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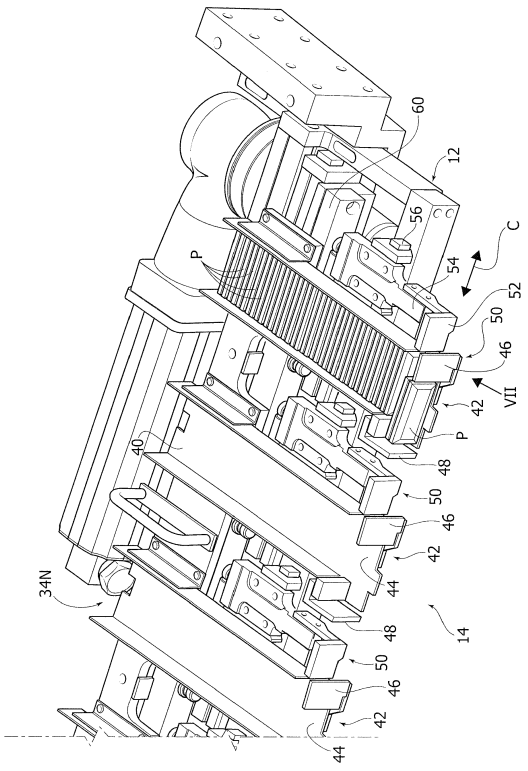
(54) **APPARATUS FOR FORMING GROUPS OF PRODUCTS ON EDGE**

(57) Apparatus for forming groups of products (P) on edge, comprising:
- a supply unit (14) configured to feed at least one continuous array of products (P) on edge, and
- at least one slug-forming device (16) arranged for receiving successive groups of products (P) on edge from said supply unit (14),
wherein said supply unit (14) is configurable for feeding products (P) to said slug-forming device (16) in a volumetric mode or in a numeric mode, and wherein said supply unit (14) comprises an extractor device (50) operable for extracting individual products (P) from said continuous array of products (P) on edge when the supply unit (14) is configured to feed the products (P) in the numeric mode.
(Figure 4)

FIG. 4



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Description

Field of the invention

[0001] The present invention relates to the packaging of products, such as biscuits or the like, and regards an apparatus for forming groups of products on edge starting from a continuous flow of products on edge.

Description of the prior art

[0002] In the field of packaging of food products, in particular of biscuits or the like, the products to be packaged are frequently fed along a plurality of U-shaped guides and are arranged on edge in contact with each other. The products arranged on edge are usually sent to packaging machines grouped into groups or slugs, each of which is formed by a plurality of products on edge, in contact with each other along respective main surfaces.

[0003] In packaging lines, the slugs can be composed according to a volumetric mode or according to a numeric mode. In the volumetric mode, each slug has a predetermined length and the number of products that make up the slugs may vary. In the numeric mode of forming slugs, each slug is formed by a predetermined number of products and the length of the slugs may vary. The volumetric loaders select a part with constant length from the continuous array of products at the inlet. The numeric loaders form the slugs by extracting a predetermined number of products from the continuous array of products at the inlet.

[0004] In the prior art, the volumetric loaders and the numeric loaders are machines essentially different from each other. This involves great problems when different types of products -according to volumetric or numeric modes- are required to be packed using the same system. In the state of the art, to change the mode of forming the slugs it is necessary to replace the loader or carry out major interventions to change the structure of the loader.

Object and summary of the invention

[0005] The present invention aims to provide an apparatus for forming groups of products that can be used for forming slugs of products in both a volumetric mode and a numeric mode.

[0006] According to the present invention, this object is achieved by an apparatus for forming groups of products having the characteristics forming the subject of claim 1.

[0007] The claims form an integral part of the disclosure provided here in relation to the invention.

Brief description of the drawings

[0008] The present invention will now be described in detail with reference to the attached drawings, given purely by way of non-limiting example, wherein:

- Figure 1 is a perspective view of an apparatus for forming groups of products according to the present invention,
- Figure 2 is a perspective view on a larger scale of a part indicated by the arrow II in Figure 1,
- Figure 3 is a perspective view of a part of the apparatus of Figure 1 configured with guides for feeding products in the volumetric mode,
- Figure 4 is a perspective view of a part of the apparatus of Figure 1 configured with guides for feeding products in the numeric mode,
- Figures 5 and 6 are perspective views illustrating, respectively, the guides for the feeding of products in the volumetric mode and the guides for the feeding of products in the numeric mode,
- Figure 7 is a perspective view of an extractor device indicated by the arrow VII in Figure 4,
- Figures 8-10 are longitudinal sections illustrating some steps of the sequence of forming slugs in the volumetric mode,
- Figure 11 is a plan view illustrating a step of the sequence of forming slugs in the numeric mode, and
- Figures 12 and 13 are partial perspective views illustrating a second embodiment of an apparatus according to the present invention configured, respectively, in the volumetric mode and the numeric mode.

Detailed description

[0009] With reference to Figures 1 and 2, numeral 10 indicates an apparatus for forming groups of products on edge intended to be sent to a packaging machine. The apparatus 10 comprises a stationary support structure 12 that carries a supply unit 14 configured for feeding products on edge along a plurality of parallel arrays.

[0010] The apparatus 10 comprises a plurality of slug-forming devices 16, each of which is associated with a respective array of products of the supply unit 14. In Figure 2, only one slug-forming device 16 is illustrated to simplify the understanding of the drawing. The apparatus 10 is typically configured to feed a plurality of arrays of products on edge to a plurality of slug-forming devices 16. However, it is intended that the present invention is applicable to apparatuses in which the supply unit 14 has at least one feeding array of products on edge associated with at least one slug-forming device 16.

[0011] With reference to Figure 2, each slug-forming device 16 comprises two supports 18 fixed to a first transverse bar 20. The first transverse bar 20 oscillates about a transverse axis A to move the slug-forming devices 16 between a position for receiving products and a position for releasing slugs. In the position for receiving the products, the slug-forming devices 16 are aligned with respective feeding arrays of products of the supply unit 14. In the position for releasing the slugs, the slug-forming

devices 16 are arranged to release the slugs on a lower conveyor.

[0012] Each slug-forming device 16 comprises two side walls 24 and two openable bottom walls 22. Each slug-forming device 16 has a closed configuration for receiving the products and an open configuration for releasing the products. A mechanism 26 controlled by a second transverse bar 28 controls the movement of the bottom wall 22 of each slug-forming device 16 between the closed position and the open position.

[0013] Each slug-forming device 16 comprises a front stop member 30 fixed to a third transverse bar 32. The third transverse bar 32 is movable along a longitudinal direction B to move the front stop elements 30 of the slug-forming devices 16 along respective longitudinal directions indicated by the arrow B.

[0014] The slug-forming devices 16 of the type illustrated in Figure 2 are known to experts in the field and have been widely used in apparatuses for forming slugs of the volumetric type, produced and marketed by the same Applicant.

[0015] According to the present invention, the supply unit 14 is configurable to carry out the formation of slugs in the volumetric mode or in the numeric mode. To switch between the volumetric mode slug-forming configuration and the numeric mode slug-forming configuration, and vice versa, it is not necessary to change either the structure or the operation of the slug-forming devices 16 in any way.

[0016] According to a first embodiment of the present invention, to configure the supply unit 14 in the volumetric mode or in the numeric mode, a guide of the supply unit 14 is replaced. In Figure 5, 34V indicates a guide for feeding products in the volumetric mode. In Figure 6, 34N indicates a guide for feeding products in the numeric mode. The guides 34V, 34N are interchangeable and are installable on the support structure 12 of the apparatus 10, one in place of the other. Figures 3 and 4 show the supply unit 14 of the apparatus 10 configured with the volumetric feed guide 34V and, respectively, with the numeric feed guide 34N.

[0017] With reference to Figures 3 and 5, the volumetric guide 34V comprises a plurality of channels 36, each of which has a bottom wall and two side walls. The channels 36 are sized so as to guide respective arrays of products P arranged on edge. Each channel 36 has an outlet section 38 and an inlet section 40, which are offset from each other in a transverse direction. The outlet sections 38 of the channels 36 are open, so as not to obstruct the outlet of the arrays of products P movable along the respective channels 36.

[0018] With reference to Figures 4 and 6, each numeric guide comprises a plurality of parallel channels 42, sized to guide respective arrays of products P arranged on edge. Each channel 42 has an outlet section 44 having a front stop element 46 and a lateral stop element 48. The front stop element 46 prevents movement of the respective array of products P in the longitudinal direction. The lateral stop element 48 of each channel-shaped element 42 is shifted laterally relative to the respective side wall. The front stop element 46 and the lateral stop element 48 define an outlet window for the products, which is displaced laterally with respect to the longitudinal axis of the respective channel 42. To be able to pass through the outlet window of the products, the individual products P must be displaced transversely relative to the longitudinal array of products P arranged on edge.

[0019] With reference to Figures 4 and 7, the supply unit 14 comprises a plurality of extractor devices 50 associated with respective arrays of products P. The extractor devices 50 are only intended to be activated when the supply unit 14 is configured with the numeric guide 34N. Each extractor device 50 is configured to move individual products P in a transverse direction to align the individual products with the outlet window of the respective channel 42. With reference to Figure 7, each extractor device 50 comprises a pusher 52, cyclically movable in a transverse direction C. The pusher 52 is carried by a carriage 54 movable in the transverse direction C along a guide 56 fixed to the support structure 12 of the supply unit 14. The carriage 54 cooperates with a thrust pin 58, carried by a transverse bar 60, cyclically movable along the transverse direction C. A traction helical spring 62 elastically pulls the carriage 54 towards a first position. The pin 58 of the transverse bar 60 moves the carriage 54 towards a second position. A locking piston 64 allows the carriage 54 to be locked in the second position. During operation, the pusher 52 is cyclically moved in the direction C between the first and the second position and extracts a single product P from the respective array for each stroke from the second position towards the first position. During the extraction movement, each product P is pushed against the lateral stop element 48 and disengages from the front stop element 46. Each extractor device 50 can be temporarily deactivated when there are no products in the respective array, by means of the locking piston 64, which keeps the carriage 54 in the second position.

[0020] With reference to Figures 8-10, the supply unit 14 comprises a plurality of stop arms 66 associated with respective arrays of products P. Each stop arm 66 is movable between a raised position and a lowered position in front of the outlet end 38 of a respective channel 36.

[0021] Figures 8 to 10 illustrate the operation of the apparatus 10 in the volumetric mode. To operate in this mode, the volumetric guides 34V are mounted on the support structure 12 of the supply unit 14. In the volumetric mode operation, the extractor devices 50 are deactivated. In the initial position of the slug-forming cycle (Figure 8), each slug-forming device 16 is empty and is aligned with the respective channel 36. The front stop element 30 of the slug-forming device 16 is in the advanced position and is positioned alongside the outlet end of the respective channel 36. The array of products P rests against the front stop element 30 of the respective slug-forming device 16. Starting from the position of Fig-

ure 8, the front stop element 30 moves forward in the direction indicated by the arrow D. The array of products P moves accordingly in the direction D. The products P arranged on edge enter inside the respective slug-forming device 16.

[0022] With reference to Figure 9, when the front stop element 30 is in its forward stroke-end position, one slug S of products P is contained within the slug-forming device 16. At this point, the stop arm 66 is moved into the lowered position to separate the slug S from the continuous array of products P contained in the channel 36.

[0023] Then, as shown in Figure 10, the slug-forming device 16 is lowered and the bottom walls 22 are opened to deposit the slug S on a lower conveyor 68. While the slug-forming device 16 is lowered, the stop arm 66 is in the lowered position and prevents the forward movement of the array of products P in the respective channel 36. After having deposited the slug 36 on the lower conveyor 68, the slug-forming device 16 returns to the initial position and the stop arm 66 is raised to start a new cycle.

[0024] Figure 11 illustrates the operation of the apparatus 10 in the numeric mode. In this case, the numeric guide 34N is mounted on the support structure 12 of the supply unit 14 in place of the volumetric guide 34V. In this case, the extractor devices 50 are operative. The operation cycle of the slug-forming device 16 is identical to that of the volumetric mode of operation. When the slug-forming device 16 is in the raised position, the extractor device 50 extracts individual products P from the continuous array. The products P, displaced laterally with respect to the continuous array, are aligned with the respective slug-forming device 16. The products P advance in the slug-forming device 16 as they are gradually extracted by the extractor device 50. In this case, a predetermined number of products P are inserted into the slug-forming device 16. When the predetermined number of products is reached, the stop arm 66 is lowered and the slug-forming device 16 is lowered to deposit the slug on the lower conveyor 68, in a manner identical to that described previously with reference to the volumetric mode operation.

[0025] From the preceding description, it is clear that with the simple substitution of the volumetric guides 34V with the numeric guides 34N, or vice versa, the configuration of the apparatus 10 is changed from the volumetric mode operation to the numeric mode operation, or vice versa. Thus, it is possible to package different types of products using the same system without the need to carry out major changes of the structure of the apparatus 10.

[0026] In a second embodiment of the present invention, the supply unit 14 can be configured in the volumetric mode or in the numeric mode by moving some components of the guide between a volumetric feed position and a numeric feeding position. In this case, replacement of the guides as in the previously described case is not carried out.

[0027] Figures 12 and 13 illustrate a possible example of this second embodiment. The elements corresponding to those previously described are indicated with the same reference numerals.

[0028] With reference to Figures 12 and 13, the supply unit 14 comprises a guide 70 comprising at least one channel 72 for the feeding of products arranged on edge. In Figures 12 and 13 - for simplicity of representation - only one channel 72 has been illustrated but, in general, the guide 70 has a number of channels 72 equal to the number of arrays of products, and equal to the number of the slug-forming devices 16.

[0029] Each channel 72 is sized so as to guide a respective array of products arranged on edge and has a bottom wall 74 fixed with respect to the stationary support structure 12. Each channel 72 has an outlet section 76 having a front stop element 78 oriented transversely with respect to the longitudinal axis of the channel 72, and a lateral stop element 80 oriented parallel to the longitudinal axis of the channel 72. The stop elements 78, 80 are fixed to the bottom wall 74.

[0030] Each channel 72 comprises two side walls 82, 84 that guide the products movable along the channel 72. The space between the side walls 82 defines a guide section for the products. The side walls 82 are movable between a volumetric configuration illustrated in Figure 12 and a numeric configuration illustrated in Figure 13.

[0031] In the volumetric configuration of the guide 70, the guide section between the side walls 82 is moved laterally relative to the front stop element 78. In this way, the front stop element 78 does not obstruct the outlet of the arrays of products movable along the channel 72. In the volumetric configuration of the guide 70, the operation of the apparatus 10 is identical to the operation of the apparatus of the first embodiment configured with the volumetric guide 34V. In this case, the extractor device 50 is deactivated.

[0032] In the numeric configuration of the guide 70, the front stop element 78 is located within the guide section between the side walls 82 and prevents movement of the respective array of products in the longitudinal direction. The lateral stop element 80 is moved laterally outwards relative to the respective side wall.

[0033] In the numeric configuration of the guide 70, the operation of the apparatus 10 is identical to the operation of the apparatus of the first embodiment configured with the numeric guide 34N. In this case, the extractor device 50 is active and the pusher 52 is cyclically movable in the transverse direction C. In each stroke towards the inside of the pusher 52, a product from the continuous array of products on edge is extracted.

[0034] In a variant of the present invention, the guide 70 could have fixed side walls 82. In this case, the stop elements 78, 80 would be movable in the transverse direction between a volumetric configuration and a numeric configuration. In this case, the slug-forming devices must be moved in the transverse direction to keep these slug-forming devices aligned with the outlet axis of the products of the respective guides 72 in both the volumetric configuration and the numeric configuration of the guide

70.

[0035] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments can be widely varied with respect to those described and illustrated, without thereby departing from the scope of the invention as defined by the claims that follow.

Claims

1. Apparatus for forming groups of products (P) on edge, comprising:

   - a supply unit (14) configured to feed at least one continuous array of products (P) on edge, and
   - at least one slug-forming device (16) arranged for receiving successive groups of products (P) on edge from said supply unit (14),

   characterized in that said supply unit (14) is configurable for feeding products (P) to said slug-forming device (16) in a volumetric mode or in a numeric mode, and **in that** said supply unit (14) comprises an extractor device (50) operable for extracting individual products (P) from said continuous array of products (P) on edge when the supply unit (14) is configured to feed the products (P) in the numeric mode.

2. Apparatus according to claim 1, comprising a volumetric guide (34V) and a numeric guide (34N) interchangeable with each other and selectively installable on the supply unit (14), one in place of the other,

3. Apparatus according to claim 2, wherein said volumetric guide (34V) has at least one channel (36) having an outlet section (38) and an inlet section (40), offset from each other in a transverse direction.

4. Apparatus according to claim 2, wherein said numeric guide (34N) comprises at least one channel (42) having an outlet section (44) comprising a front stop element (46) and a lateral stop element (48), which define an outlet window for the products, displaced laterally with respect to the longitudinal axis of the channel (42).

5. Apparatus according to claim 1, comprising a guide (70) including at least one channel (72) having a bottom wall, a front stop element (78), a lateral stop element (80) and two side walls (82), wherein said side walls are movable between a volumetric configuration and a numeric configuration.

6. Apparatus according to claim 1, comprising a guide (70) including at least one channel (72) having a bottom wall, a front stop element (78), a lateral stop element (80) and a pair of side walls (82), wherein the front stop element (78) and the lateral stop element (80) are movable between a volumetric configuration and a numeric configuration.

7. Apparatus according to any one of claims 1-6, wherein said extractor device (50) comprises a pusher element (52) movable in a transverse direction (C), said pusher element (52) being elastically biased towards a first position and being pushed towards a second position by a transverse bar (60) movable cyclically in a transverse direction.

8. Apparatus according to claim 7, wherein said pusher element (52) is lockable in said second position by means of a locking piston (64).

9. Apparatus according to any one of the preceding claims wherein said slug-forming device (16) is cyclically movable between a raised position in which it is aligned with the respective guide (34V, 34N, 70) and a lowered position for depositing the slug on a lower conveyor (68).

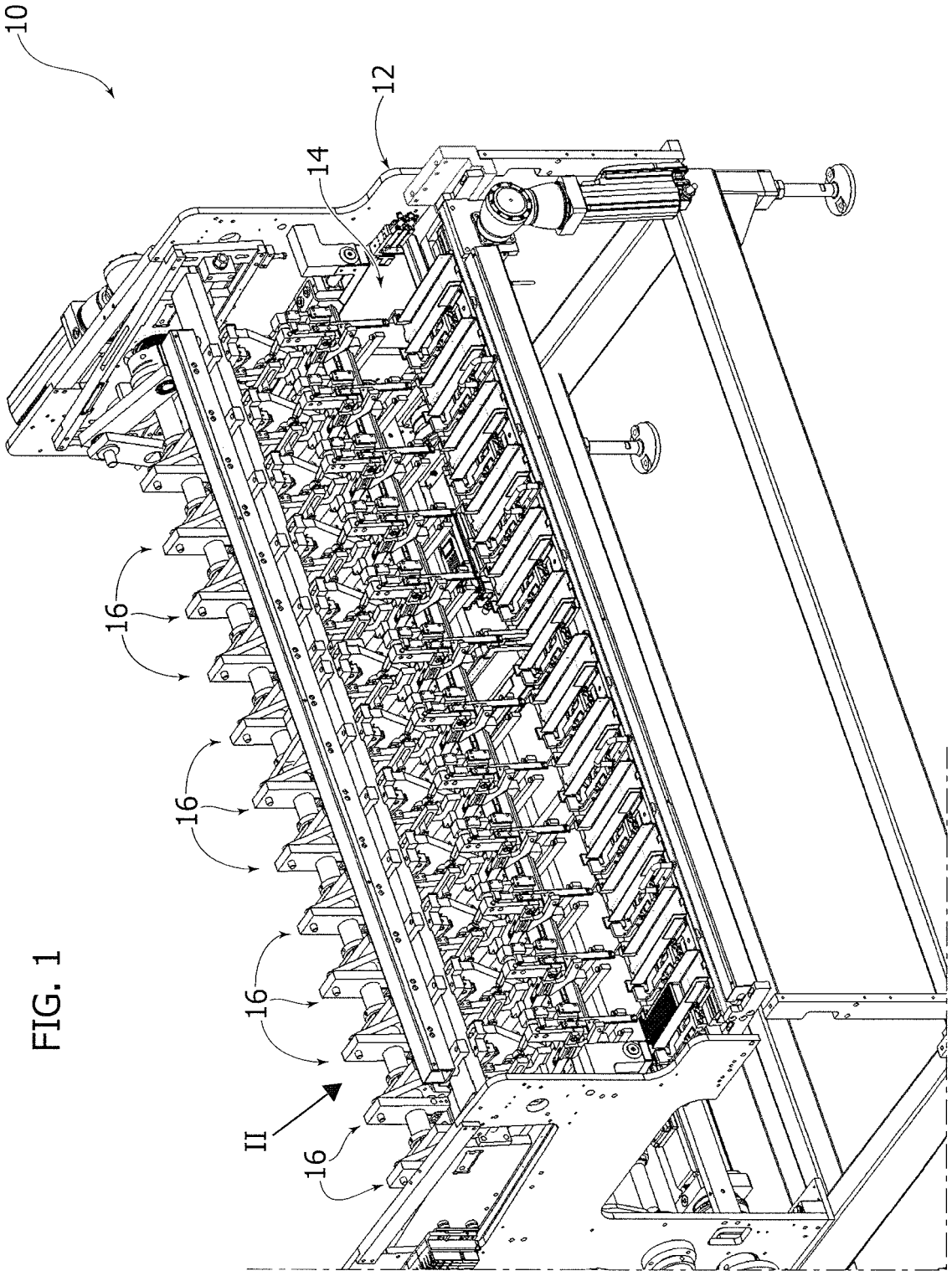


FIG. 1

FIG. 2

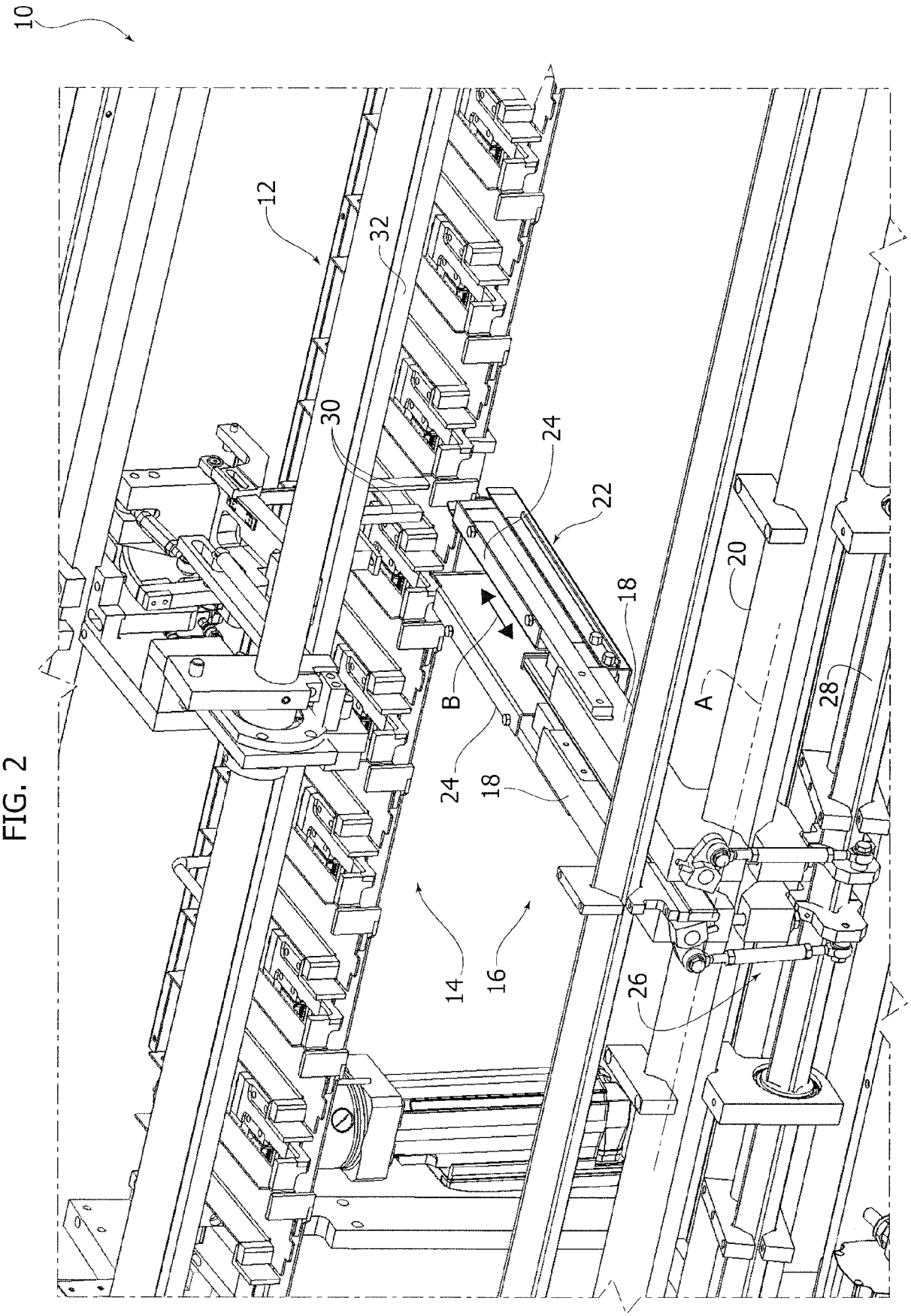


FIG. 3

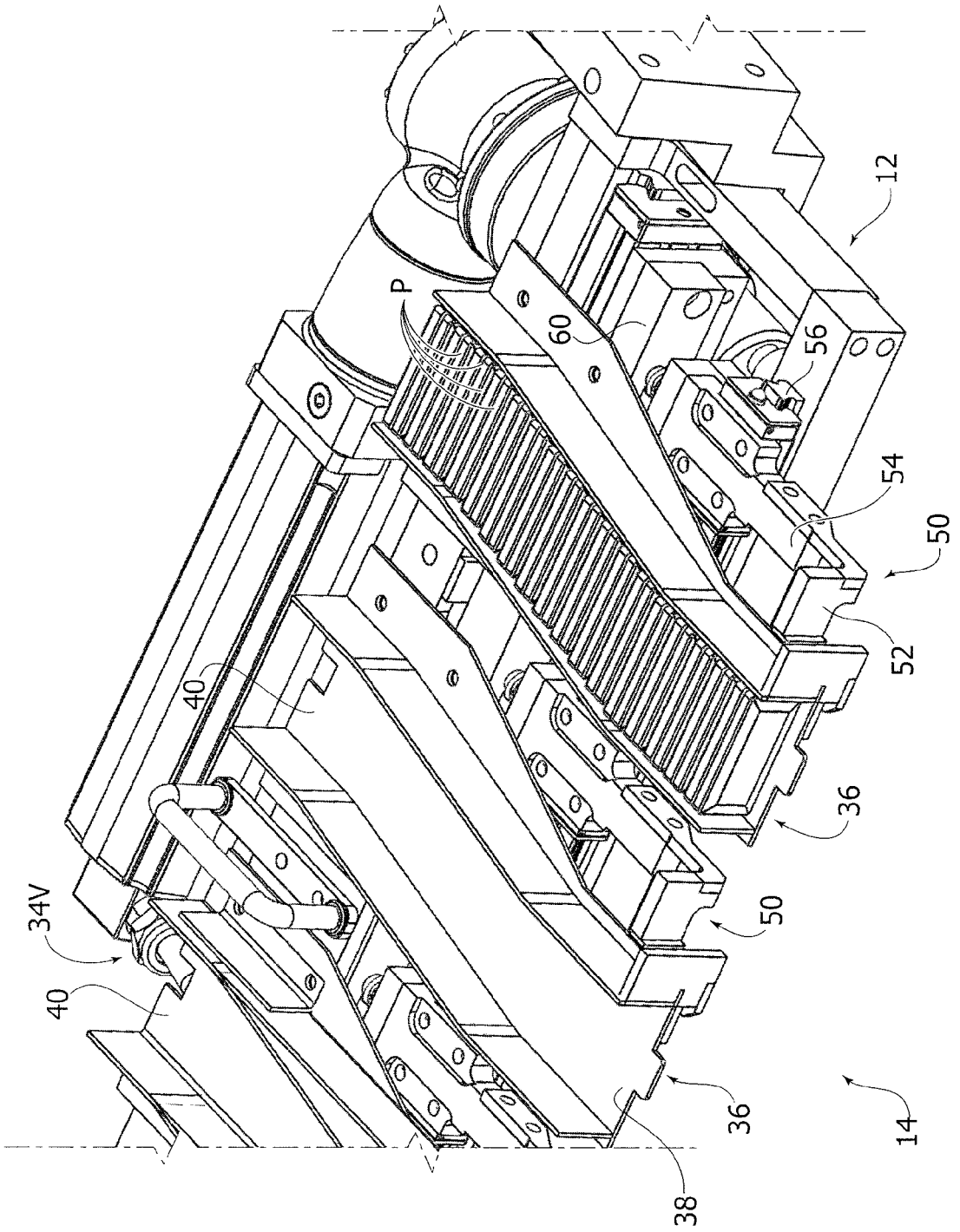


FIG. 4

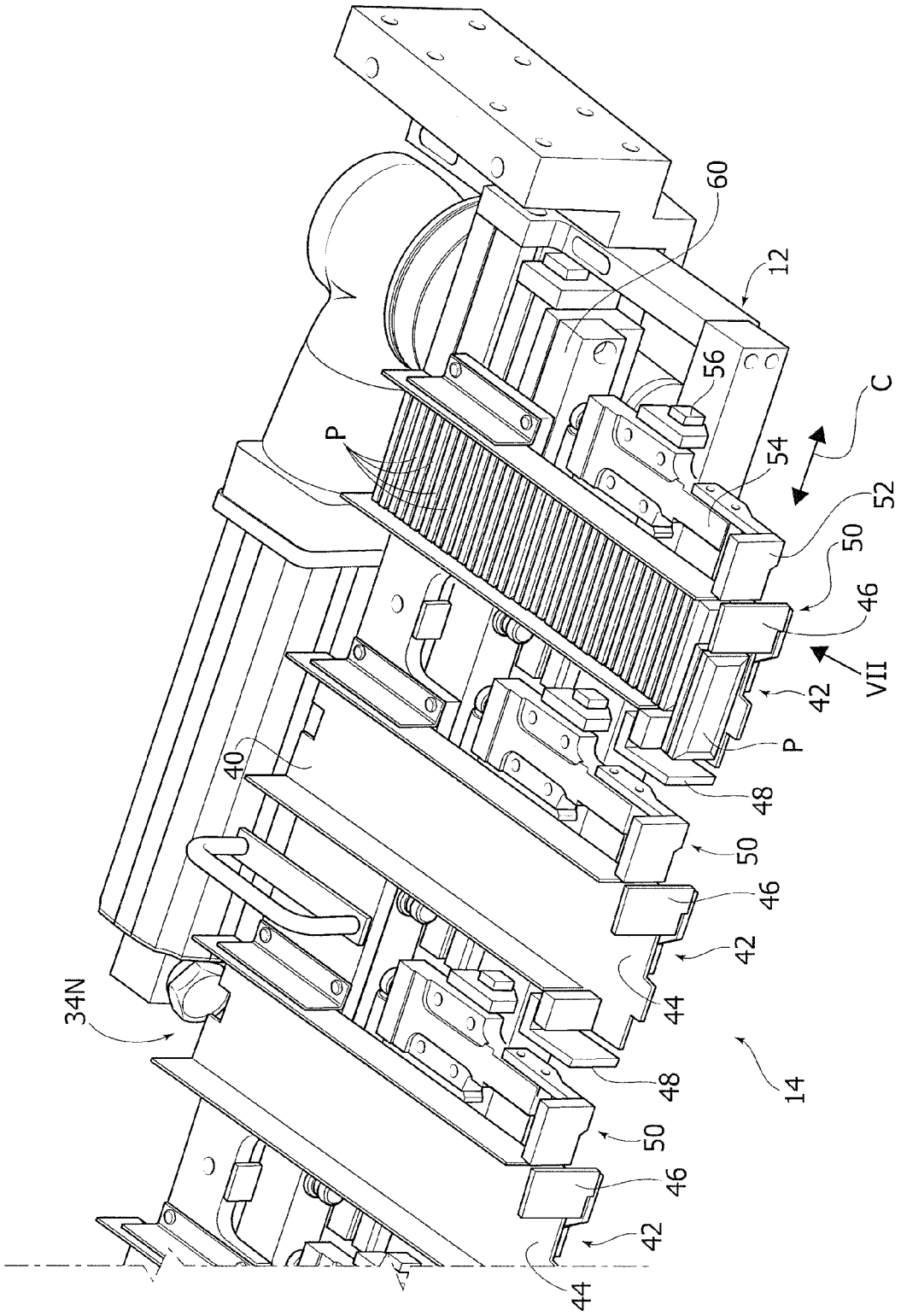


FIG. 5

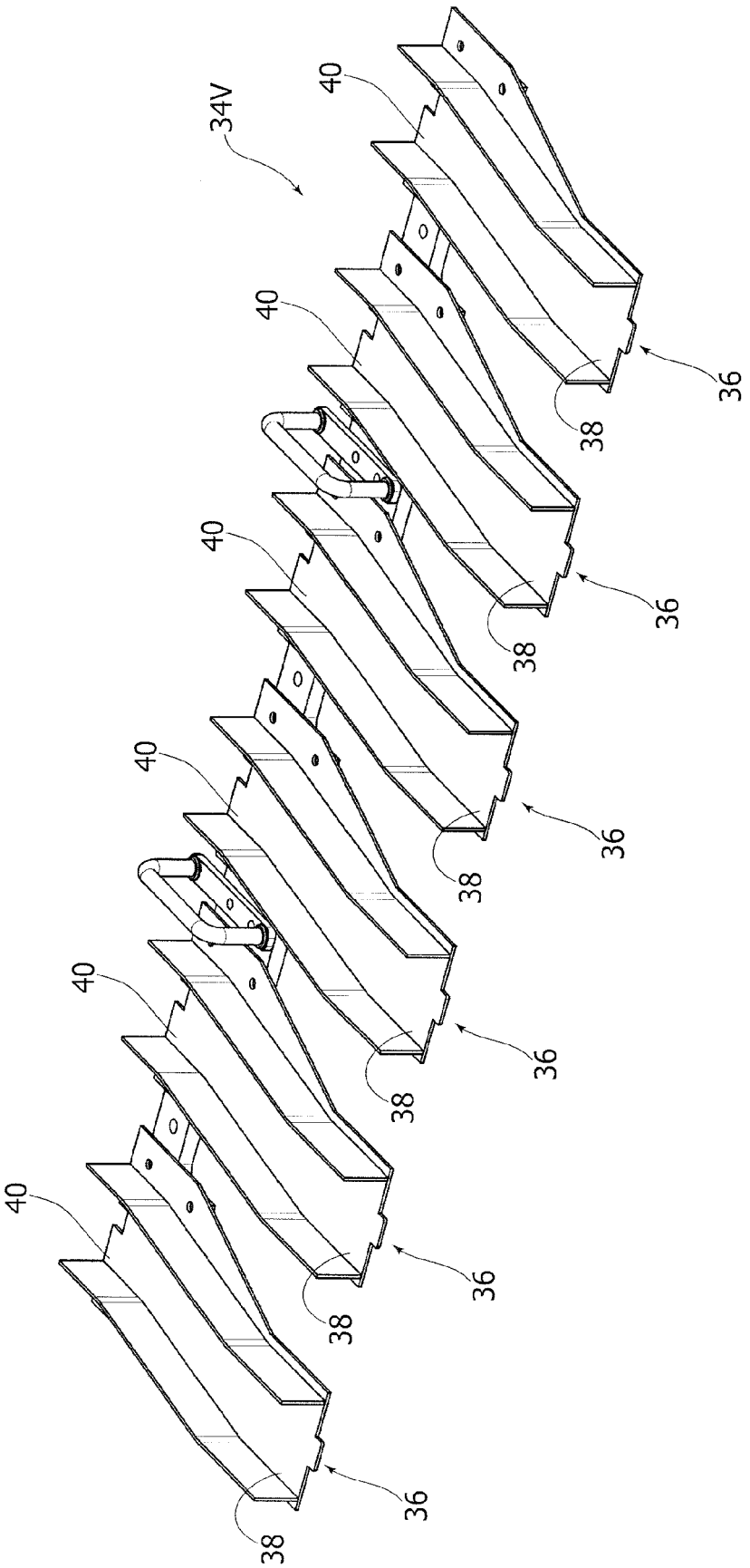


FIG. 6

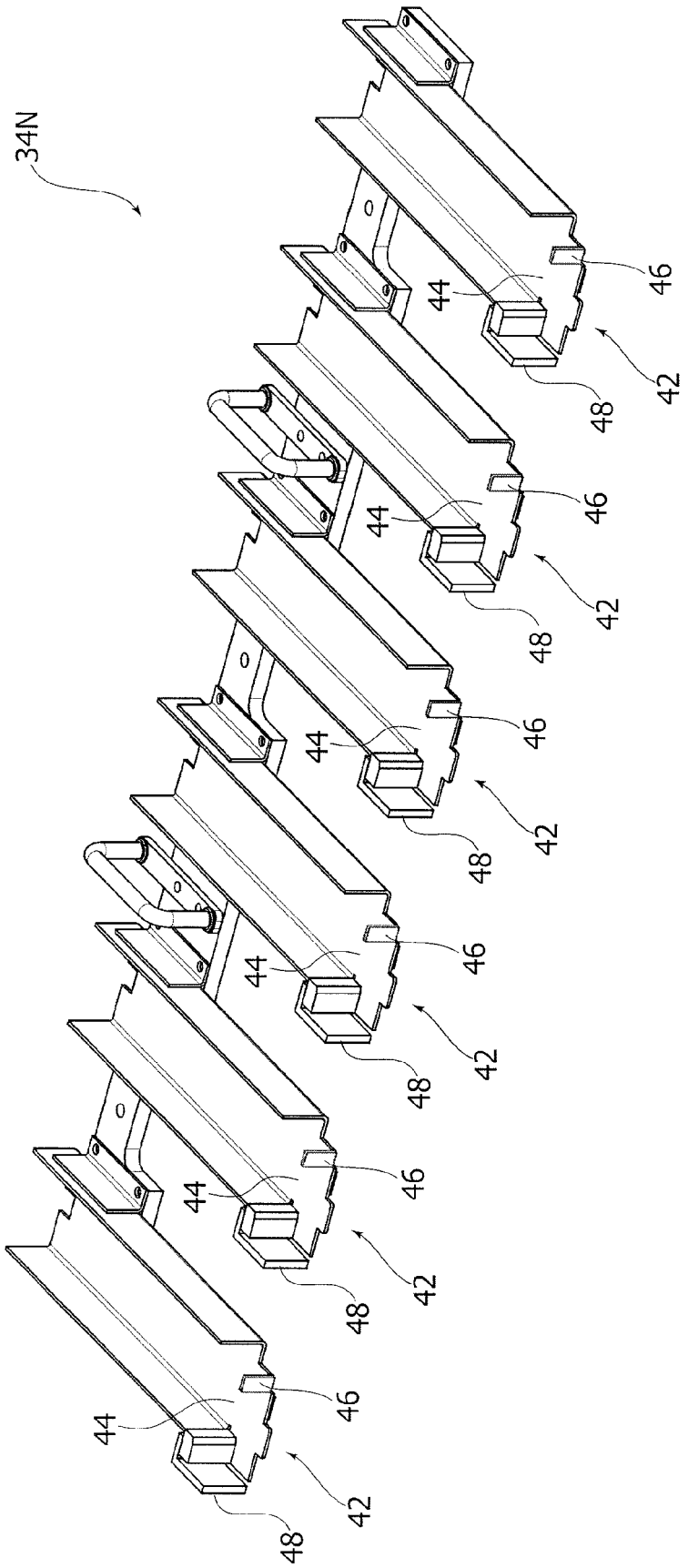


FIG. 7

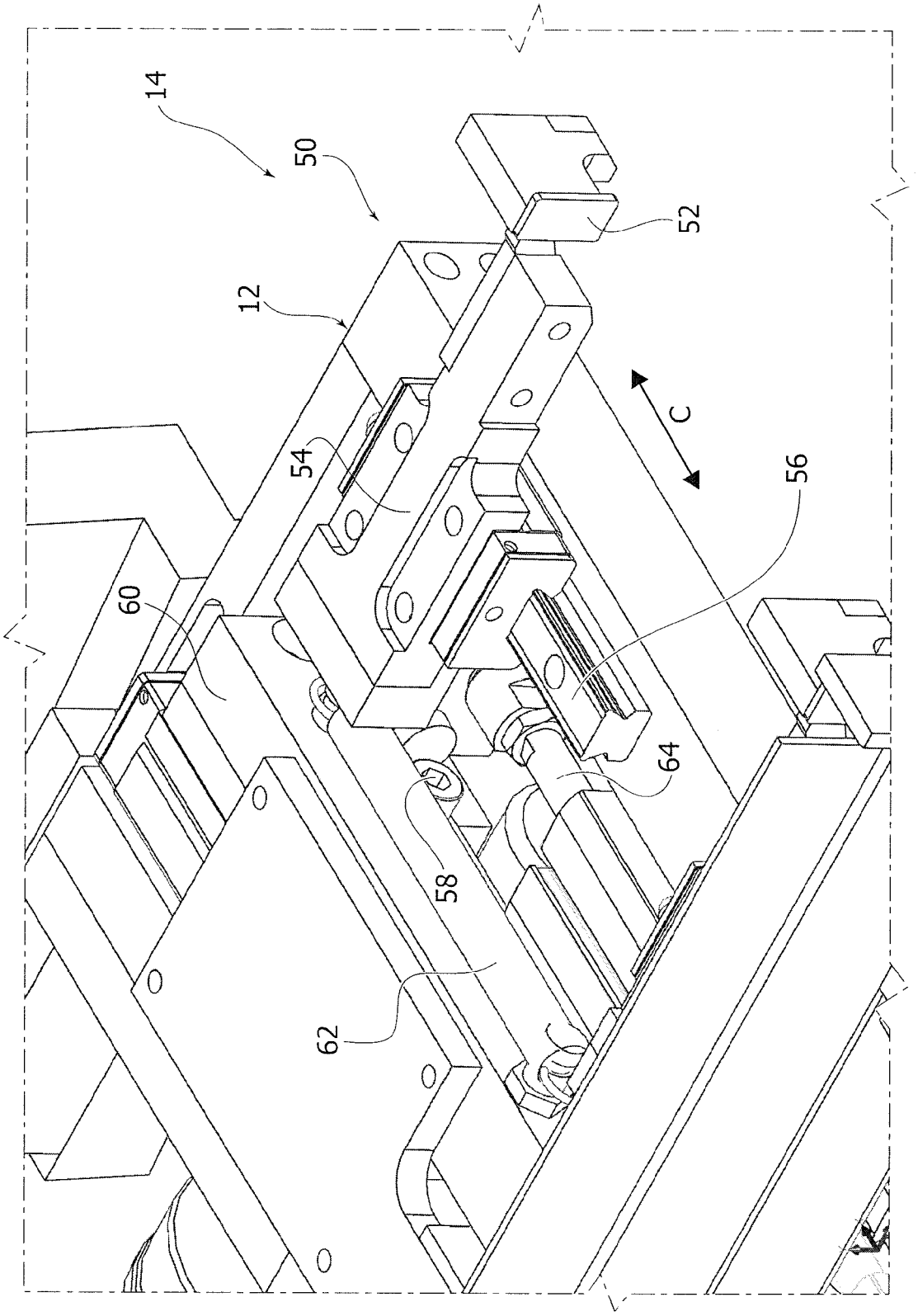


FIG. 8

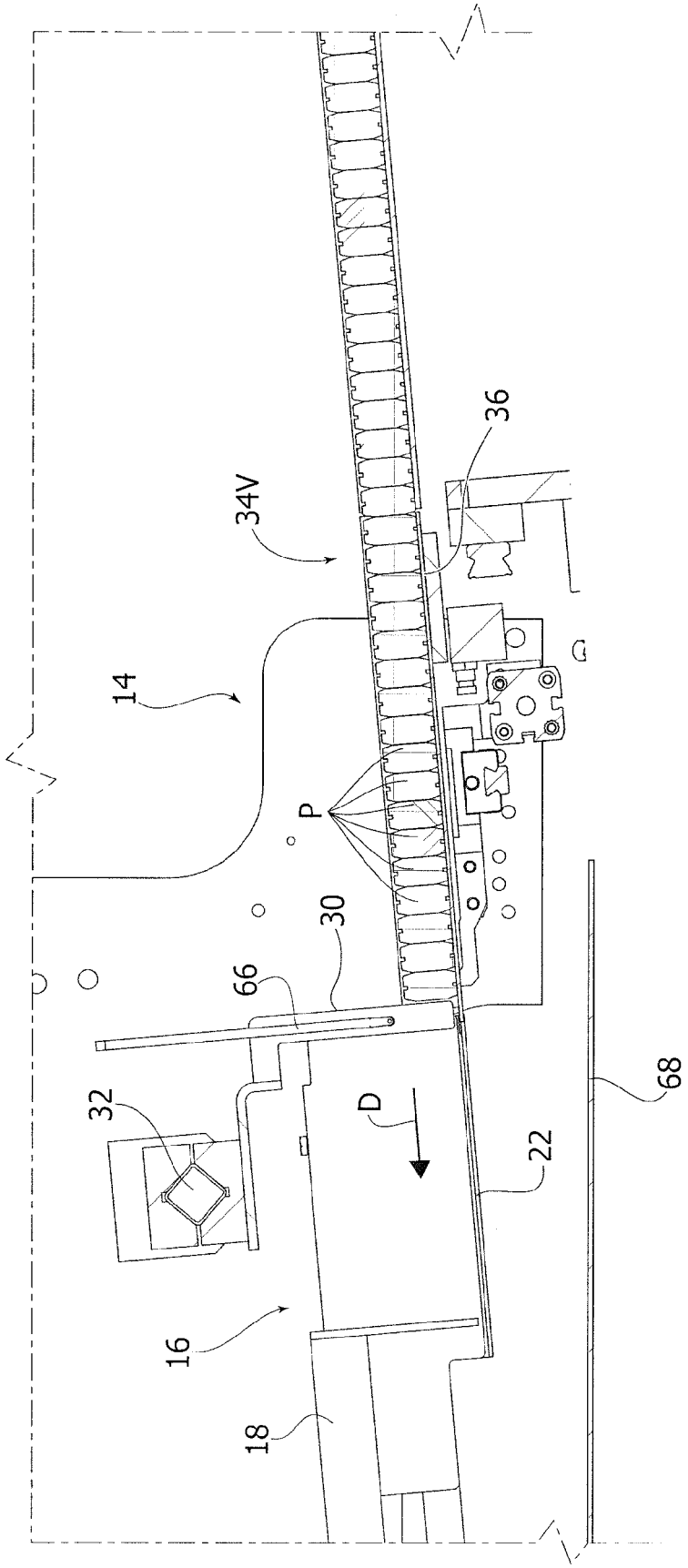


FIG. 9

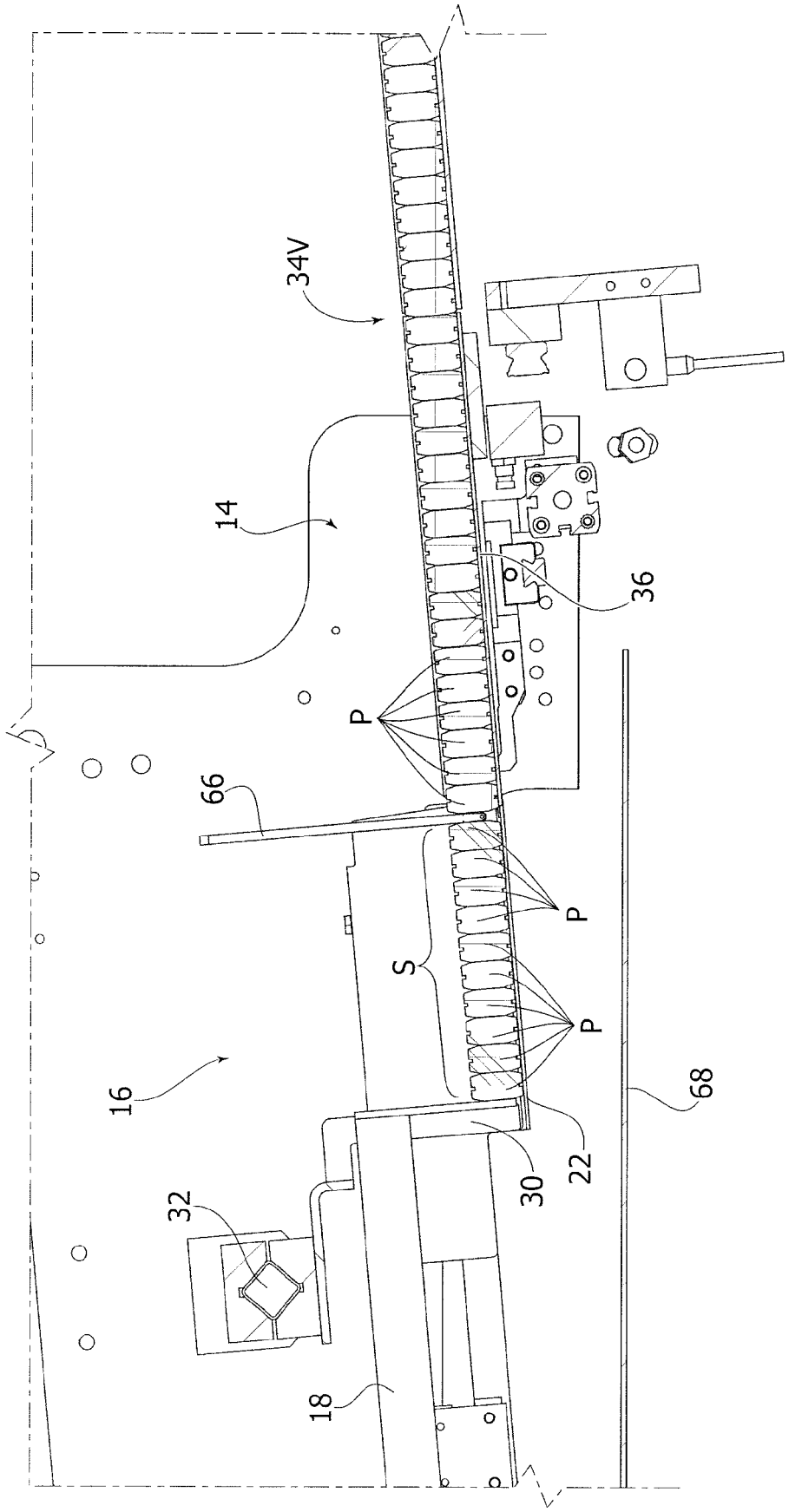


FIG. 10

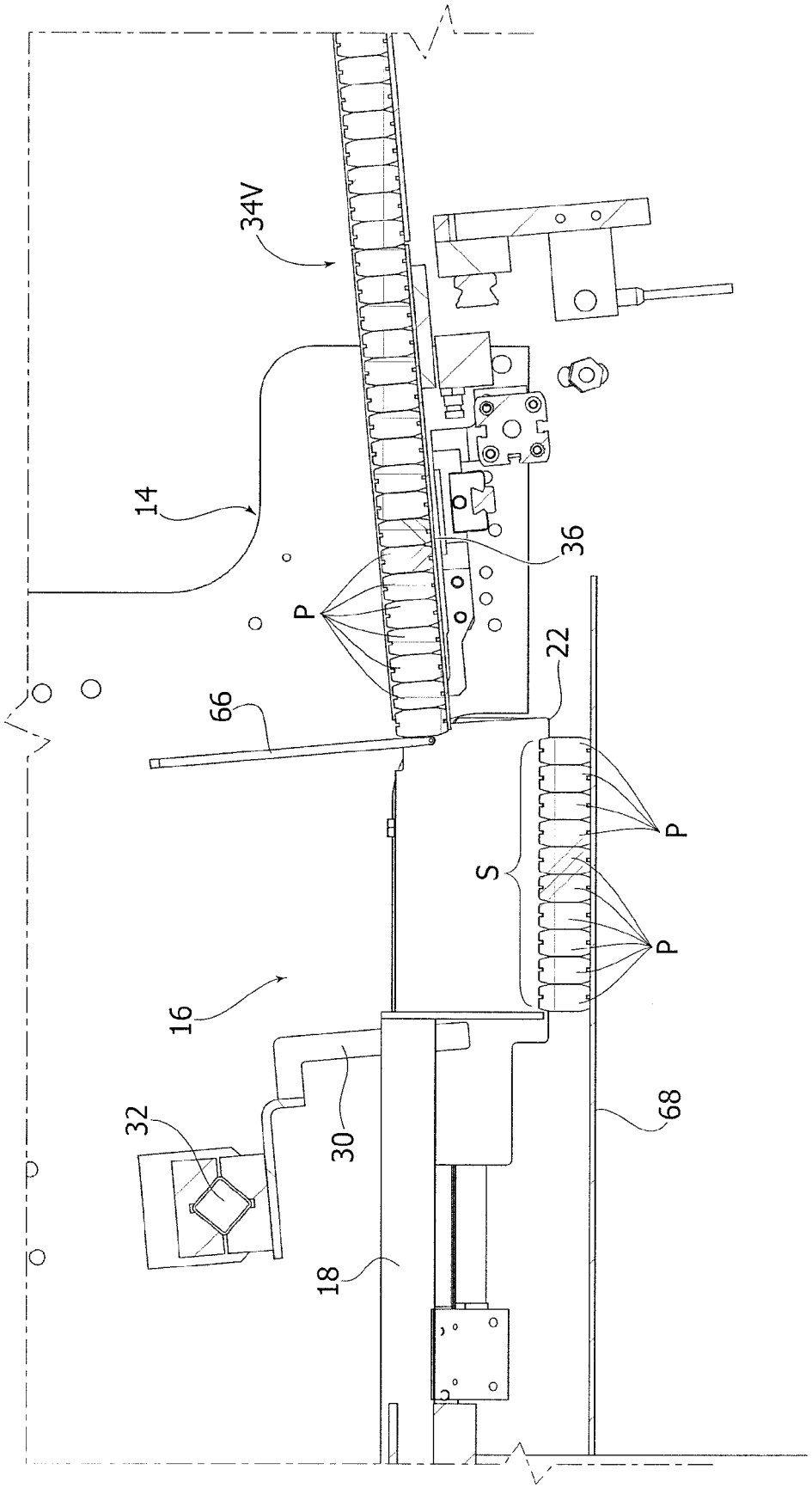


FIG. 11

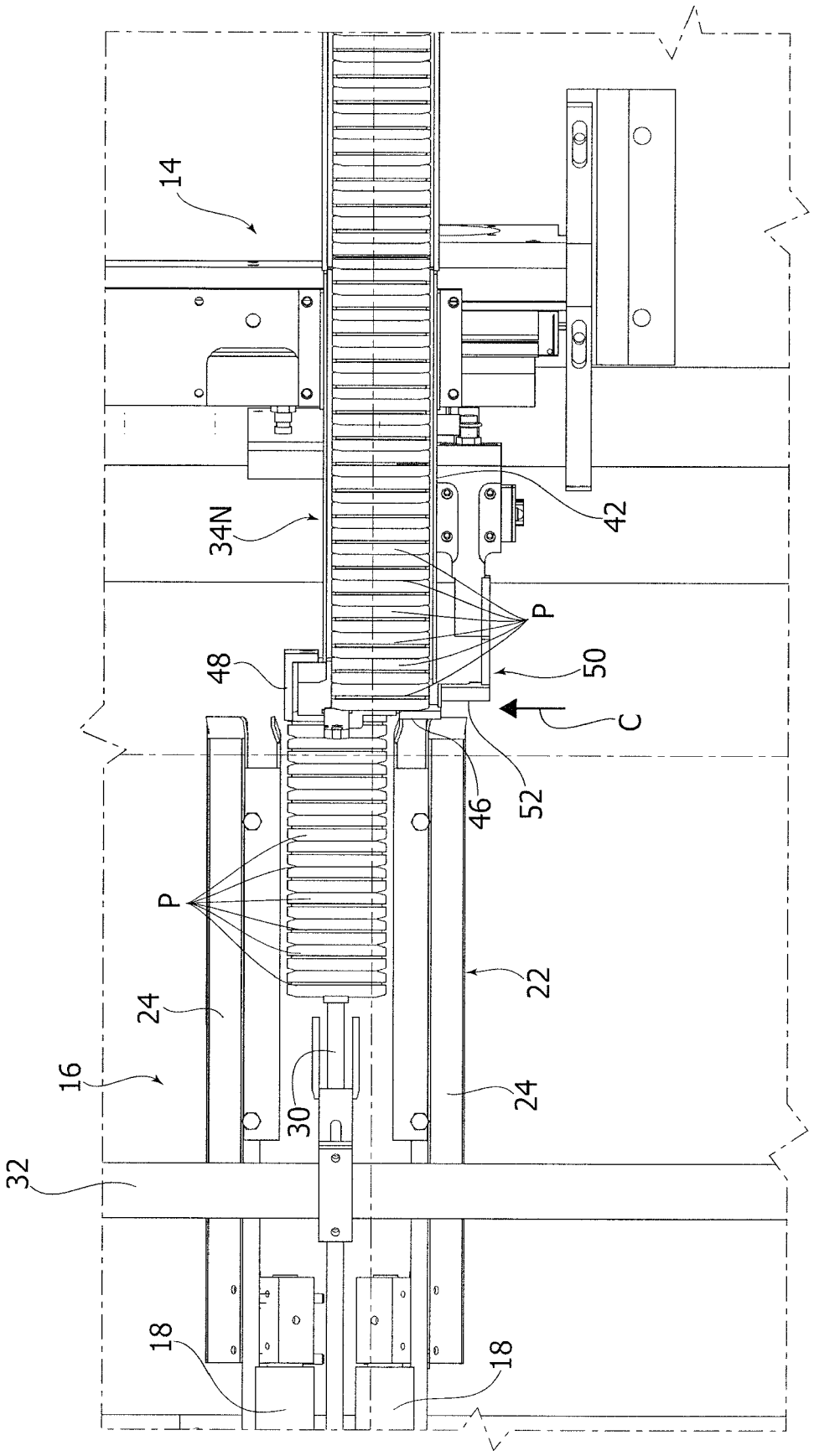


FIG. 12

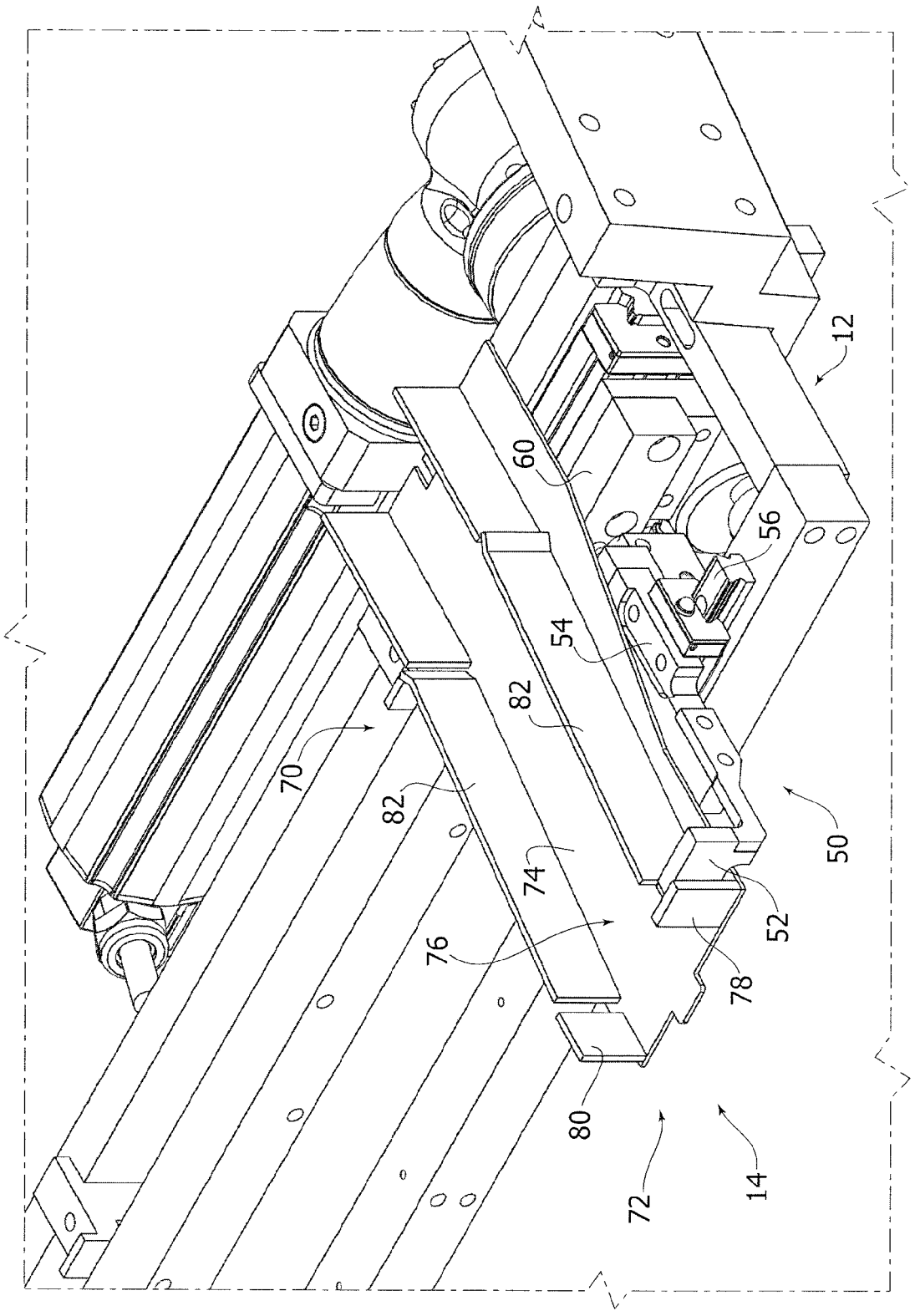
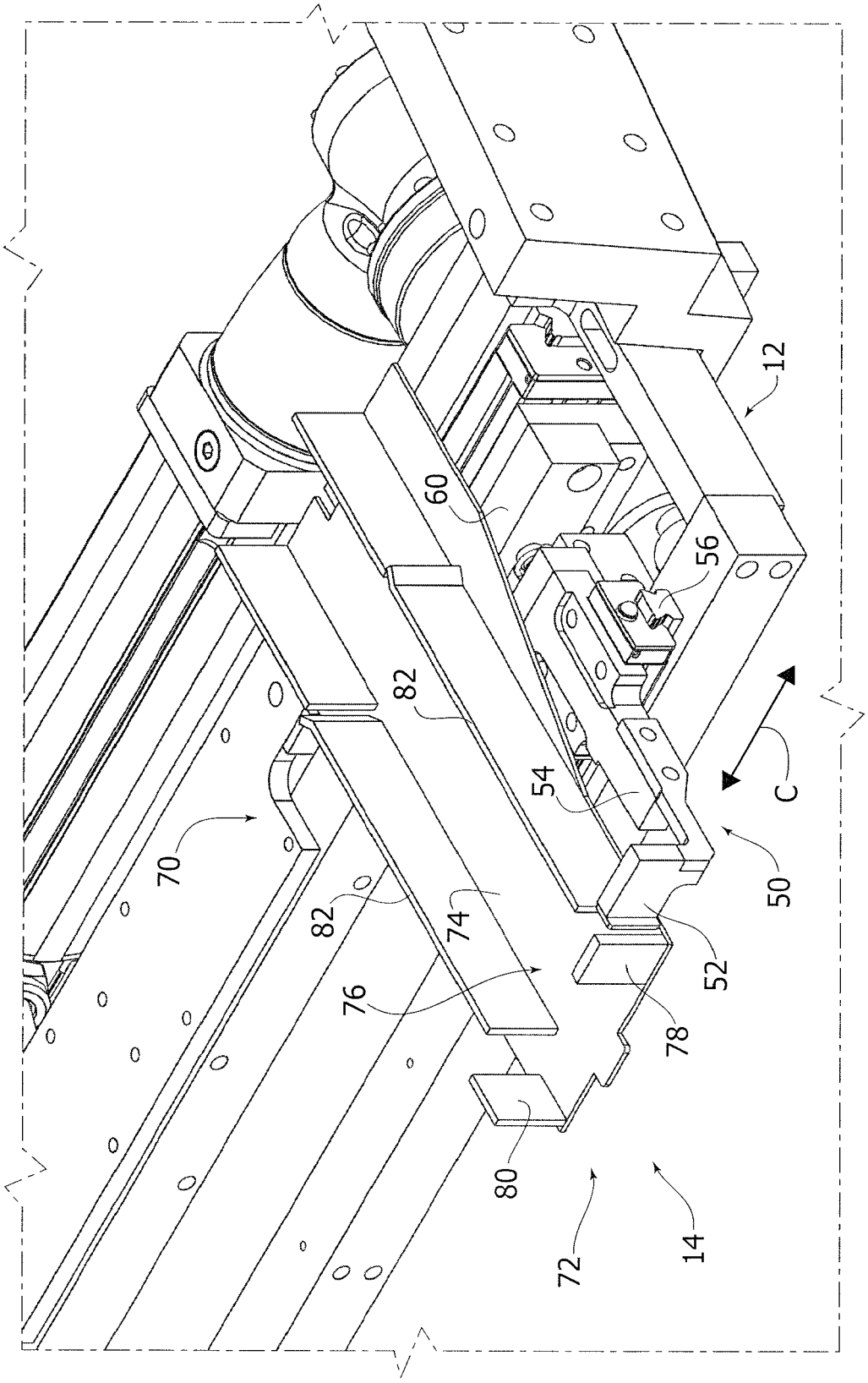


FIG. 13



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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 6766

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 2 634 099 A1 (BOSCH GMBH ROBERT [DE]; BOSCH PACKAGING TECHNOLOGY INC [US]) 4 September 2013 (2013-09-04) * the whole document *	1,7,8 2-6,9	INV. B65B23/14 B65B5/04 B65B5/06 B65B35/20 B65B35/40
X A	EP 1 318 089 A1 (CHAUHAN VIJAY [IN]) 11 June 2003 (2003-06-11) * the whole document *	1,7-9 2-6	
A	GB 2 070 544 A (HAUNI WERKE KOERBER & CO KG) 9 September 1981 (1981-09-09) * page 4, line 88 - page 5, line 45; figure 13 *	1-9	
A	US 3 930 572 A (FLUCK RENE ET AL) 6 January 1976 (1976-01-06) * figure 1 *	9	

TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 January 2017	Cardoso, Victor

CATEGORY OF CITED DOCUMENTS

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11-01-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2634099 A1	04-09-2013	CN 102481986 A	30-05-2012
		EP 2417029 A1	15-02-2012
		EP 2634099 A1	04-09-2013
		ES 2418533 T3	14-08-2013
		US 2010281823 A1	11-11-2010
		WO 2010118239 A1	14-10-2010
EP 1318089 A1	11-06-2003	AT 316926 T	15-02-2006
		DE 60208983 T2	27-07-2006
		EP 1318089 A1	11-06-2003
		US 2003102200 A1	05-06-2003
		US 2004173959 A1	09-09-2004
GB 2070544 A	09-09-1981	DE 3004896 A1	20-08-1981
		GB 2070544 A	09-09-1981
		IT 1169040 B	20-05-1987
US 3930572 A	06-01-1976	AR 199980 A1	08-10-1974
		CH 568905 A5	14-11-1975
		DE 2432678 A1	06-02-1975
		GB 1466892 A	09-03-1977
		US 3930572 A	06-01-1976

EPO FORM P0459

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