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(54) **Blank prefolding unit and method**

(57) A unit (1) and method for prefolding a blank (2); a packing pocket (7) of a packing conveyor (6) is stopped at an insertion station (S1) to receive the blank (2); a transfer device (12) transfers the blank (2), in a transfer direction (D), into the packing pocket (7) of the conveyor (6) stopped at the insertion station (S1), so that at least one end (4; 5) of the blank (2) projects from the packing

pocket (7); and at least one guide device (16), located in a fixed position directly downstream from the insertion station (S1) along the packing path (P), holds the end (4; 5) of the blank (2), projecting from the packing pocket (7), in a predetermined position as the packing conveyor (6) moves the packing pocket (7) out of the insertion station (S1) to a follow-up work station (S3, S4).

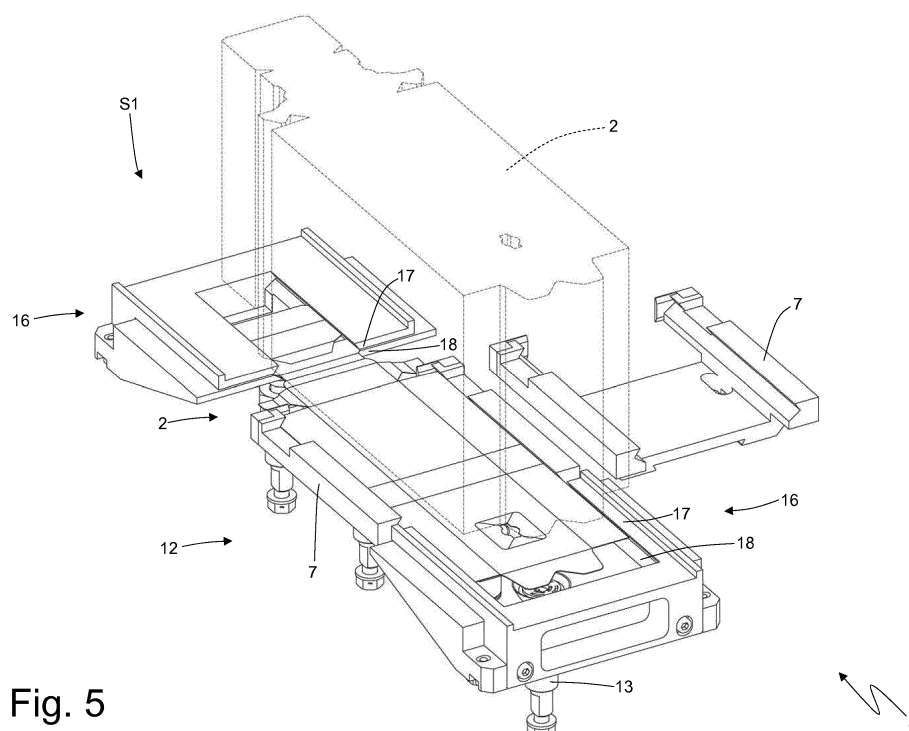


Fig. 5

Description

TECHNICAL FIELD

[0001] The present invention relates to a blank prefolding unit and method.

[0002] The present invention may be used to advantage for prefolding a cigarette packet blank at a packing conveyor of a cigarette packing machine, to which the following description refers purely by way of example.

BACKGROUND ART

[0003] Some cigarette packets are made from blanks with outer panels located at the ends of the blank, and which must be folded 180° and gummed onto corresponding inner panels. In which case, it has been proposed to prefold the outer panels of the blank, by means of a prepacking unit, before applying the blank to (i.e. folding the blank about) the group of cigarettes.

[0004] Known prepacking units comprise a packing conveyor with a number of packing pockets, each for housing and feeding a blank along a packing path between an insertion station and an output station. At the insertion station, a hopper containing a stack of blanks feeds the blanks cyclically from a bottom outlet into the packing pockets on the packing conveyor. More specifically, each blank at the bottom outlet of the hopper is withdrawn by a suction gripping head moving vertically up and down, and is deposited inside a packing pocket on the packing conveyor, arrested at the insertion station and aligned beneath the bottom outlet. The packing conveyor is equipped with at least one gumming device located along the packing path, downstream from the insertion station, and which gums at least one outer panel; and at least one folding device located downstream from the gumming device, along the packing path, and which folds the gummed outer panel to gum it onto a corresponding inner panel.

[0005] In a preferred embodiment, the blank is positioned inside the packing pocket so that at least one outer panel of the blank projects from the packing pocket. This makes the outer panel easier to fold later on using a fixed folding device, as the packing pocket travels along the packing path, as opposed to a movable folding device.

[0006] Known prepacking units of the above type, however, do not always provide for accurately folding the outer panels, and are subject to frequent stoppages due to jamming caused by the outer panel, projecting from the pocket, interacting wrongly with the gumming device and/or folding device.

[0007] Patent Application GB1571465A describes a blank transfer conveyor equipped with a succession of pockets, each for retaining a respective blank. At an insertion station, each transfer conveyor pocket is stopped to receive a respective blank from a hopper over the transfer conveyor; and, once inserted inside the transfer conveyor pocket, each blank is fed in steps to an output

station where the blank is expelled and continues on to a packing station. Between the insertion station and the output station, each blank undergoes no packing or gumming work.

DESCRIPTION OF THE INVENTION

[0008] It is an object of the present invention to provide a blank prefolding unit and method designed to eliminate the above drawbacks, and which, in particular, are cheap and easy to implement.

[0009] According to the present invention, there are provided a blank prefolding unit and method as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the attached drawings, in which:

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a prefolding unit forming part of a cigarette packing machine and in accordance with the present invention;

Figure 2 shows a plan view of a blank, which is folded on the Figure 1 prefolding unit;

Figure 3 shows a schematic side view, with parts removed for clarity, of a feed station of the Figure 1 prefolding unit;

Figures 4 and 5 show two schematic views in perspective, with parts removed for clarity, of the Figure 3 feed station;

Figure 6 shows a schematic section, with parts removed for clarity, of a guide device of the Figure 1 prefolding unit.

PREFERRED EMBODIMENTS OF THE INVENTION

[0011] Number 1 in Figure 1 indicates as a whole a prefolding (prepacking) unit forming part of a cigarette packing machine, and which provides for prefolding a blank 2 (shown more clearly in Figure 2) from which to form a packet of cigarettes.

[0012] As shown in Figure 2, blank 2 comprises inner panels 3; outer panels 4 at the left-hand end of inner panels 3; and an outer panel 5 at the right-hand end of inner panels 3. In other words, outer panels 4 and 5 are located at opposite ends of inner panels 3. And prefolding unit 1 provides for folding 180° and gumming some of outer panels 4 and 5 onto corresponding inner panels 3.

[0013] As shown in Figure 1, prefolding unit 1 comprises a packing conveyor 6, which moves in steps (i.e. cyclically alternating stop-go steps) along a packing path P. Packing conveyor 6 comprises a number of packing pockets 7, each for housing and feeding a blank 2 along packing path P, which extends between an insertion station S1, where a feed unit 8 inserts blanks 2 successively

inside packing pockets 7, and an output station S2, where the partly folded blanks 2 are expelled from packing pockets 7 and fed to a follow-up packing unit. Packing conveyor 6 is a belt conveyor, and comprises a flexible belt 9 fitted with packing pockets 7 and looped endlessly about two end pulleys 10.

[0014] Feed unit 8 is located at insertion station S1 and comprises a hopper 11, which contains a stack of blanks 2 and has a bottom outlet facing packing pocket 7 of packing conveyor 6 stopped at insertion station S1. As shown in Figure 3, feed unit 8 comprises a transfer device 12, which withdraws each blank 2 at the bottom outlet of hopper 11, and inserts blank 2 into a packing pocket 7 of packing conveyor 6 stopped at insertion station S1 and aligned beneath the bottom outlet. Transfer device 12 comprises a number of suction gripping heads 13 fitted to a shared support, which moves up and down in a vertical transfer direction D perpendicular to packing path P. In other words, suction gripping heads 13 of transfer device 12 move up and down, in transfer direction D, between insertion station S1 and a pickup station located over insertion station S1 and defined by the bottom outlet of hopper 11.

[0015] As shown in Figure 1, packing conveyor 6 is equipped with a gumming device 14 located at a work station S3 downstream from insertion station S1 along packing path P, to deposit gum on some of outer panels 4, 5 of each blank 2; and a folding device 15 located at a work station S4 downstream from gumming device 14 along packing path P, to fold 180° and gum the gummed outer panels 4 and 5 of each blank 2 onto corresponding inner panels 3. The Figure 1 embodiment only has two work stations S3 and S4, though other embodiments not shown may obviously comprise additional work stations for performing additional gumming and/or folding operations on blanks 2.

[0016] As shown in Figures 3 and 5, each blank 2 is positioned inside respective packing pocket 7 so that outer panels 4 and 5 (forming the opposite ends of blank 2) project from opposite sides of packing pocket 7. This makes outer panels 4 and 5 easier to fold later on using fixed folding devices, as packing pocket 7 travels along packing path P, as opposed to movable folding devices.

[0017] As shown in Figures 3-6, prefolding unit 1 comprises two guide devices 16 located at insertion station S1, in fixed positions on opposite sides of the stationary pocket 7, and by which the corresponding outer panels 4, 5 of blank 2 projecting from pocket 7 (and forming the opposite ends of blank 2) are maintained in predetermined positions as conveyor 6 moves pocket 7 out of insertion station S1. In other words, each guide device 16 is located in a fixed position directly downstream from insertion station S1 along packing path P of conveyor 6, and, as conveyor 6 moves pocket 7 out of insertion station S1, provides for maintaining in a predetermined position the corresponding outer panels 4 or outer panel 5 of blank 2 projecting from pocket 7. It is important to note that each guide device 16 is located in a fixed position be-

tween insertion station S1 (i.e. directly downstream from insertion station S1 along packing path P) and work station S3 (i.e. directly upstream from work station S3 along packing path P). Each guide device 16 comprises a top guide member 17 located above packing path P of conveyor 6 to prevent the corresponding outer panels 4 or outer panel 5 of blank 2, projecting from pocket 7, from lifting up with respect to packing path P as conveyor 6 moves pocket 7 out of insertion station S1; and a bottom guide member 18 located below packing path P of conveyor 6 to prevent the corresponding outer panels 4 or outer panel 5 of blank 2, projecting from pocket 7, from dropping with respect to packing path P of conveyor 6 as conveyor 6 moves pocket 7 out of insertion station S1. Top guide member 17 and bottom guide member 18 of each guide device 16 are located above and below packing path P of conveyor 6, and define a gap 19 through which corresponding outer panels 4 or outer panel 5, projecting from pocket 7, travel as conveyor 6 moves pocket 7 out of insertion station S1.

[0018] In a preferred embodiment shown more clearly in Figure 6, guide members 17 and 18 of each guide device are triangular on the side facing insertion station S1, so an inlet portion of gap 19 decreases gradually in size (i.e. is 'funnel-shaped') to act as a lead-in for the corresponding outer panels 4 or outer panel 5 of blank 2 projecting from pocket 7.

[0019] In a preferred embodiment shown in Figures 4 and 5, each guide device 16 is U-shaped, i.e. top and bottom guide members 17 and 18 are U-shaped to define between them a gap 19 located downstream from insertion station S1 along packing path P of conveyor 6, and a gap 19 located upstream from insertion station S1 along packing path P of the conveyor. Obviously, the gap 19 upstream from insertion station S1 along packing path P of the conveyor is of 'no use', in that, upstream from insertion station S1, packing pockets 7 contain no blanks 2. But the symmetrical U-shape of guide devices 16 simplifies and strengthens assembly of guide devices 16 to the packing machine frame.

[0020] Operation of prefolding unit 1 will now be described, particularly as regards feeding a blank 2 into a packing pocket 7 of packing conveyor 6. To begin with, packing conveyor 6 moves one step forward along packing path P to move packing pocket 7 into insertion station S1, and then stops for a given length of time to arrest packing pocket 7 at insertion station S1. When packing pocket 7 is arrested at insertion station S1, suction gripping heads 13 of transfer device 12 (which are initially positioned beneath packing pocket 7, as shown in Figures 3 and 4) move up and down together in transfer direction D to withdraw blank 2 from the pickup station located over insertion station S1 and defined by the bottom outlet of hopper 11, and to insert blank 2 into packing pocket 7 arrested at insertion station S1. When blank 2 is inserted inside packing pocket 7 arrested at insertion station S1, the outer panels 4, 5 of blank 2 (forming the opposite ends of blank 2) project from opposite sides of

packing pocket 7 (as shown in Figures 3 and 5).

[0021] Once blank 2 is inserted inside packing pocket 7 arrested at insertion station S1, packing conveyor 6 moves forward another step along packing path P to move packing pocket 7 containing blank 2 out of insertion station S1, to move another empty packing pocket 7 into insertion station S1, and to move packing pocket 7 containing blank 2 into work station

[0022] S3 (where blank 2 is gummed by gumming device 14). As packing pocket 7 containing blank 2 moves out of insertion station S1 (i.e. before blank 2 reaches work station S3), at least some of outer panels 4, 5 of blank 2 (forming the opposite ends of blank 2) engage corresponding gaps 19 in guide devices 16 (insertion of outer panels 4, 5 inside gaps 19 is aided by the 'funnel-shaped' inlet portions of gaps 19).

[0023] Without guide devices 16, outer panels 4, 5 forming the opposite ends of blank 2 and projecting from opposite sides of packing pocket 7 (i.e. not secured to packing pocket 7) tend to vibrate (oscillate) perpendicular to packing path P (i.e. vertically) as they move out of insertion station S1. This vibration (oscillation) of outer panels 4, 5 of blank 2 projecting from opposite sides of packing pocket 7 may have negative effects, by impairing interaction of outer panels 4, 5 with gumming devices 14 and/or folding devices 15, and so resulting in poor-quality (inaccurate) gumming and/or folding, or even in jamming.

[0024] Prefolding unit 1 described has numerous advantages.

[0025] Firstly, prefolding unit 1 described provides for better (more accurately) gumming and/or folding outer panels 4, 5 forming the opposite ends of blank 2 and projecting from opposite sides of packing pocket 7. This is achieved by providing guide devices 16, to prevent the outer panels 4, 5 of blank 2 projecting from opposite sides of packing pocket 7 from vibrating (oscillating) as they move out of insertion station S1.

[0026] Secondly, prefolding unit 1 described is cheap and easy to implement, by guide devices 16 comprising small fixed sections (i.e. with no moving parts) fixed at insertion station S1, which is a normally 'clear', easily accessible part of the packing machine.

Claims

1. A prefolding unit (1) for prefolding a blank (2); the prefolding unit (1) comprising:

a packing conveyor (6) with a packing pocket (7) which is fed along a packing path (P);
an insertion station (S1) where the packing pocket (7) of the packing conveyor (6) is stopped to receive the blank (2);
a transfer device (12), which transfers the blank (2), in a transfer direction (D), into the packing pocket (7) of the packing conveyor (6) stopped at the insertion station (S1), so that at least one

end (4; 5) of the blank (2) projects from the packing pocket (7);

an output station (S2) where the partly folded blank (2) is expelled from the packing pocket (7); and

at least one work station (S3, S4) located along the packing path (P), between the insertion station (S1) and the output station (S2), and which comprises an operating member (14, 15) for operating on the blank (2);

the prefolding unit (1) being **characterized by** comprising at least one guide device (16), which is located in a fixed position between the insertion station (S1) and the work station (S3, S4), is perpendicular to the packing path (P), and holds the end (4; 5) of the blank (2), projecting from the packing pocket (7), in a predetermined position as the packing conveyor (6) moves the packing pocket (7) out of the insertion station (S1) to the work station (S3, S4).

2. A prefolding unit (1) according to Claim 1, wherein the guide device (16) comprises a top guide member (17) located above the packing path (P), and which prevents the end (4; 5) of the blank (2) projecting from the packing pocket (7) from lifting up with respect to the packing path (P).
3. A prefolding unit (1) according to Claim 1, wherein the guide device (16) comprises a bottom guide member (18) located below the packing path (P), and which prevents the end (4; 5) of the blank (2) projecting from the packing pocket (7) from dropping with respect to the packing path (P).
4. A prefolding unit (1) according to Claim 1, wherein the guide device (16) comprises a top guide member (17) and bottom guide member (18), which are located above and below the packing path (P), and define a gap (19) through which the end (4; 5) of the blank (2) projecting from the packing pocket (7) passes.
5. A prefolding unit (1) according to Claim 4, wherein, facing the insertion station (S1), the top and bottom guide members (17, 18) are triangular, so an inlet portion of the gap (19) decreases gradually in size to act as a lead-in for the end (4; 5) of the blank (2) projecting from the packing pocket (7).
6. A prefolding unit (1) according to Claim 4 or 5, wherein the top and bottom guide members (17, 18) are U-shaped, and define a first gap (19) located downstream from the insertion station (S1) along the packing path (P), and a second gap (19) located upstream from the insertion station (S1) along the packing path (P).

7. A prefolding unit (1) according to one of Claims 1 to 6, wherein:

at the insertion station (S1), two opposite ends (4; 5) of the blank (2) project from opposite sides of the packing pocket (7); and
the prefolding unit (1) comprises two guide devices (16) located in fixed positions on opposite sides of the packing pocket (7), and which hold the two corresponding ends (4; 5) of the blank (2), projecting from the packing pocket (7), in predetermined positions as the packing conveyor (6) moves the packing pocket (7) out of the insertion station (S1) to the work station (S3, S4).

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8. A prefolding unit (1) according to one of Claims 1 to 7, wherein the transfer device (12) comprises at least one suction gripping head (13) movable up and down, in the transfer direction (D), between the insertion station (S1) and a pickup station located over the insertion station (S1).
9. A prefolding unit (1) according to Claim 8, and comprising a hopper (11), which contains a stack of blanks (2), is located over the insertion station (S1), and has a bottom outlet defining the pickup station.
10. A prefolding unit (1) according to one of Claims 1 to 9, wherein the guide device (16) is located in a fixed position directly downstream from the insertion station (S1) along the packing path (P), and directly upstream from the work station (S3) along the packing path (P).
11. A prefolding unit (1) according to one of Claims 1 to 10, wherein the guide device (16) is located between the insertion station (S1) and the work station (S3).
12. A method of prefolding a blank (2); the method comprising the steps of:

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feeding a packing pocket (7) on a packing conveyor (6) along a packing path (P);
stopping the packing pocket (7) at an insertion station (S1);
transferring the blank (2), in a transfer direction (D) and by means of a transfer device (12), into the packing pocket (7) of the conveyor (6) stopped at the insertion station (S1), so that at least one end (4; 5) of the blank (2) projects from the packing pocket (7);
expelling the partly folded blank (2) from the packing pocket (7) at an output station (S2); and
performing at least one operation on the blank (2) by means of an output member (14, 15) at a work station (S3, S4) located along the packing path (P), between the insertion station (S1) and

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the output station (S2);

the method being **characterized by** comprising the further step of holding the end (4; 5) of the blank (2), projecting from the packing pocket (7), in a predetermined position as the packing conveyor (6) moves the packing pocket (7) out of the insertion station (S1) to the work station (S3, S4), and by means of at least one guide device (16), which is located in a fixed position between the insertion station (S1) and the work station (S3, S4), and is perpendicular to the packing path(P).

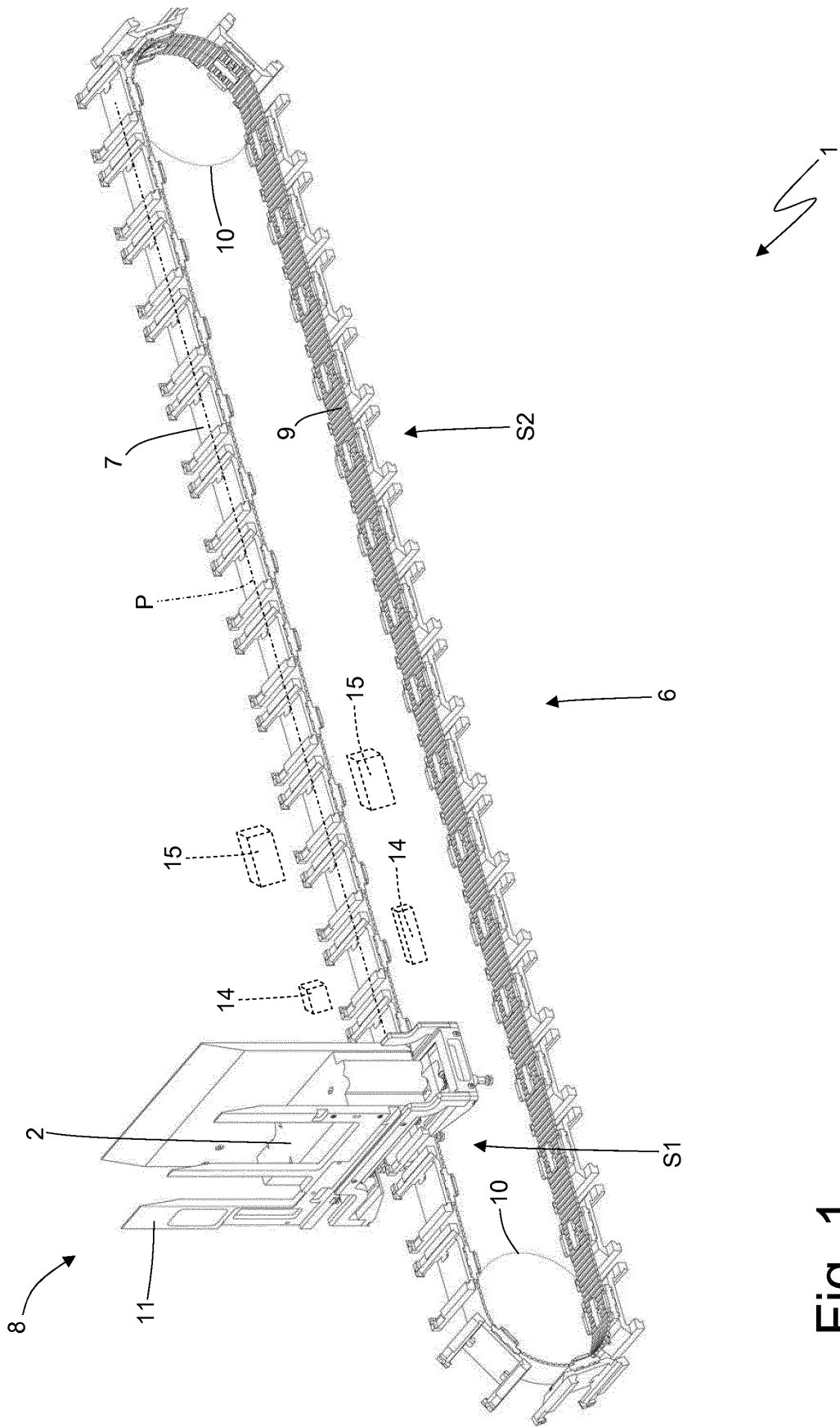


Fig. 1

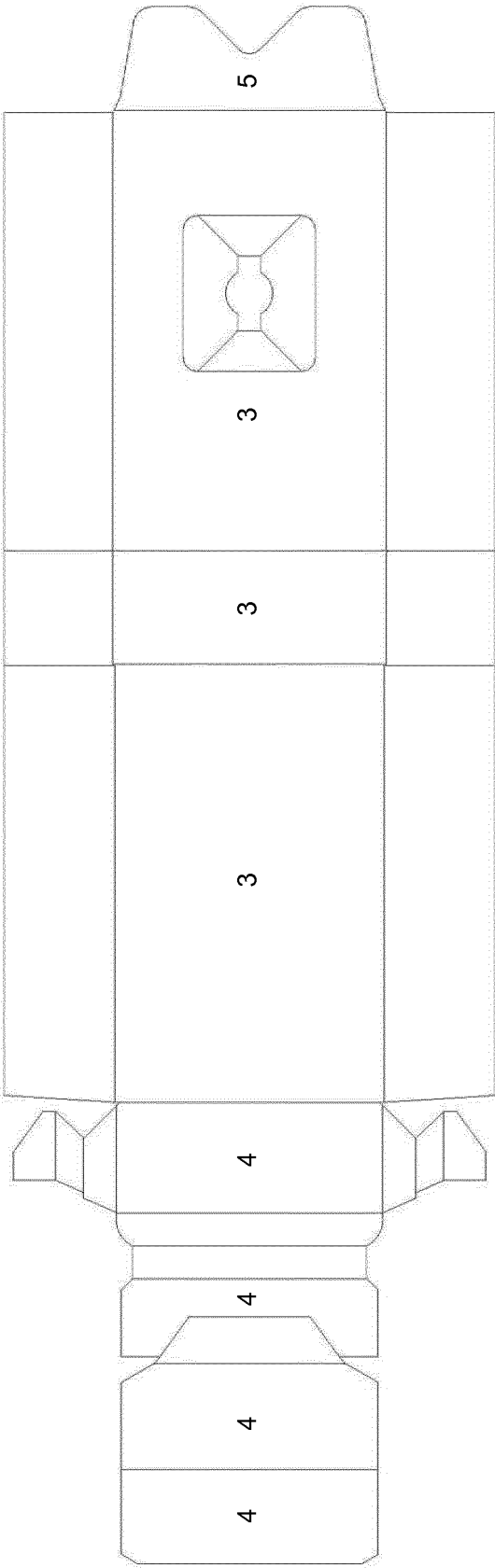


Fig. 2

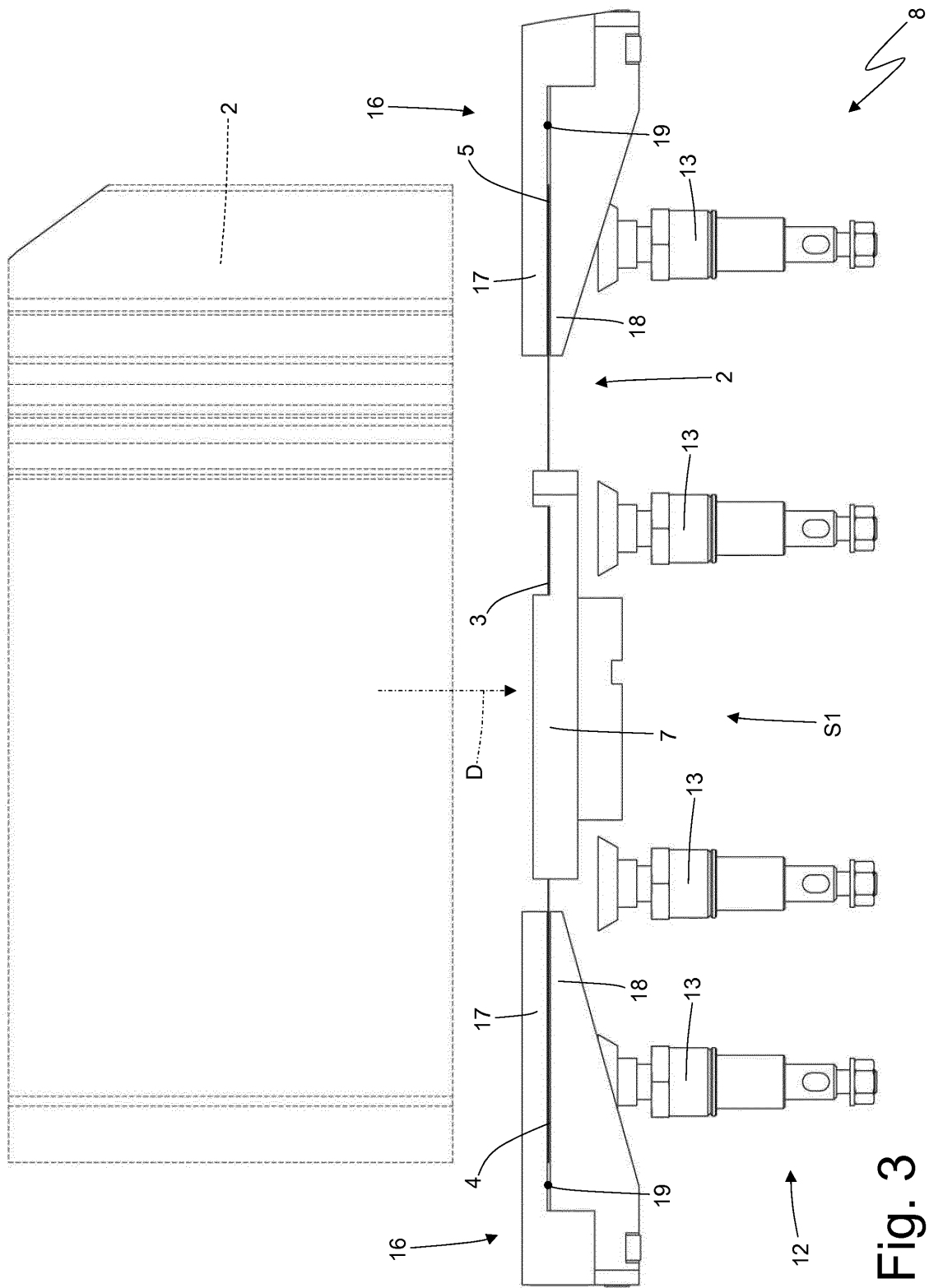


Fig. 3

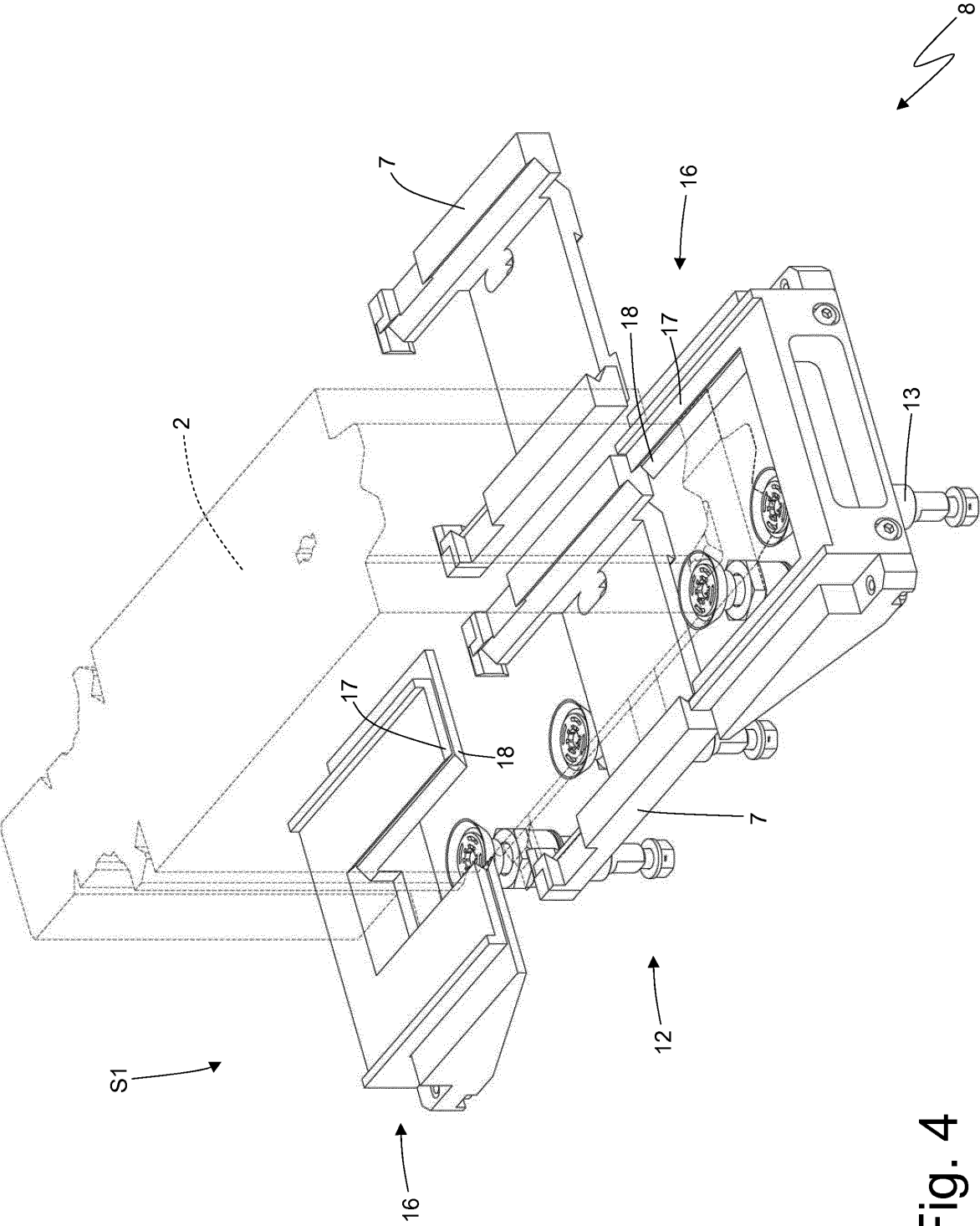


Fig. 4

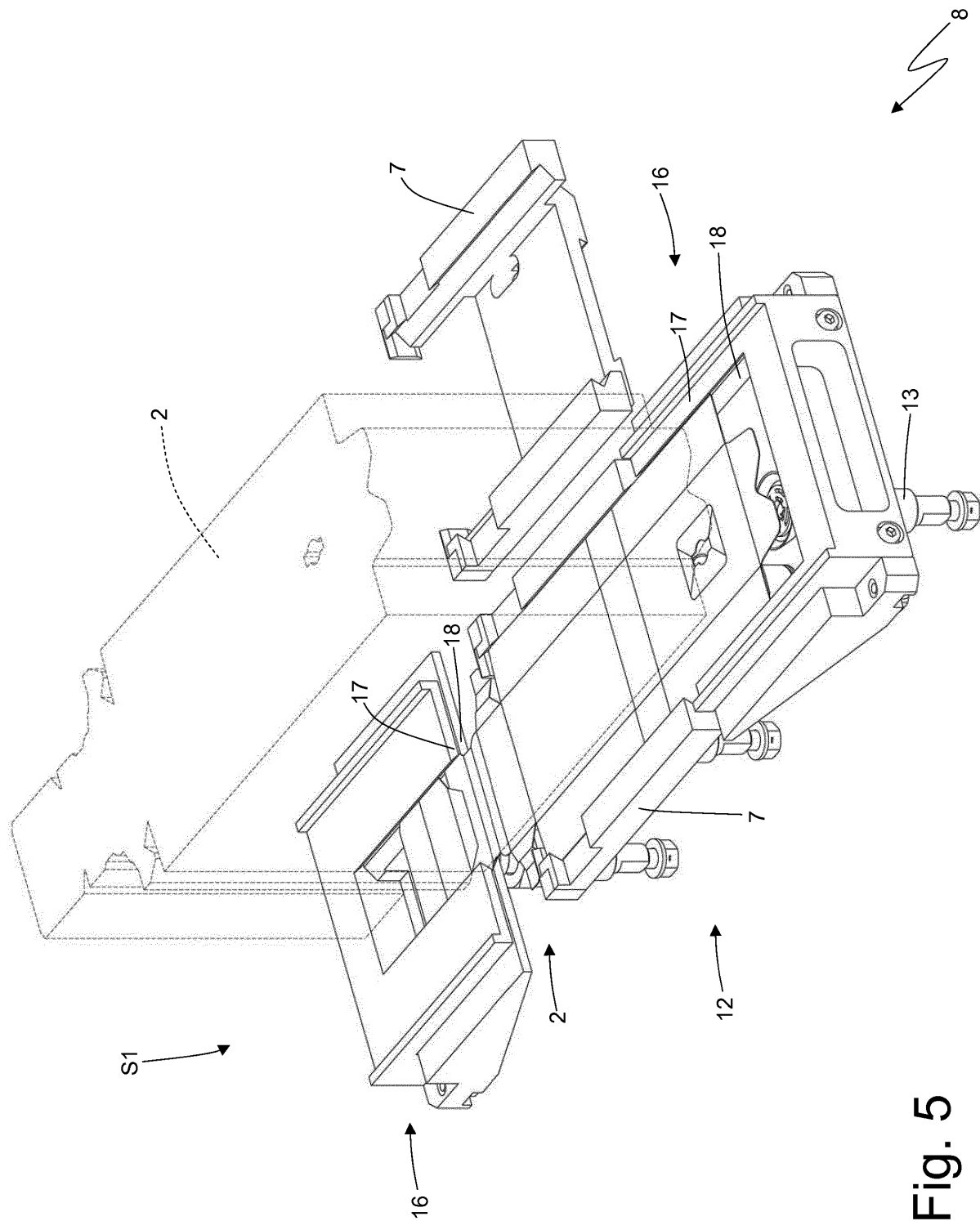


Fig. 5

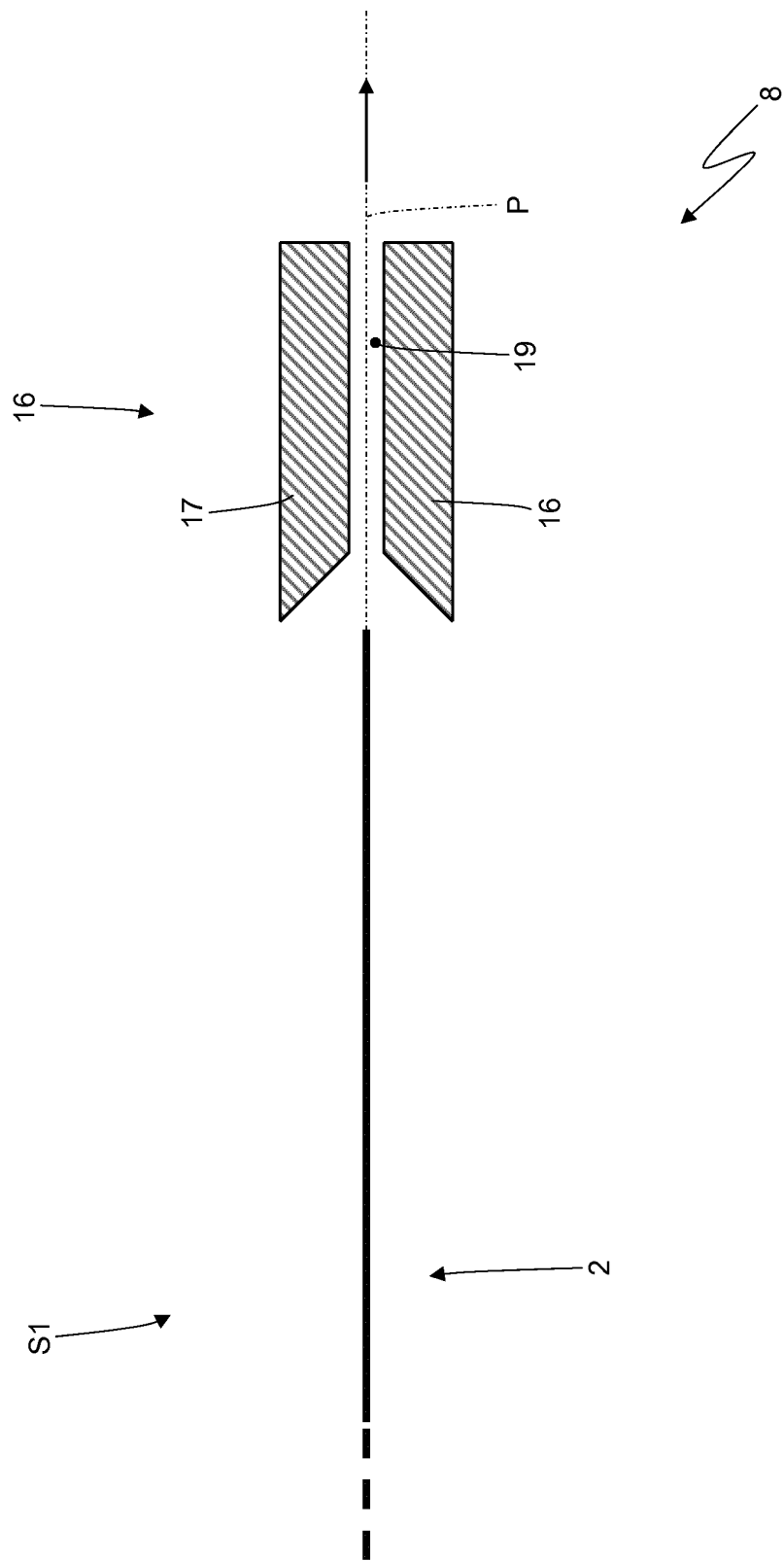


Fig. 6



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Application Number
EP 13 15 8057

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Place of search Munich		Date of completion of the search 29 May 2013	Examiner Schelle, Joseph
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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