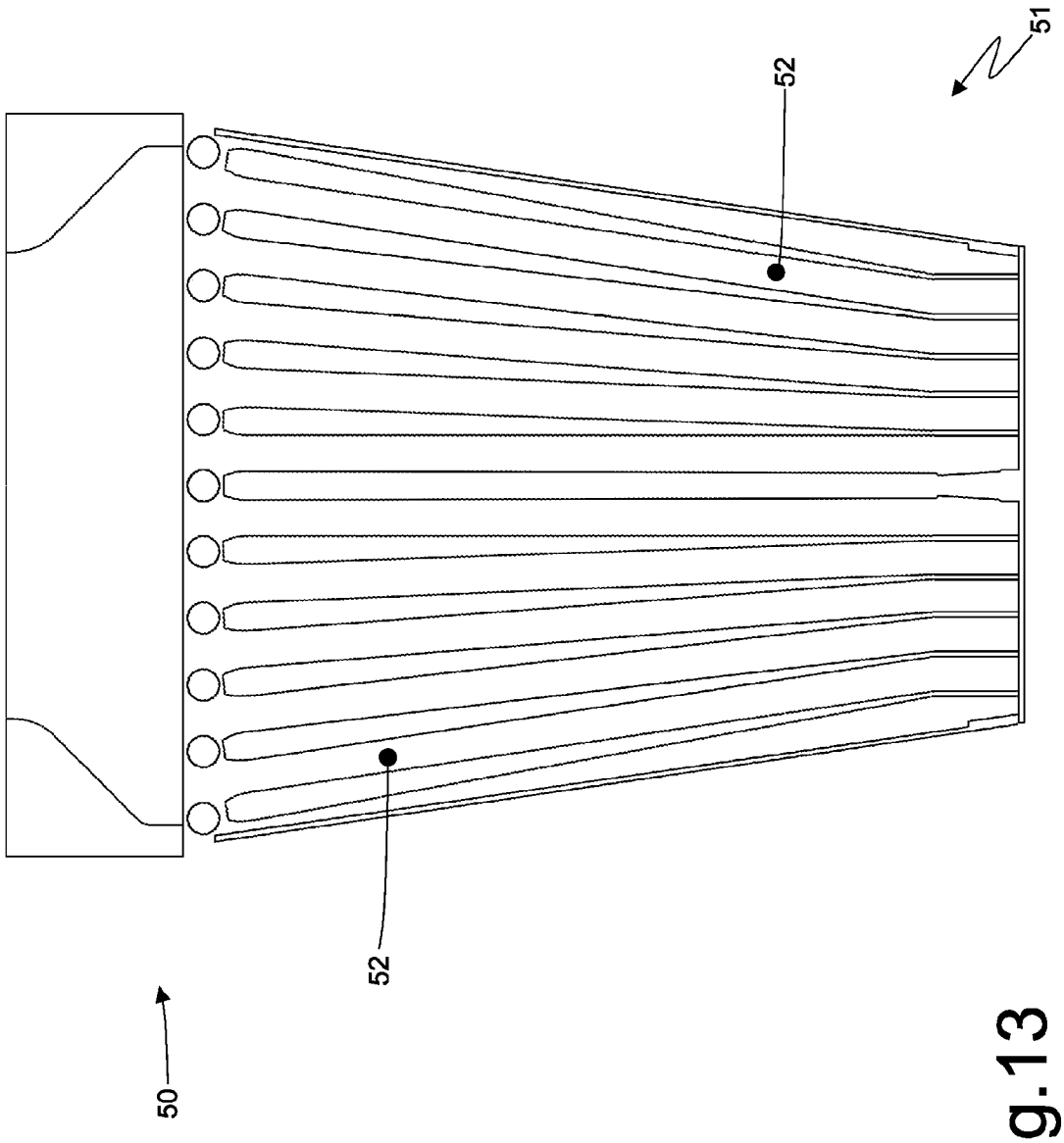


Fig.13

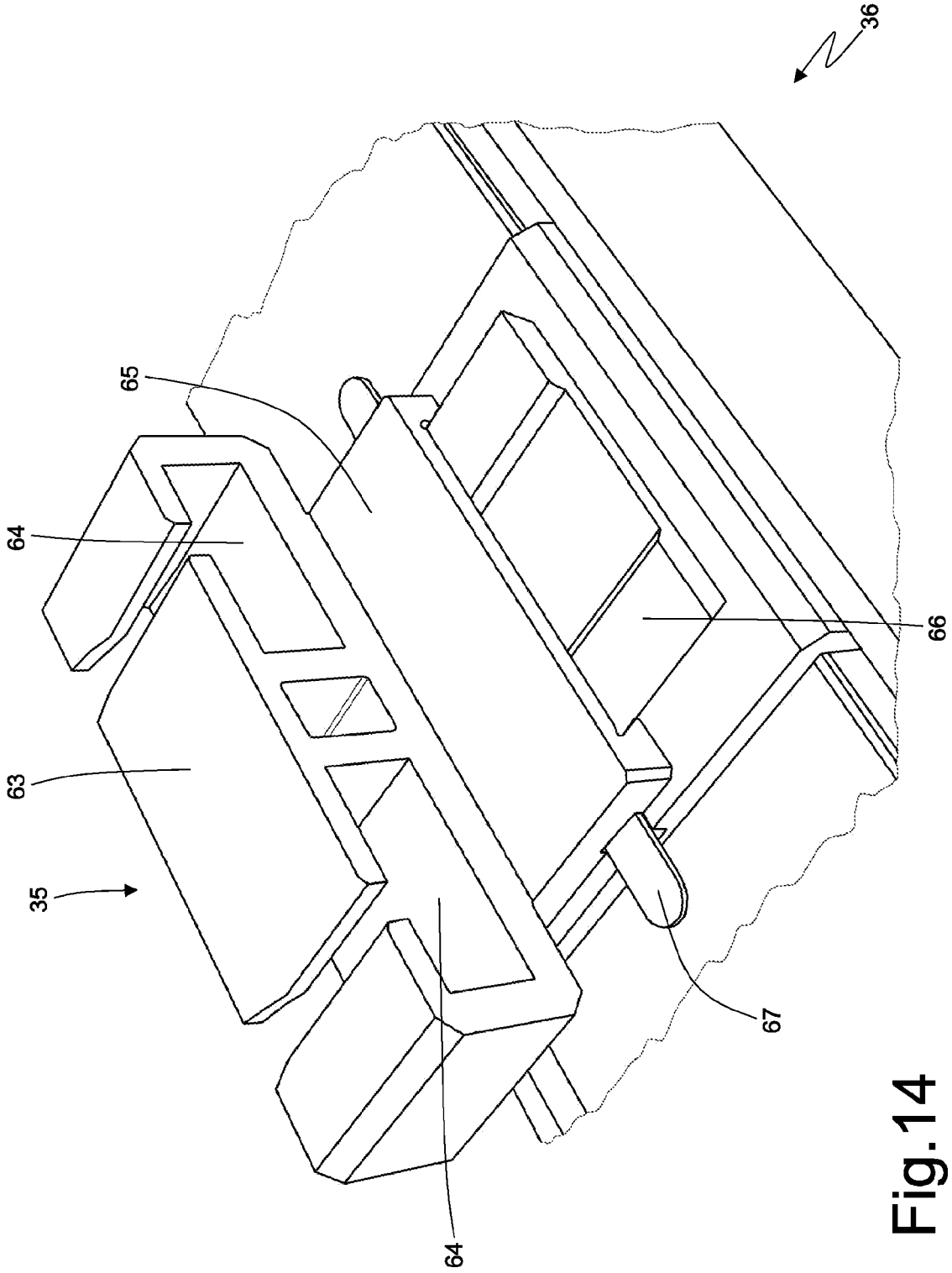


Fig.14

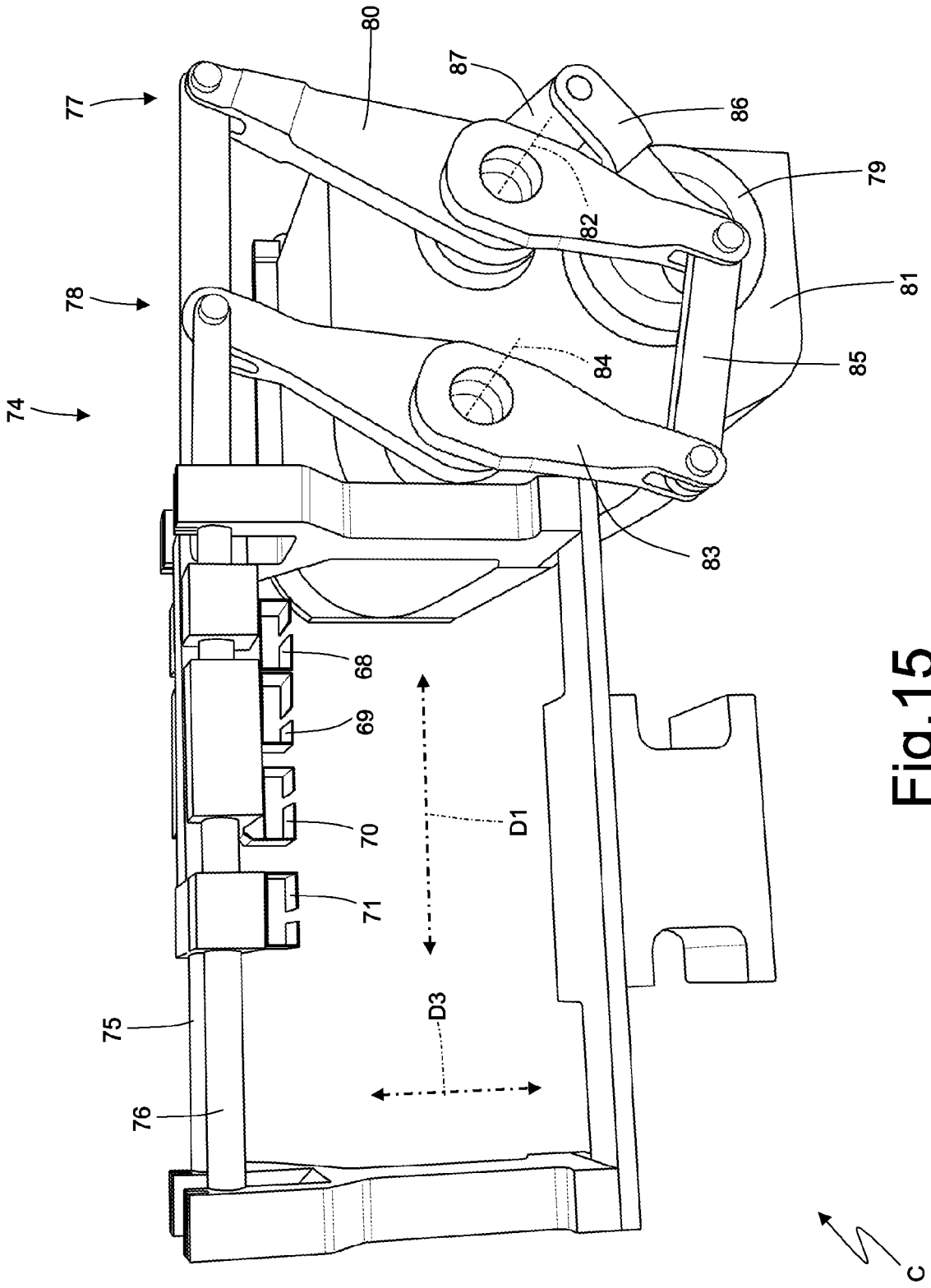
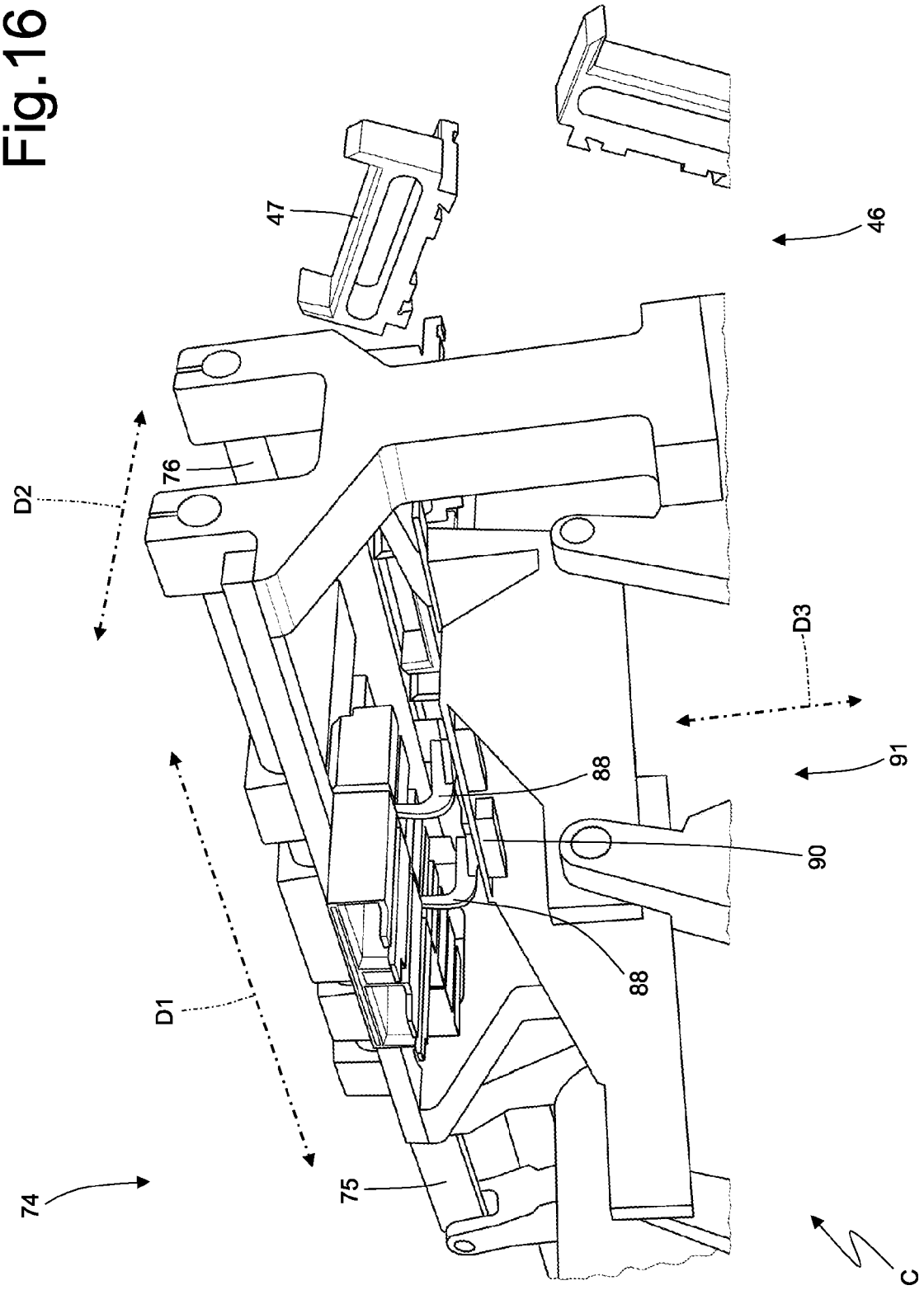


Fig.15

Fig.16



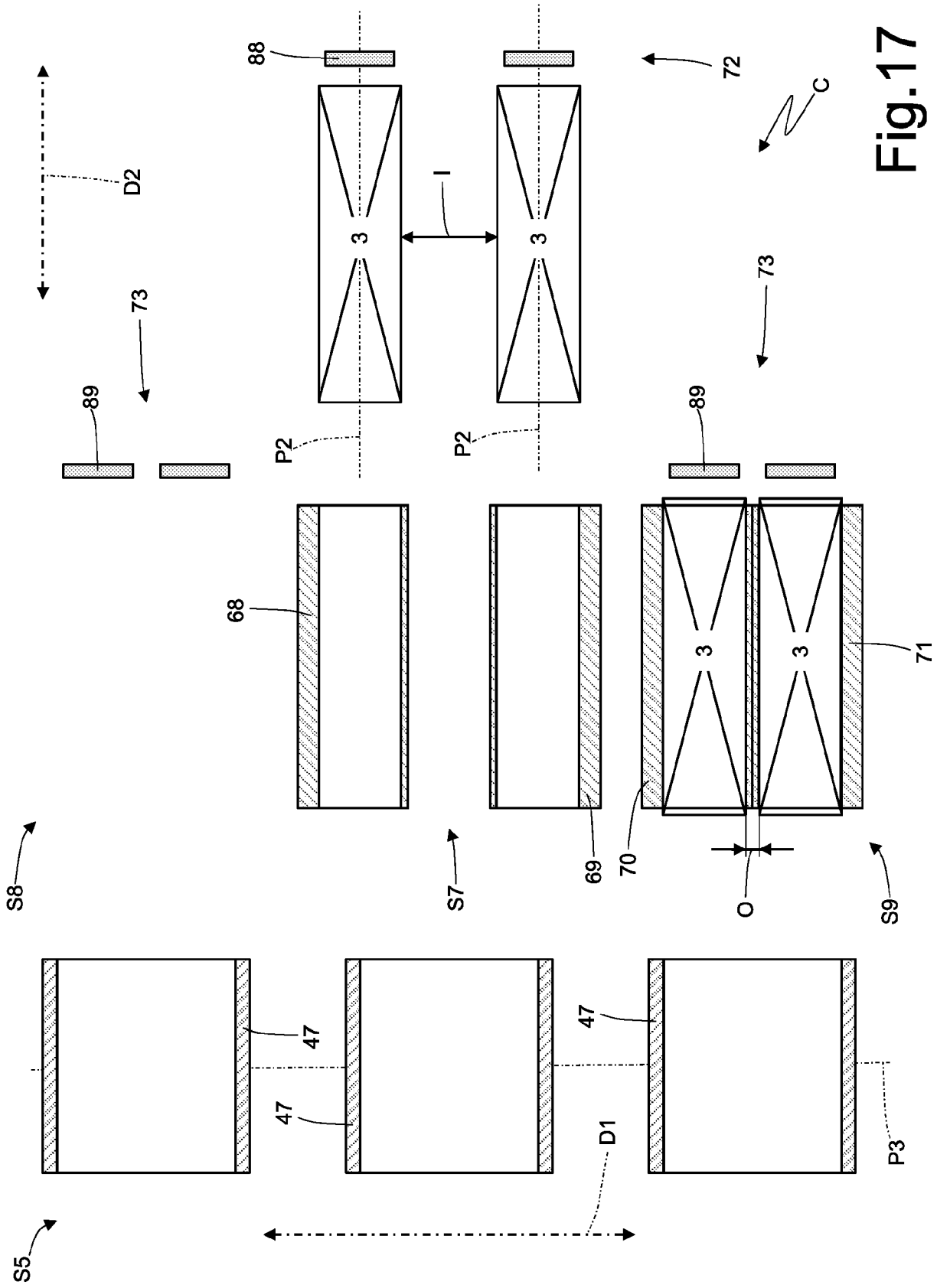

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Fig.17

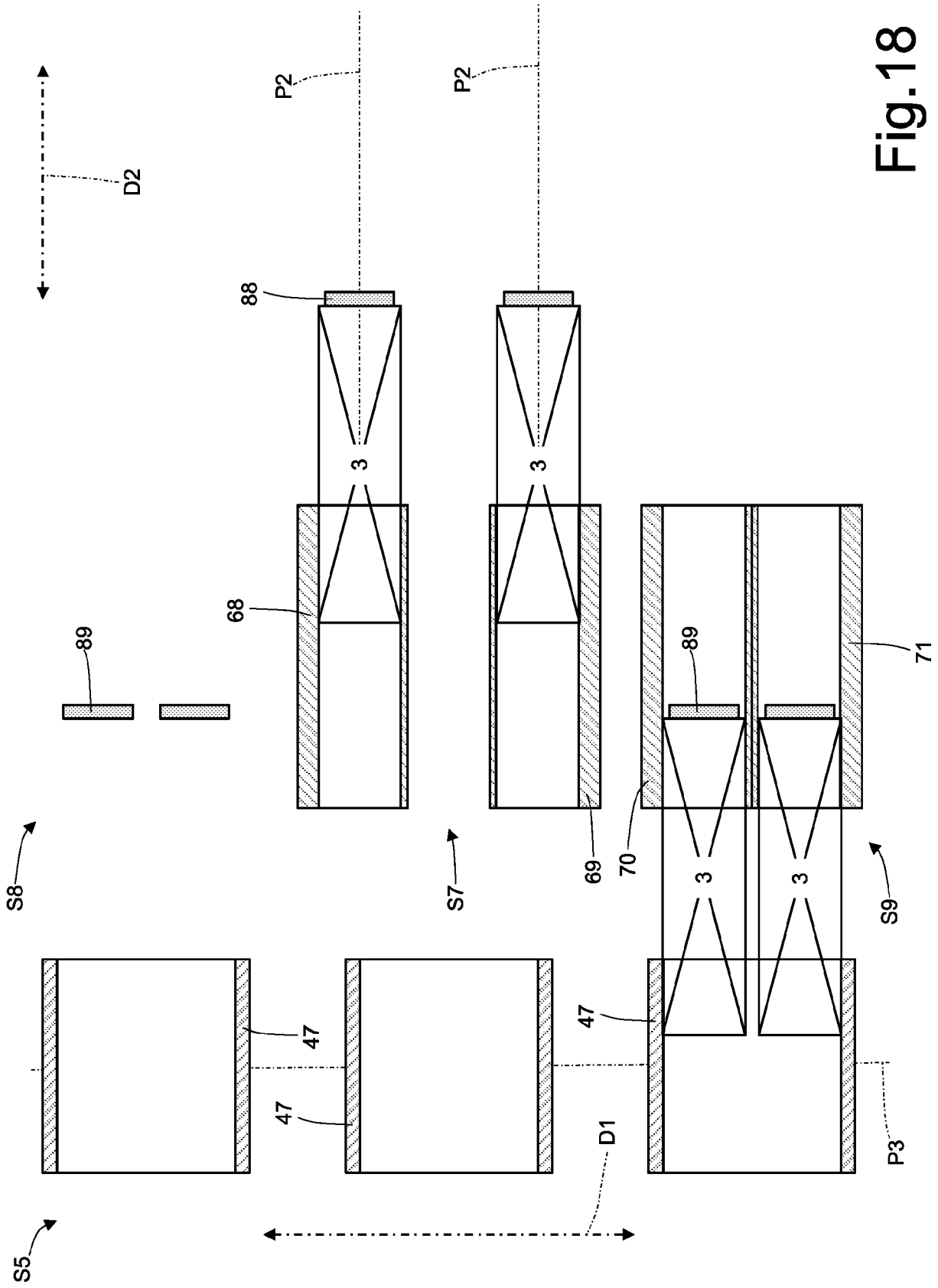

Fig.18

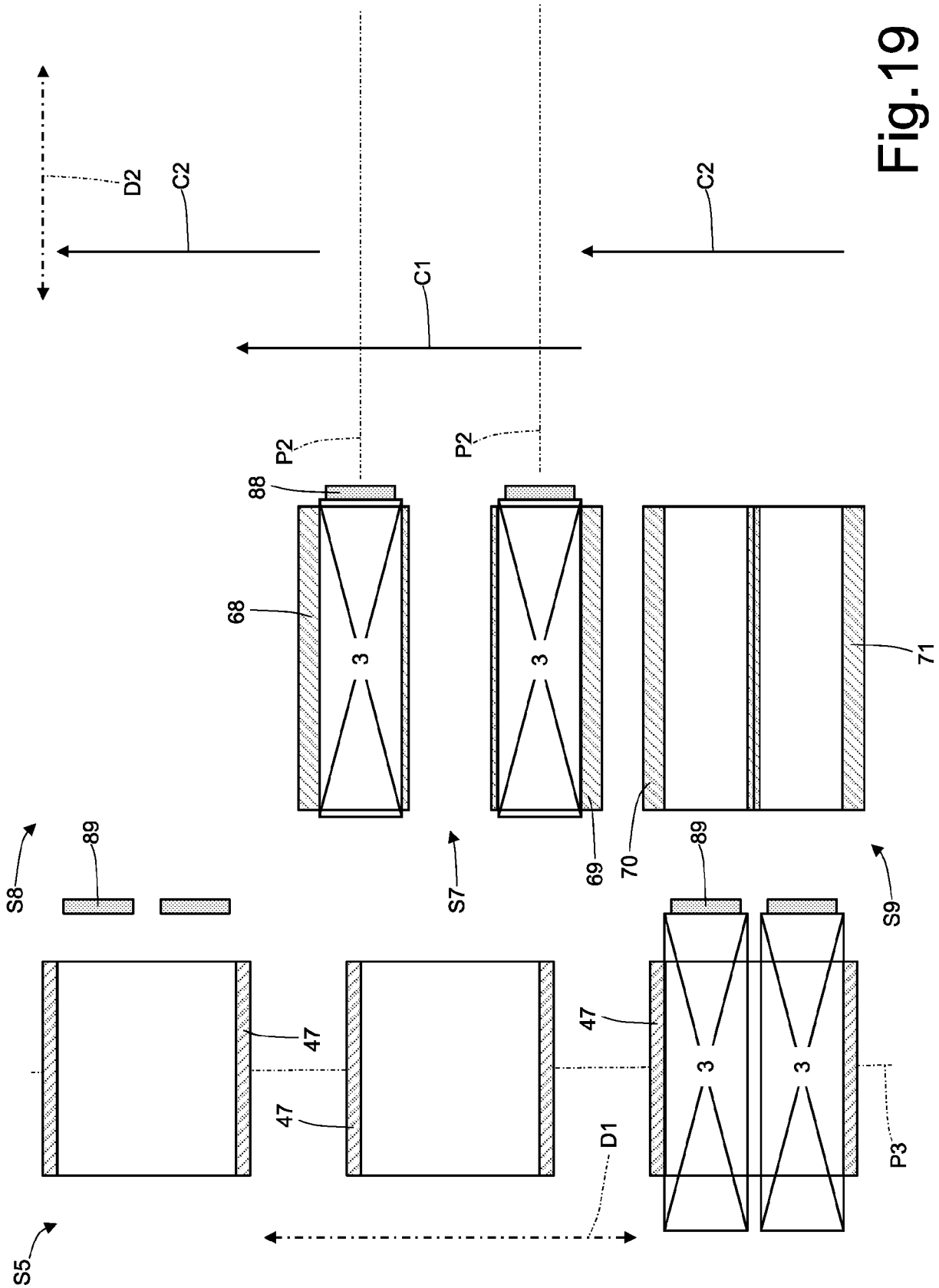

Fig.19

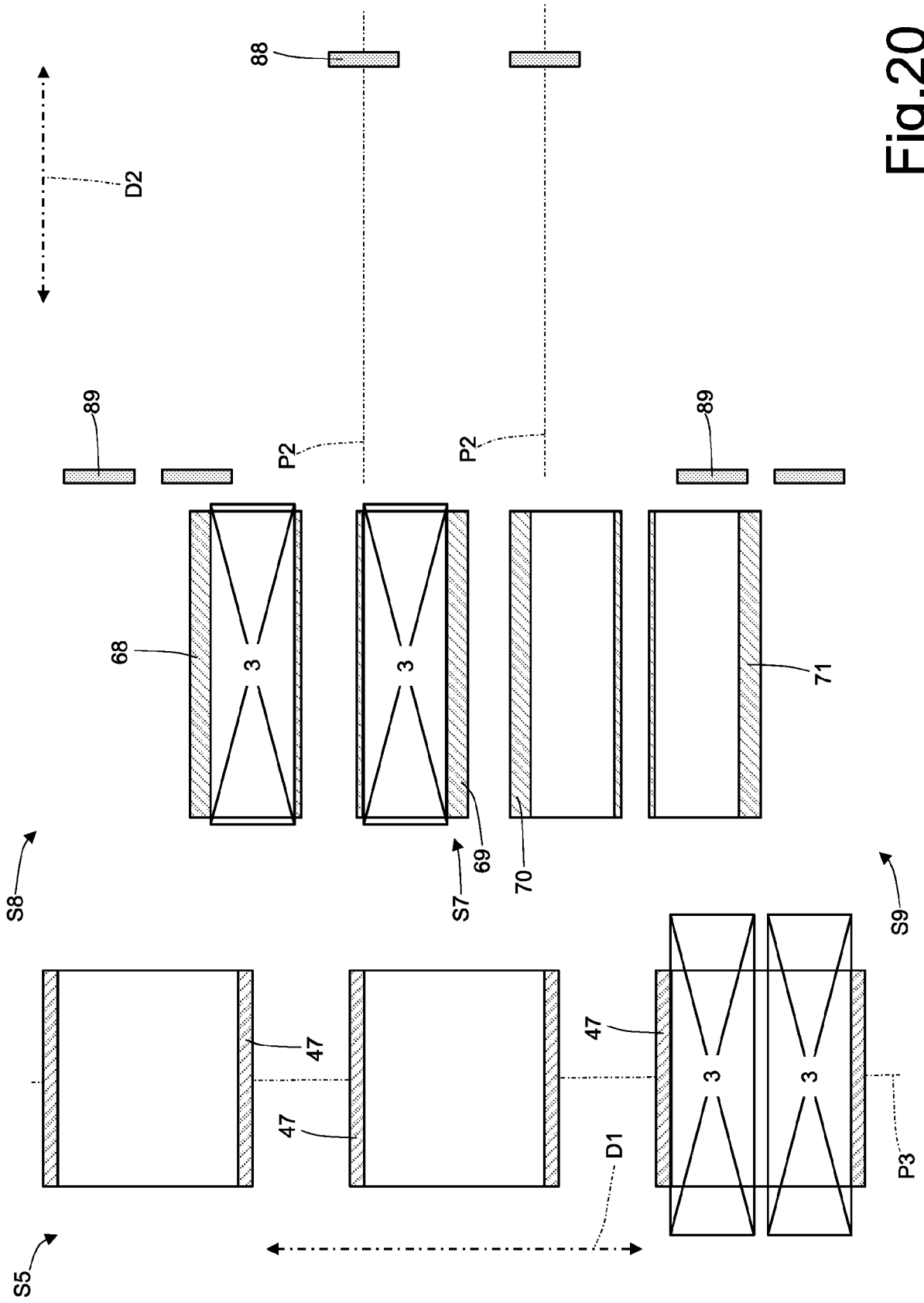

Fig.20

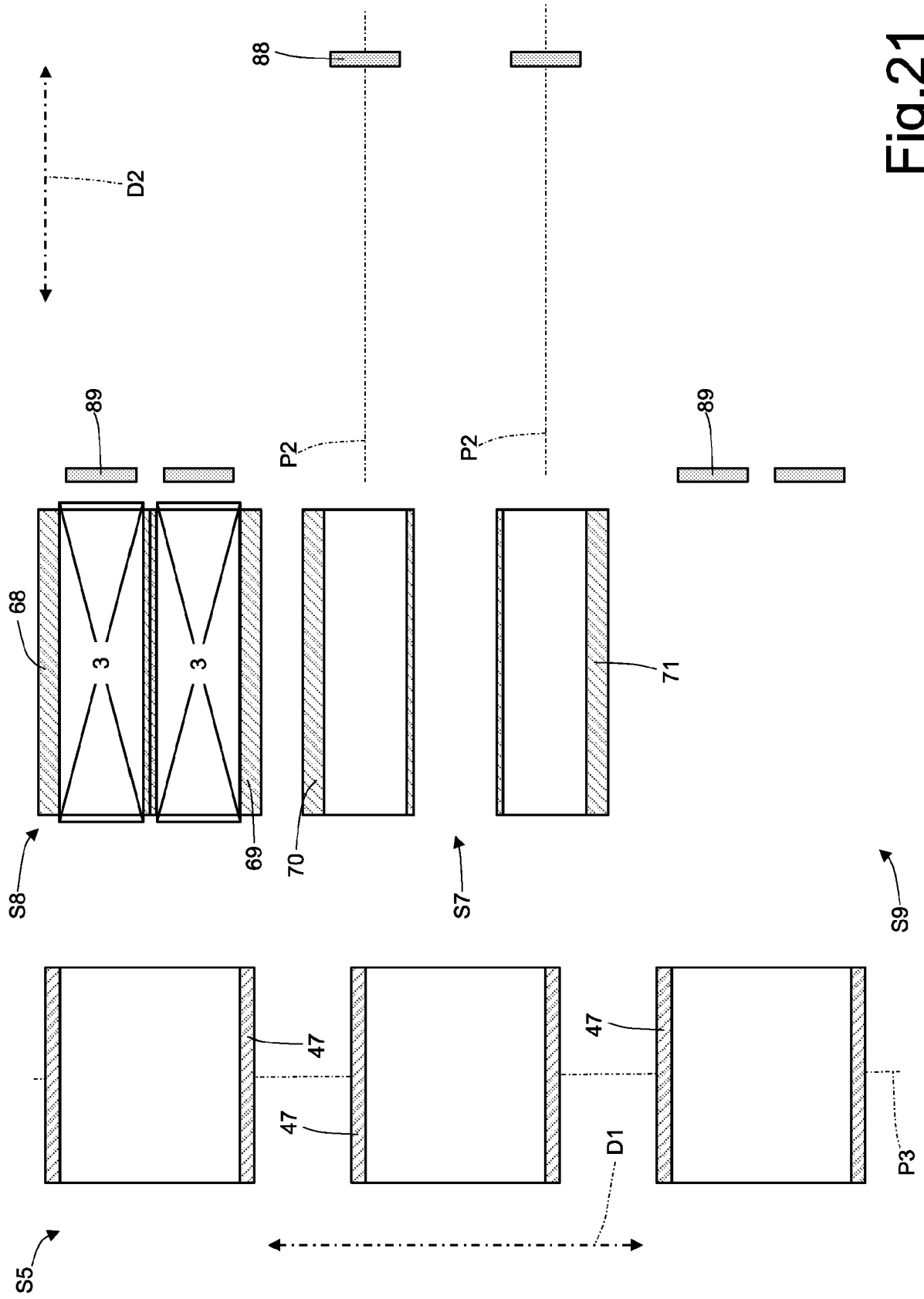

Fig.21

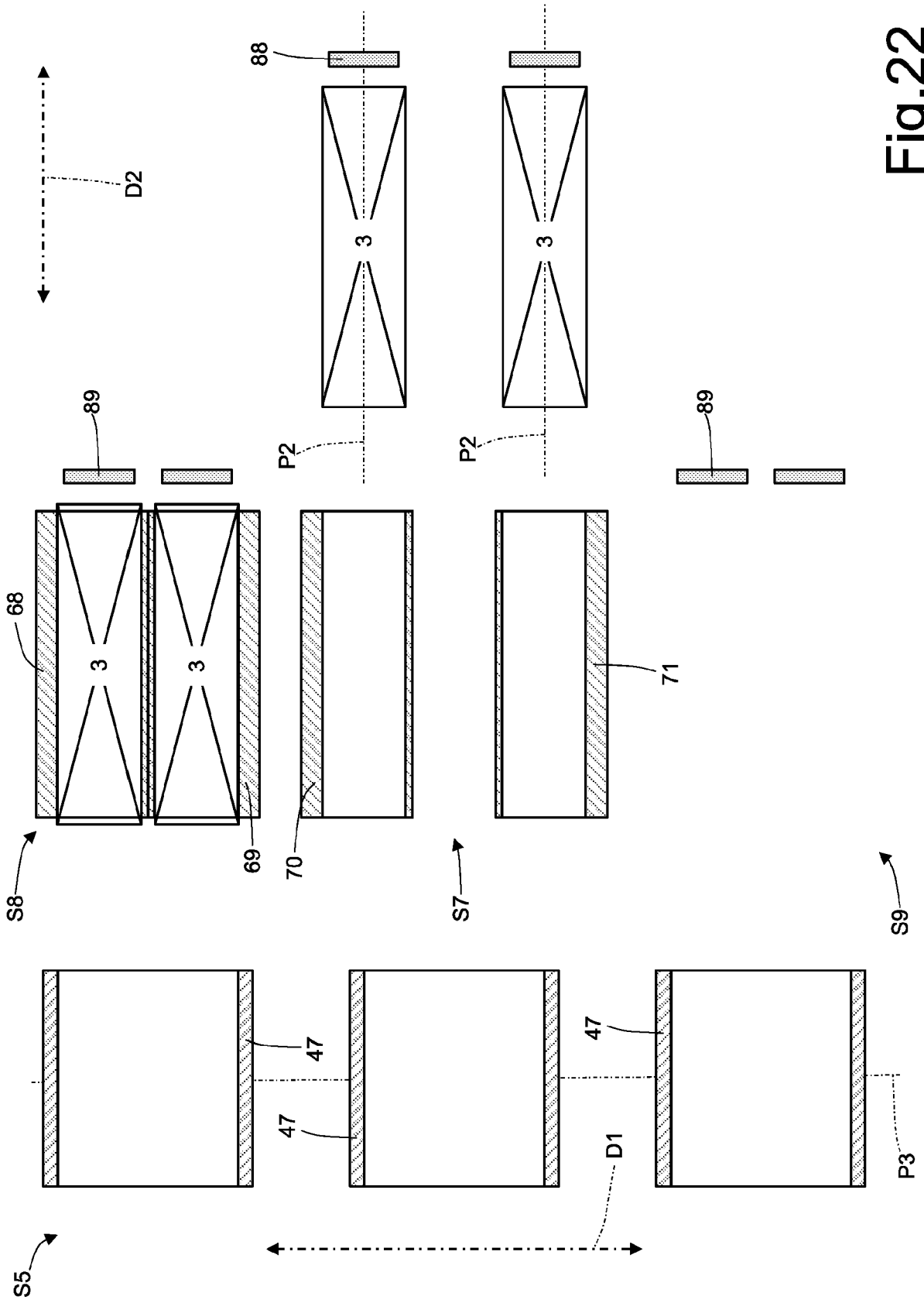

Fig.22

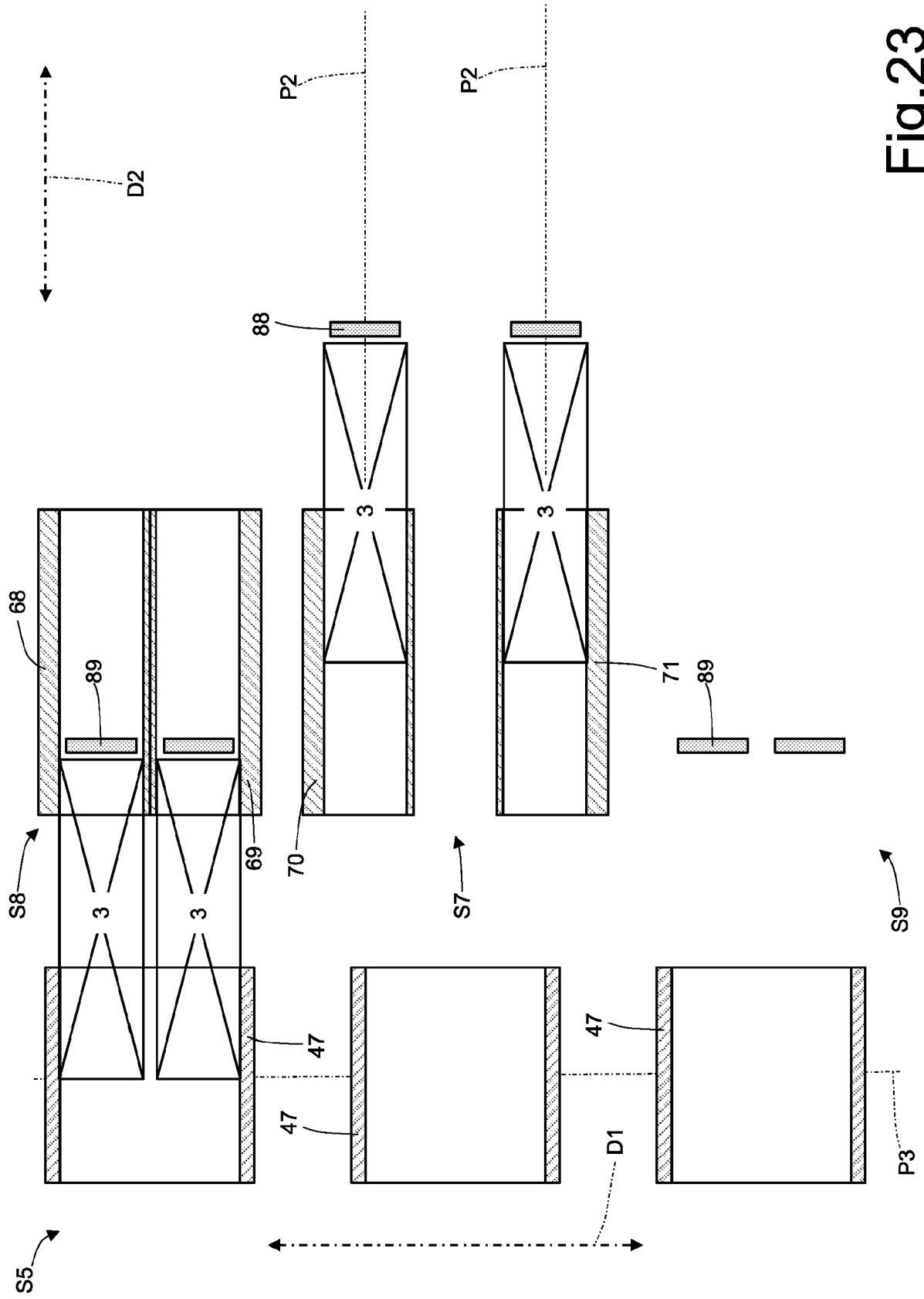

Fig.23

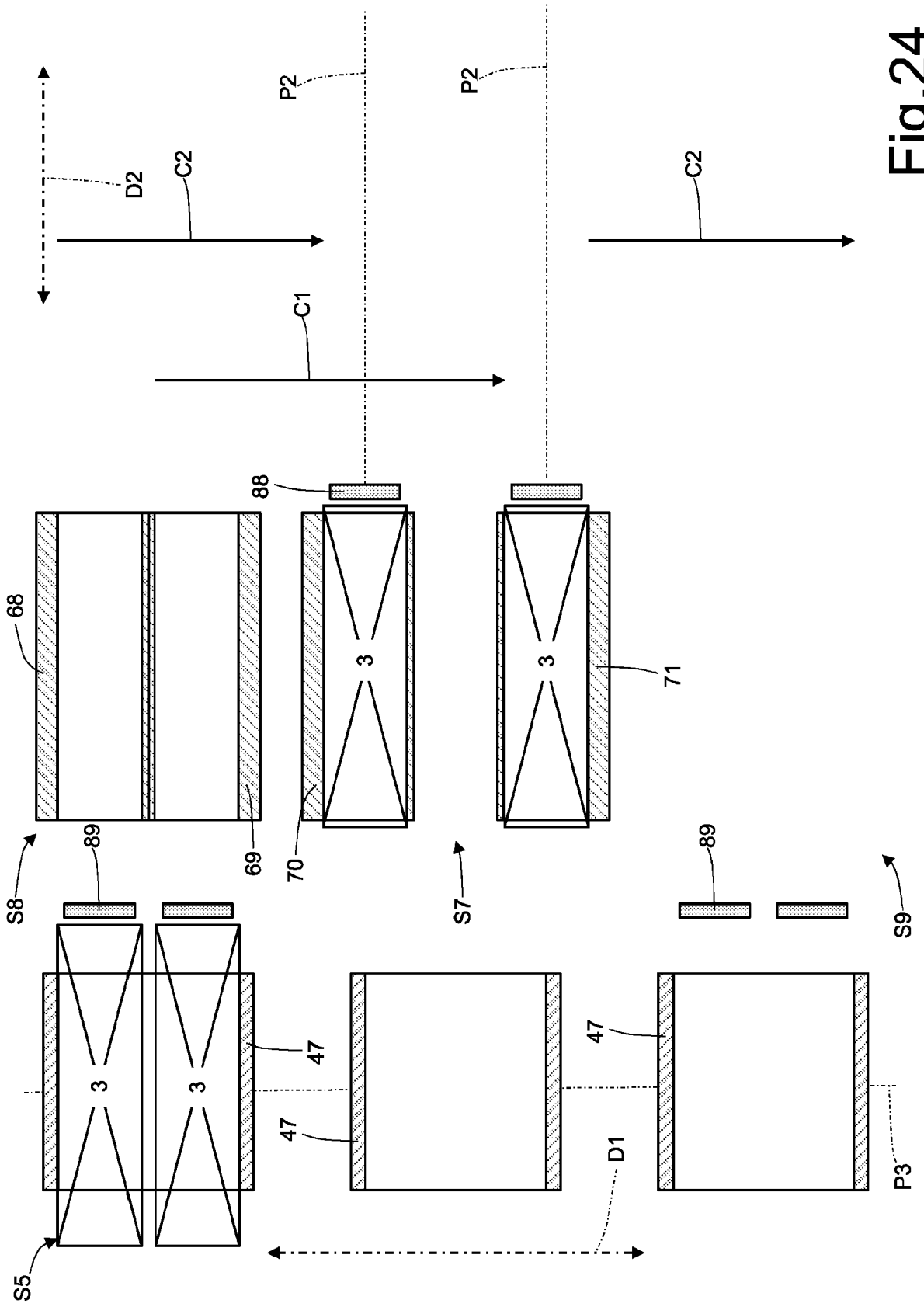

Fig.24

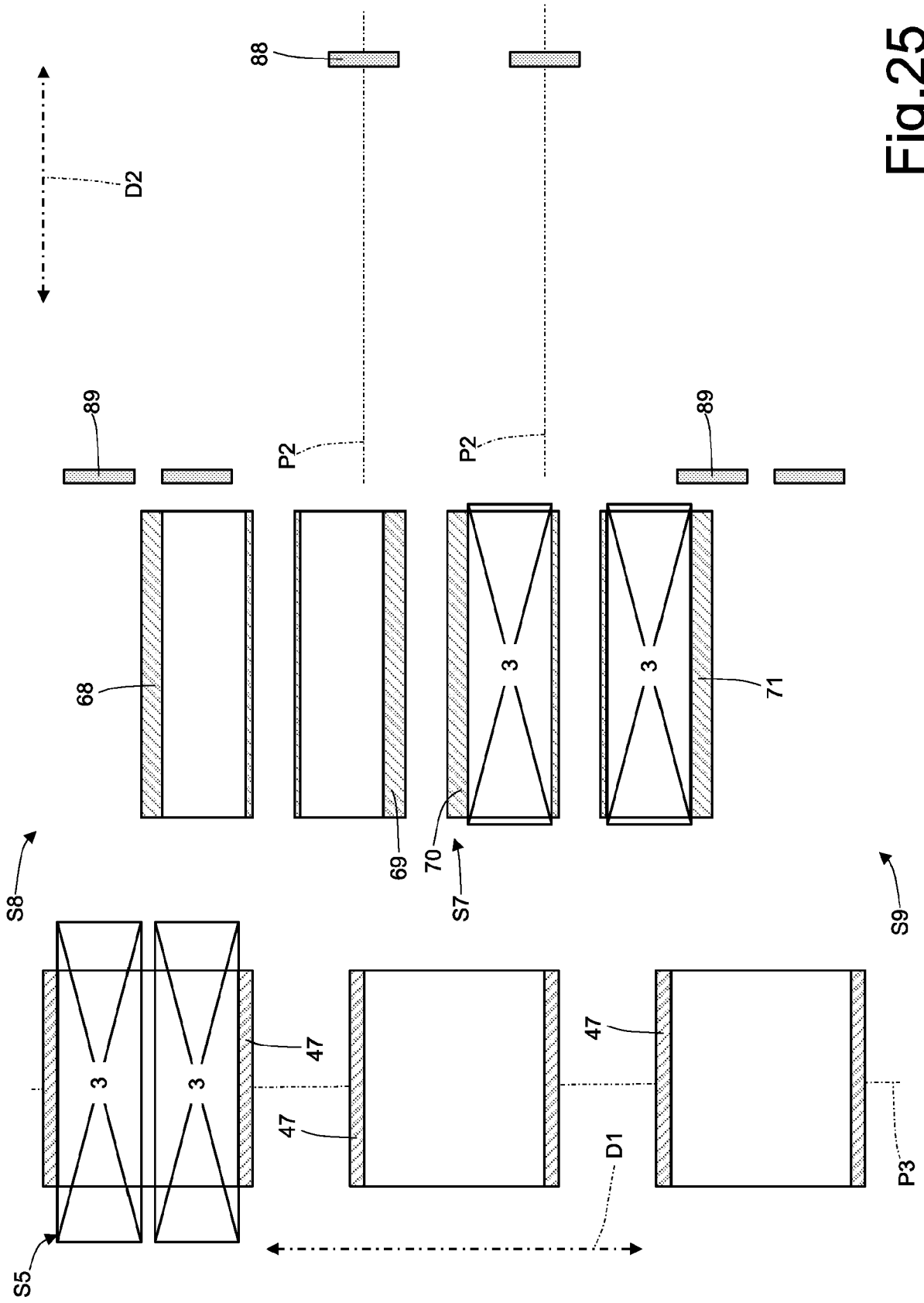

Fig.25

REFERENCES CITED IN THE DESCRIPTION

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