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(71) Applicant: **BAUMER S.r.l.**
41013 Castelfranco Emilia (IT)

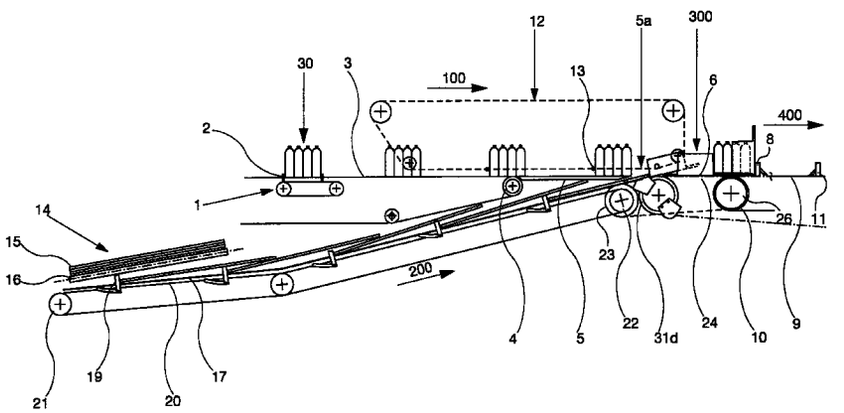
(72) Inventor: **Gambetti, Mario**
40014 Crevalcore (Bologna) (IT)

(74) Representative: **Gustorf, Gerhard, Dipl.-Ing.**
Patentanwalt,
Bachstrasse 6 A
84036 Landshut (DE)

(54) Method and system for combining products and packaging blanks in continously operating packaging machines

(57) The invention relates to a method for combining, for packaging purposes, products (30) with and on packaging blanks (15) for continuous packaging machines of the box and/or tray packaging type. It comprises the arrangement of the blanks (15) partially longitudinally superimposed on one another along a second conveyor line (200) for blanks in which this partial longitudinal superimposition has a measurement such that the front portion (51, 52) of each blank (15) does not interfere with the base panel (50) of the previous blank (15) and the rear portion (53, 54) of each blank (15) does not interfere with the base panel (50) of the following blank (15).

Fig.1



EP 0 786 407 A1

Description

The present invention relates to a method for combining, for packaging purposes, products with and on packaging blanks particularly adapted for continuous packaging machines of the box and/or tray packaging type, adapted to combine a product with a blank in order subsequently to create a product- packaging unit having this packaging partially or totally wrapped around the product. The present invention also relates to a system for the application of this method.

In the packaging sector, the current prior art, as disclosed for instance by Patent Specifications US-3 908 333, corresponding to the Italian Patent Specification IT-970 180, US-3 555 776, US-4 571 916, US-4 793 117 and US-5 148 654, discloses packaging machines of the above-mentioned type substantially comprising a first line for conveying products, a second line for conveying blanks, a station where the products are combined with or loaded onto the blanks and, lastly, a third line for conveying product-blank units adapted to fold and secure a plurality of flaps extending from the base panel of the blank and articulated thereon by bead lines.

The first line for conveying products, in particular when products composed of batches of upright objects such as bottles are being handled, is adapted to feed a continuous flow of reciprocally spaced products disposed one after the other towards and into the combining station, extends horizontally and longitudinally in the downstream direction of the packaging machine and substantially comprises a unit former, a product conveyor, a dead slide plate and at the top a suspended thrust bar conveyor.

The second line for conveying blanks is adapted to feed a continuous flow of blanks to the above-mentioned combining station, extends below the first conveyor line and is vertically inclined upwards and in a downstream direction and comprises a conveyor using thrust pads which press on the rear edge of the blank.

The combining station, disposed downstream of these first and second conveyor lines and upstream of the third line, is adapted to combine each product with a respective blank by placing each product in sequence on the base panel of a respective blank and, in general, may use moving plate means and/or other controlled oscillating folding means.

The third line for conveying product-blank units is adapted to fold the panels and/or flaps extending from the base panel of the blank around the product and substantially comprises controlled fixed or moving folding means.

With reference to the blanks that these machines use and/or may use, it should be noted that these may have a different format and/or configuration, selected in relation to the products to be packaged and/or in relation to the packaging that it is wished to produce, but that they substantially always comprise a base panel on which the product to be packaged has to be placed in a correct position and various panels and flaps which are connected to the base panel by bead lines adapted to be folded about the product and secured in position to form a partial or total packaging.

With reference to the above-mentioned combining operation, it is evident that this must take place without relative movements between the product and the blank using an operating method which does not entail reversals or variations of the operating speeds, which does not entail a change in the directions of movement and in such a way that there is always a perfect phase relationship between the products and blanks. For this purpose, the optimum technical and functional characteristic that needs to be provided lies in moving the product and the relative blank into the above-mentioned combining station in the same direction and at an equivalent linear speed.

This optimum technical and functional characteristic is particularly necessary in the case of products consisting of batches of objects whose equilibrium is precarious such as bottles or the like.

With reference to the above-mentioned prior art, in order to embody the above-mentioned optimum technical and functional characteristic, the operating method used consists in disposing the blanks along the blank conveyor line one after the other with a feed pitch equivalent to or greater than their longitudinal length and disposing the products along the product conveyor line with the same pitch so that the product and blank can be combined in the combining station.

This method, in particular when handling blanks of substantial longitudinal length, entails the drawback of having to use a large product feed pitch which lowers the production capacity of the respective machines.

The Patent Specification US-4 631 895, corresponding to Italian Patent Specification IT-1 174 517, discloses a particular method and a particular system for combining the products with the respective blanks which is adapted to reduce this product feed pitch.

More particularly, in this prior art the blanks are folded into an L shape prior to their introduction and are temporarily and partially superimposed during their transverse insertion, commencing the insertion of a subsequent box above the rear panel of the horizontal portion of the previous blank by raising the subsequent product and making use for this operation of the free space between the thrust bar of the previous package and the front of the subsequent package. The blanks, passing between snap-locked thrust bars, are stopped in a position downstream of a dead slide plate provided with a vertical alternating movement and the combination of the products and blanks is obtained by means of these rear thrust bars which urge the products against the front panel of the stationary blank so that the product-blank unit can be forwarded to a subsequent conveyor.

This prior art has the drawbacks that the blanks have to be folded into an L shape prior to their insertion, that a discontinuous multidirectional and intermittent movement has to be used for these blanks, that a dwell

time between one product and the successive product has to be provided to allow for the insertion of the blank and that operating means with discontinuous and/or multidirectional and/or alternating movements have to be used as a result of which it is not possible to reach the operating speeds that can be obtained with substantially monodirectional continuous movements.

The object of the present invention is to resolve the above-mentioned drawbacks. The invention, as characterised in the claims, resolves the problem of creating a method and a system for combining, for packaging purposes, products with and on packaging blanks, particularly adapted for continuous packaging machines of the box or tray packaging type, adapted to combine a product with a blank so that a product-packaging unit can then be formed having this packaging wrapped partially or totally around the product.

The following results may be obtained from the use of a method and system of this type: a feed pitch between the products that is smaller than the longitudinal length of the blank; substantially continuous, uniform and monodirectional product and blank supply and feed movements; operating movements of the operating means that are substantially continuous, uniform and monodirectional.

The advantages obtained by the present invention consist substantially in that higher operating speeds can be used with a consequent increase in production capacity and in that a system with a monodirectional, continuous and linear movement can be obtained which is simple, functional and inexpensive to construct.

Description of an embodiment

Further characteristic features and advantages of the invention are set out in further detail in the following detailed description of a preferred embodiment given purely by way of non-limiting example, made with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic lateral view of a packaging machine using the method and system of the present invention;

Fig. 1A is a diagrammatic top view of the machine of Fig. 1 in which the product conveyor line has been removed in order to show the blank conveyor line;

Fig. 1B is a diagrammatic top view of the machine of Fig. 1;

Figs. 2 and 2A are, respectively, a diagrammatic lateral view of the packaging machine and a diagrammatic top view of the same machine in which the product conveyor line has been removed in order to show the blank conveyor line, illustrating a first operating position of the machine cycle;

Figs. 3 and 3A are two views similar to those of Figs. 2 and 2A showing a subsequent or second operating position of the machine cycle;

Figs. 4 and 4A are two views similar to those of Figs. 3 and 3A showing a subsequent or third operating position of the machine cycle;

Figs. 5 and 5A are two views similar to those of Figs. 4 and 4A showing a subsequent or fourth operating position of the machine cycle;

Figs. 6 and 6A are two views similar to those of Figs. 5 and 5A showing a subsequent or fifth operating position of the machine cycle;

Fig. 7 is a plan view of a packaging blank.

With reference to the following description and since the packaging machine described is substantially symmetrical and in mirror image, some reference numerals are followed by the letters "s" or "d" to indicate their left or right position with respect to an observer facing in the downstream direction of the machine; the letters "a", "b" or "c" after the reference numeral show the position of the specific component with respect to an equivalent component positioned upstream or downstream of the feed flow in which "a" precedes "b" and so on.

Figs. 1, 1A and 1B illustrate a packaging machine comprising a first line 100 for conveying products, a second line 200 for conveying blanks, a combining station 300 and a third line 400 for conveying product-blank units.

The first line 100 for conveying products is disposed horizontally and comprises a unit former 1 with stop pins 2 for the formation and/or pitch movement of the individual products and batches of objects 30, a multiple-belt conveyor 3 wound in a closed loop having its downstream end returned via a roller 4, a dead slide plate 5 and, raised above the product movement plane, a known conveyor 12, with two chains 12d and 12s wound in a closed loop in respective vertical planes, which bear successive suspended bars 13 adapted to push respective products 30 forward.

The second line 200 for conveying blanks is disposed below the first line 100 and is inclined upwards and in the downstream direction and comprises a slide plane 17 disposed inclined upwards and in the downstream direction provided with longitudinally extending openings 18s and 18d, a conveyor 20 with chains 20s and 20d wound in a closed loop on respective wheels 21s-22s and 21d-22d adapted to bear pairs of thrust pads 19s-19d adapted to slide freely in the openings 18s and 18d and a conveyor 24 with chains 24s and 24d wound in a closed loop on respective wheels 23s-26s and 23d-26d adapted to bear successive pairs of thrust pads 29s- 29d.

This second conveyor line 200 also has its down-

stream end associated with a vertical store 14 adapted to contain a plurality of blanks 15 which are taken up and supplied in single file by means of take-up and supply means 16.

The third line 300 for conveying units is disposed to be coplanar and slightly spaced with respect to the first line 100 for conveying products and comprises a first pair 27s and 27d and a second pair 28s and 28d of folding members moving in a circular orbit and borne by a pair of rotary members 31s, 31d, a conveyor 6 with chains 6s and 6d wound in a closed loop with their upstream ends on respective wheels 7s and 7d and bearing a plurality of successive pairs of oscillating and controlled folding members 8s-8d adapted to raise the front portion of the blanks and a conveyor 9 with chains 9s and 9d wound in a closed loop with their upstream ends on respective wheels 10s and 10d and bearing a plurality of successive pairs of oscillating and controlled folding members 11s and 11d adapted to raise the rear portion of the blanks.

The station or zone 300 in which the blanks and products are combined is disposed between the downstream end of the dead plate 5 and the upstream end of the conveyor 6 which is slightly spaced in order to define an opening 5a through which the blanks are fed upwards and in phase relationship with the arrival of the products 30.

Fig. 7 shows a blank 15 which is composed of a base panel 50 with relative flaps 50s and 50d and by two longitudinal portions, at the front and rear with respect to an arrow F1 illustrating the direction of feed of the blanks, in which the front portion comprises a front panel 51 with relative flaps 51s and 51d and an upper panel 52 with relative flaps 52s and 52d, while the rear portion comprises a rear panel 53 with relative flaps 53s and 53d and a closure flap 54.

In order to complete the description, it should also be noted that this apparatus is provided with synchronizer means of the mechanical and/or electric and/or electronic and/or computerised type for the synchronisation of the apparatus, which are not described or illustrated here because they lie outside the inventive scope of the present invention and because they are well known and may take various forms.

The operation of the apparatus will now be described with reference to Figs. 2 to 6 which show five successive operating sequences of the overall machine cycle.

In Figs. 2 and 2A, which show the position considered to be the starting point of the machine cycle, a blank 15a has been supplied to the combining station in phase relationship with the arrival of a product 30a which, pushed by a bar 13a, is disposed in the correct position on the base panel 50a of this blank 15a.

This blank 15a has its front portion 51a and 52a folded upwards by a pair of folding members 8sa and 8da described in detail below, and its rear portion urged downstream by a pair of thrust pads 19sa and 19da which press on the rear edge of the closure flap 54a while a further pair of thrust pads 29sa and 29da of the conveyor 24 are being inserted between the gaps obtained between the flaps 53sa-50sa and 53da-50da of this blank 15a.

The blank 15a is thus moved forward on the slide plane 17 while, upstream, pushed by successive pads 19sb and 19db, a successive blank 15b is supplied by sliding it along the same slide plane 17 with its front portion bearing on the apex of the pads 19sa and 19da.

With particular reference to Figs. 2, 2A and 1, 1B, the blank 15b has been supplied upstream of the slide plate 17 by the supply means 16 which have taken it individually from the foot of the store 14 and fed it transversely in phase relationship with the forward movement of a pair of pads 19sb-19db moved in continuous sequence with respect to a pair of pads 19sa-19da, in order to enable these pads 19sb-19db to engage the rear edge of this blank 15b.

Moreover, again with reference to this supply, it should be noted that the blank 15b has its front portion longitudinally superimposed on the rear portion of the blank 15a and that this superimposition has a measurement such that the front end of the blank 15b does not interfere with the base panel 50a of the blank 15a and the rear end of the blank 15a does not interfere with the base panel of the blank 15b for the reasons set out below.

With reference to Figs. 3 and 3A, which show a successive operating position with respect to Figs. 2 and 2A, the product-blank unit 30a-15a is fed to the right by the bar 13a which pushes the product 30a and the pads 29da and 29sa which push the blank 15a.

The blank 15b is pushed downstream by the pads 19db and 19sb and the front portion of this blank is partially introduced into the combining station where, by means of the pair of folding members 27d and 27s, the flaps 53sa and 53da of the blank 15a are folded upwards together with the flaps 52sb and 52db of the blank 15b since these latter are disposed within the former.

The product 30b is fed downstream under the pressure of a respective bar 13b.

With reference to Figs. 4 and 4A, which show a successive operating position with respect to Figs. 3 and 3A, the bar 13a has been deflected upwards and the product-blank unit 30a-15a is fed to the right under the pressure of the pads 29da and 29sa which press on the rear edge of the flaps 50da and 50sa.

The blank 15b is pushed downstream by the pads 19db and 19sb and the second pair of folding members 28s and 28d raise the flaps 51sb and 51db of the blank 15b upwards.

The product 30b, pushed by the bar 13b, is fed downstream into the combining station at a speed equivalent to that of the blank 15b.

With reference to Figs. 5 and 5A, which show a successive operating position with respect to Figs. 4 and 4A, the product-blank unit 30a-15a is fed further downstream by means of the pair of thrust pads 29sa and

29da which press on the rear edge of the lateral flaps 50sa and 50da and a pair of oscillating folding members 11sa and 11da prepare to fold the rear panel 53a with its relative flap 50a upwards.

The product 30b, by means of the bar 13b, is fed downstream beyond the dead plate 5 in phase relationship with the arrival therebelow of the relative blank 15b which is fed downstream by means of the pair of thrust pads 19db-19sb while a pair of folding members 8db-8sb starts to fold the front portion 51b of the blank 15b upwards and a further pair of intermediate thrust pads 29sb and 29db are ready to be inserted into the gaps between the flaps 53sb-50sb and 53db- 50db.

The blank 15b, during the combining stage, is fed in the same direction and at the same speed as the product 30b, so that the product 30b is correctly positioned on the base panel 50b. Moreover, having previously folded the lateral flaps 51db and 51sb of the front panel 51b, by raising the latter by means of the pair of oscillating folding members 8sb-8db a front and side container is obtained for the front row of the batch of objects 30b which, as is known, is the most likely to be upset during the combining stage.

With reference to Figs. 6 and 6A, which show a successive operating position with respect to Figs. 5 and 5A, the product-blank unit 30a-15a is fed downstream under the pressure of the oscillating folding members 11da and 11sa which have also folded the rear panel 53a of this blank upwards, while the thrust pads 29sa and 29da have been deflected downwards for return.

The product 30b and the relative blank 15b have reached the conditions illustrated in Fig. 2 with reference to the product 30a and the blank 15a, as a result of which the machine cycle is complete.

With reference to the operations to fold and close the remaining flaps, these operations are carried out subsequently in successive stations by means of fixed or moving folding members and by glue or other fastening systems, which are not described and illustrated here as they depart from the inventive scope of the present invention.

The description given and illustrated above relates to a "wrap-around" packaging machine in which the blank used is adapted to be wrapped completely around the product, but it is evident that the method and the system of the present invention may also be used to obtain trays or other types of packaging in which a product has to be combined with and on a relative blank for packaging purposes.

The above description of the method and the system is given purely by way of non-limiting example and it is therefore evident that all those modifications or variants suggested by practice or use may be made thereto and therefore come within the scope of the following claims.

Claims

1. A method for combining, for packaging purposes, products (30) with and on packaging blanks (15) for continuous packaging machines of the box and/or tray packaging type, in which this combination takes place in a combining station (300) by moving the product (30) and the respective blank (15) in the same direction and at the same linear speed and in which this combination consists in placing each product (30) in sequence in a correct position on the base panel (50) of a respective blank (15) which longitudinally comprises a front portion (51, 52) and a rear portion (53) extending from this front panel (50) and in which there is substantially provided: a first line (100) for conveying products (30) extending horizontally in the downstream direction adapted to feed a continuous flow of products (30) to be combined that are disposed in succession one after the other and reciprocally spaced to the combining station (300), a second line (200) for conveying blanks extending inclined vertically upwards in the downstream direction disposed below the first conveyor line (100) and adapted to feed a continuous flow of blanks (15) disposed in sequence to the combining station (300) by causing them to pass through an opening (5a) provided downstream of the first line (100) for conveying products (30), a third line (400) for conveying product-blank units (30-15) extending from the combining station (300) in the downstream direction of the machine adapted to fold about the product the panels (52, 51, 53, 54) and/or the flaps (53s, 50s, 51s, 52s, 53d, 50d, 51d, 52d) extending from the base panel (50) of the blank (15), synchronizer means adapted to synchronise the movement of the three conveyor lines (100, 200, 400) in order to obtain in this combining station (300) the correct phase relationship between each product (30) being supplied and a respective blank (15) being supplied in order to position this product (30) centrally on the base panel (50) of the respective blank (15), characterised in that the blanks (15) are disposed partially longitudinally superimposed on one another along the second conveyor line (200) for blanks and in that this partial longitudinal superimposition has a measurement such that the front portion (51, 52) of each blank (15) does not interfere with the base panel (50) of the previous blank (15) and the rear portion (53, 54) of each blank (15) does not interfere with the base panel (50) of the following blank (15).

2. A method as claimed in claim 1, characterised in that the front portion (51, 52) of each blank (15) is disposed on the rear portion (53, 54) of the previous blank (15).

3. A method as claimed in claim 2, characterised in that the lateral flaps (52s, 52d) of the front portion of the blank (15) positioned upstream are folded upwards by folding the lateral flaps (53s, 53d) of the

rear portion of the blank (15) positioned downstream upwards.

4. A method as claimed in one of the preceding claims, characterised in that the lateral flaps (51sb, 51db) of the front portion (51b) of the blank (15b) are firstly folded upwards and then the front portion (51b) of the blank (15b) is folded upwards in order to obtain a partial inclusion of the front portion of the package (30b).

5. A method as claimed in claim 4, characterised in that the rear portion (53a, 54a) of the blank (15a) is folded upwards after having removed the superimposed rear portion (52b, 51b) of the subsequent blank (15b).

6. A system for combining, for packaging purposes, products (30) with and on packaging blanks (15) for continuous packaging machines of the box and/or tray packaging type in which this combination takes place in a combining station (300) by moving the product (30) and the respective blank (15) in the same direction and at the same linear speed and in which this combination consists in placing each product (30) in sequence in a correct position on the base panel (50) of a respective blank (15) which longitudinally comprises a front portion (51, 52) and a rear portion (53) extending from this front panel (50) and in which there is substantially provided: a first line (100) for conveying products (30) extending horizontally in the downstream direction adapted to feed a continuous flow of products (30) to be combined which are disposed in succession one after the other and reciprocally spaced to the combining station (300), a second line (200) for conveying blanks extending inclined vertically upwards in the downstream direction disposed below the first conveyor line (100) and adapted to feed a continuous flow of blanks (15) disposed in sequence to the combining station (300) by causing them to pass through an opening (5a) provided downstream of the first line (100) for conveying products (30), a third line (400) for conveying product-blank units (30-15) extending from the combining station (300) downstream of the machine adapted to fold around the product the panels (52, 51, 53, 54) and/or the flaps (53s, 50s, 51s, 52s, 53d, 50d, 51d, 52d) extending from the base panel (50) of the blank (15), synchronizer means adapted to synchronize the movement of the three conveyor lines (100, 200, 400) in order to obtain in this combining station (300) the correct phase relationship between a product (30) being supplied and a respective blank (15) being supplied in order to position this product (30) centrally on the base panel (50) of the respective blank (15), wherein this system is characterised in that the second conveyor line comprises a first conveyor (20) with thrust pads (19s, 19d) having its upstream end disposed in the vicinity of supply means (16) for blanks (15) and its downstream end disposed spaced below the opening (5a) disposed downstream of the first conveyor line (100) for products (30) and a second conveyor (24) with thrust pads (29s, 29d) having its upstream end disposed in the downstream operating area of the first conveyor (20) and its downstream end disposed in the combining station (300) and in the upstream operating area of the third line (400) for conveying products (30).

7. A system as claimed in claim 6, characterised in that the thrust pads (19s, 19d) of the first conveyor (20) act on the rear edge (54) of the blank (15) and the thrust pads (29s, 29d) of the second conveyor (24) act on the rear edge of lateral flaps (50s, 50d) of the base panel (50) of the blank (15).

8. A system as claimed in claim 7, characterised in that the second conveyor line (200) comprises a slide plate (17) inclined upwards and in the downstream direction in which the upper plane enters the combining station (300) and in which openings (18s, 18d) are provided within which the thrust pads (19s, 19d) of the first conveyor (20) slide.

9. A system as claimed in one of claims 6 to 8, characterised in that the combining station (300) is provided with rotating folding members (27s, 27d, 28s, 28d) adapted to fold upwards flaps (53s, 53d, 52s, 52d, 51s, 51d) extending laterally from the base panel (50) of the blank (15).

10. A system as claimed in claim 9, characterized in that the folding members comprise a first pair of folders (26s, 27d) and a second pair of folders (28s, 28d) borne in an angularly spaced manner along their circular path by means of a pair of rotary members (31s, 31d).

11. A method and system as claimed in the preceding claims and substantially as described and illustrated in the accompanying drawings and for the purposes specified above.

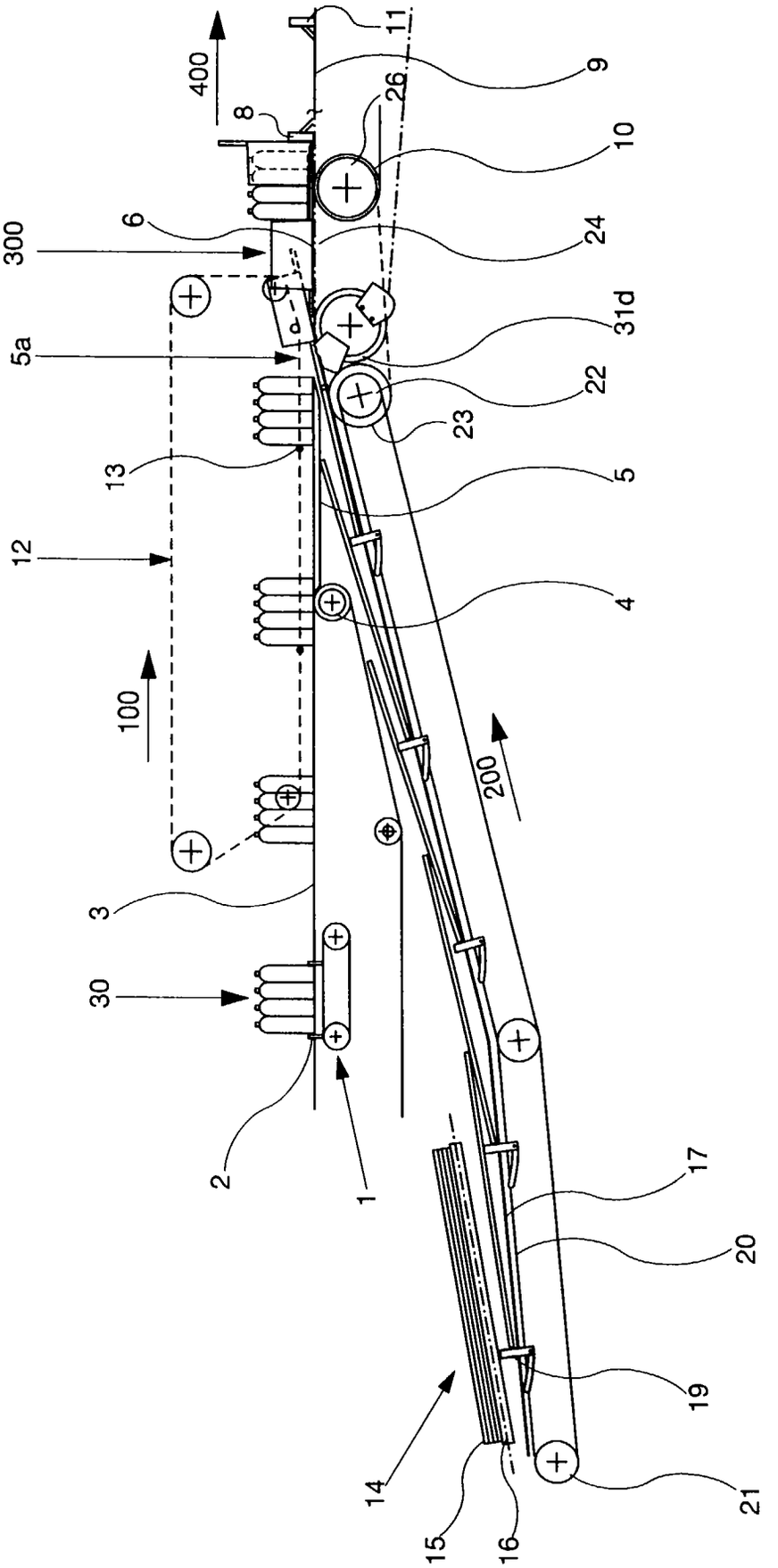
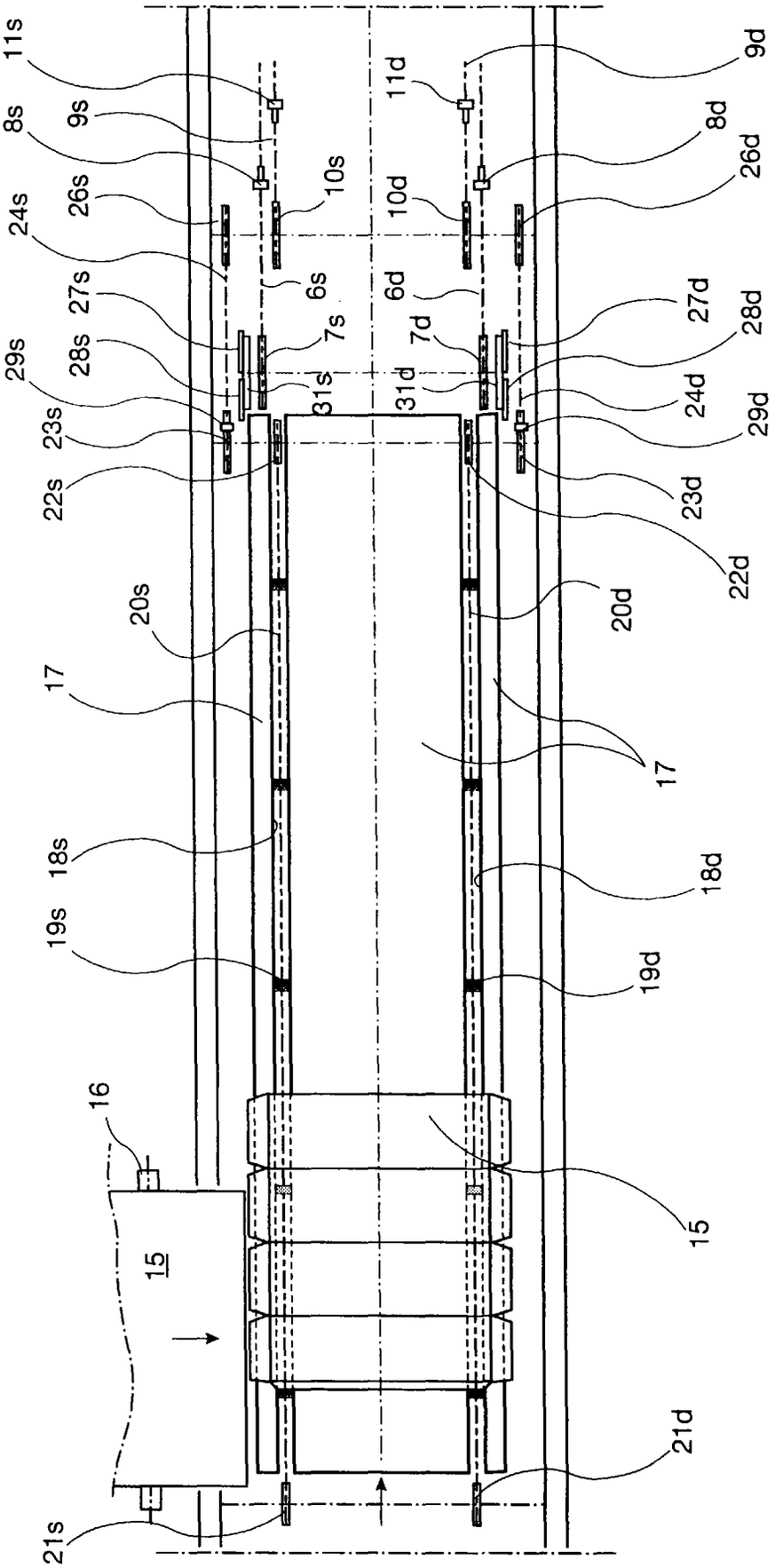

400
11
9
8
26
10
300
6
24
5a
31d
22
23
13
5
12
4
100
200
3
30
2
1
17
20
19
14
15
16
21

FIG-1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7s
29s
28s
31s
23s
22s
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18s
19s
16
15
21s
9d
11d
8d
26d
10d
6d
27d
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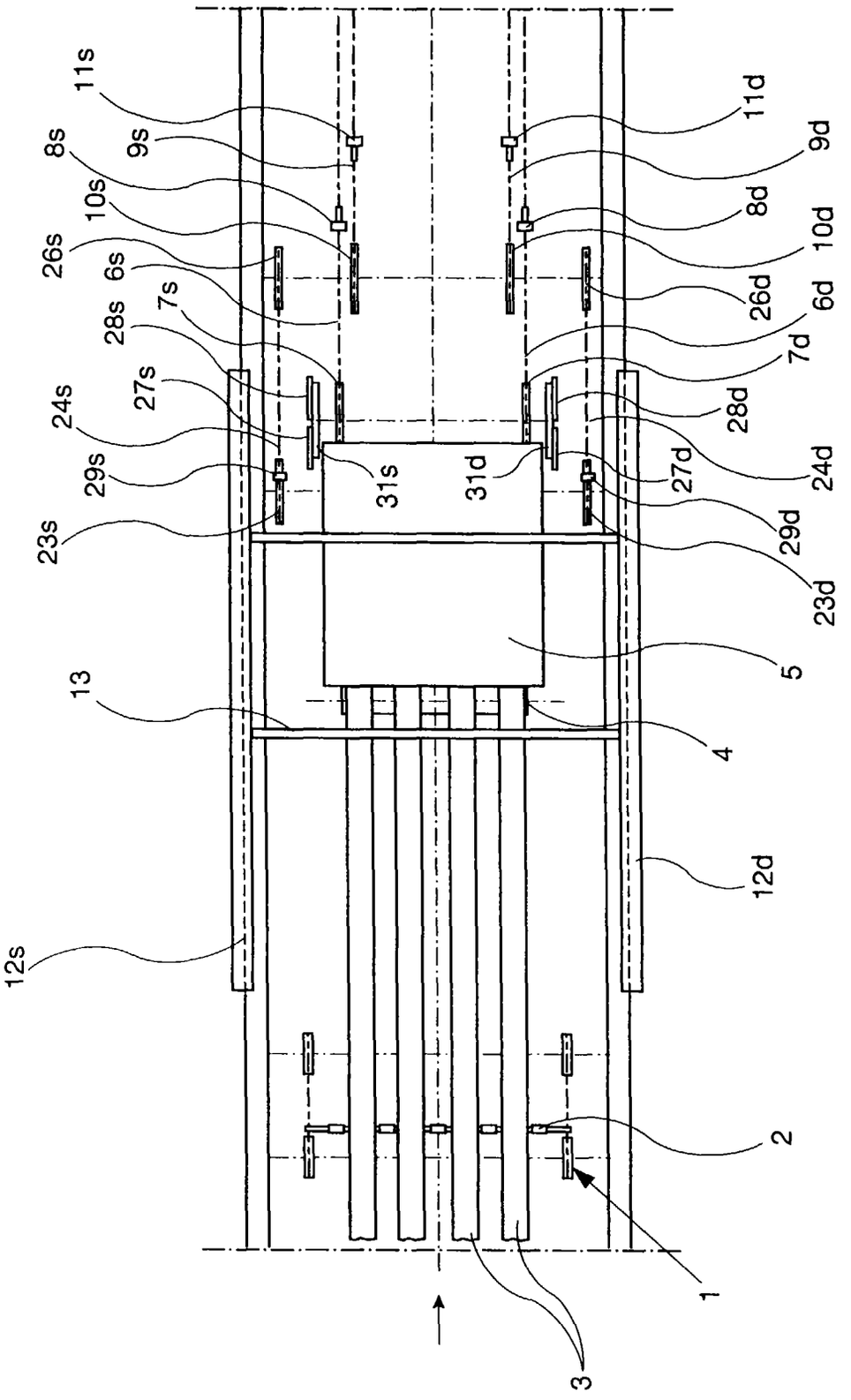
20d
17
18d
19d
15
21d

FIG. 1A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6s
7s
28s
27s
24s
29s
23s
31s
31d
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4
12s
12d
2
1
3
11d
9d
8d
10d
26d
6d
7d
28d
27d
24d
29d
23d

FIG-1B

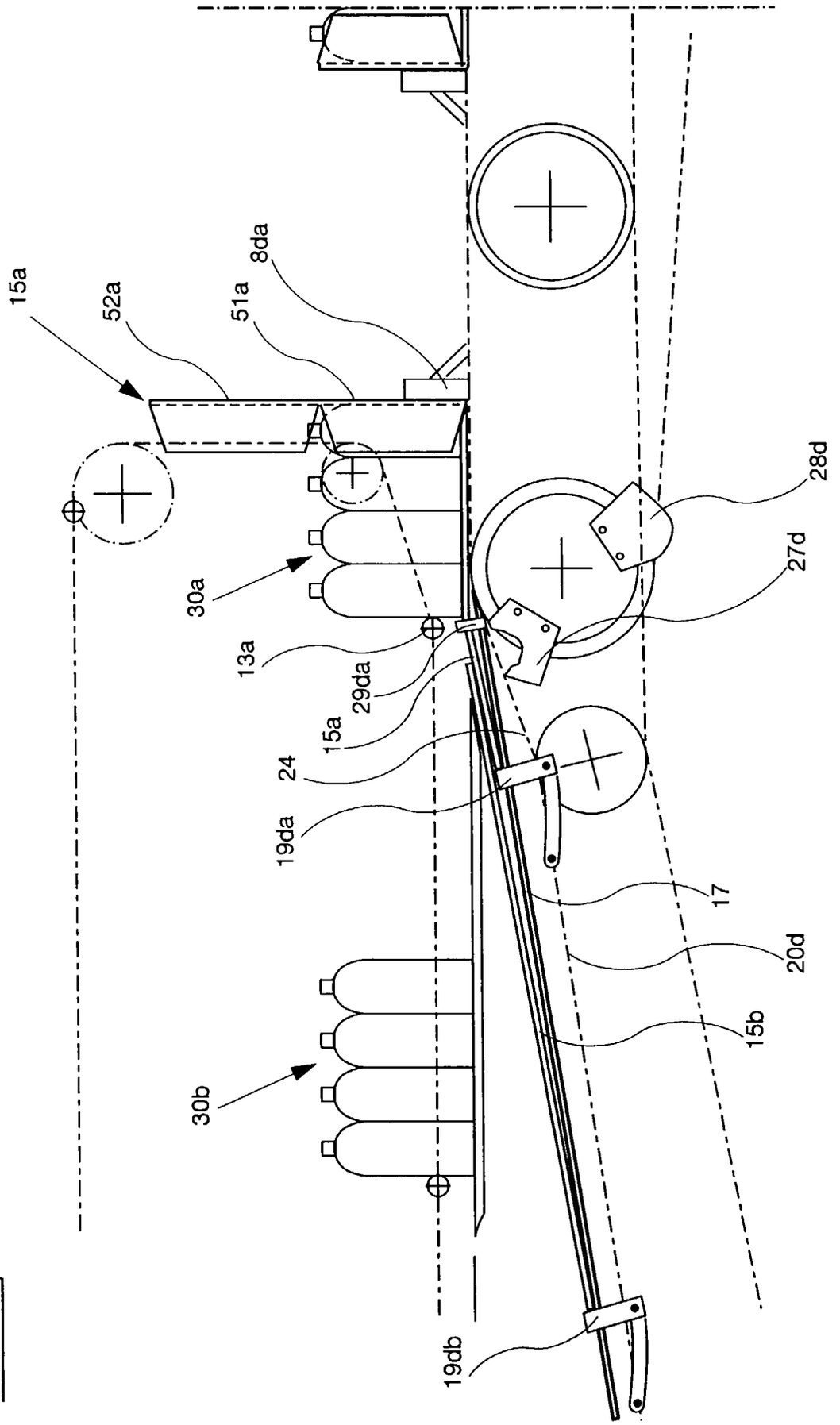

15a
52a
51a
8da
28d
27d
30a
13a
29da
15a
24
19da
17
20d
15b
30b
19db

FIG-2

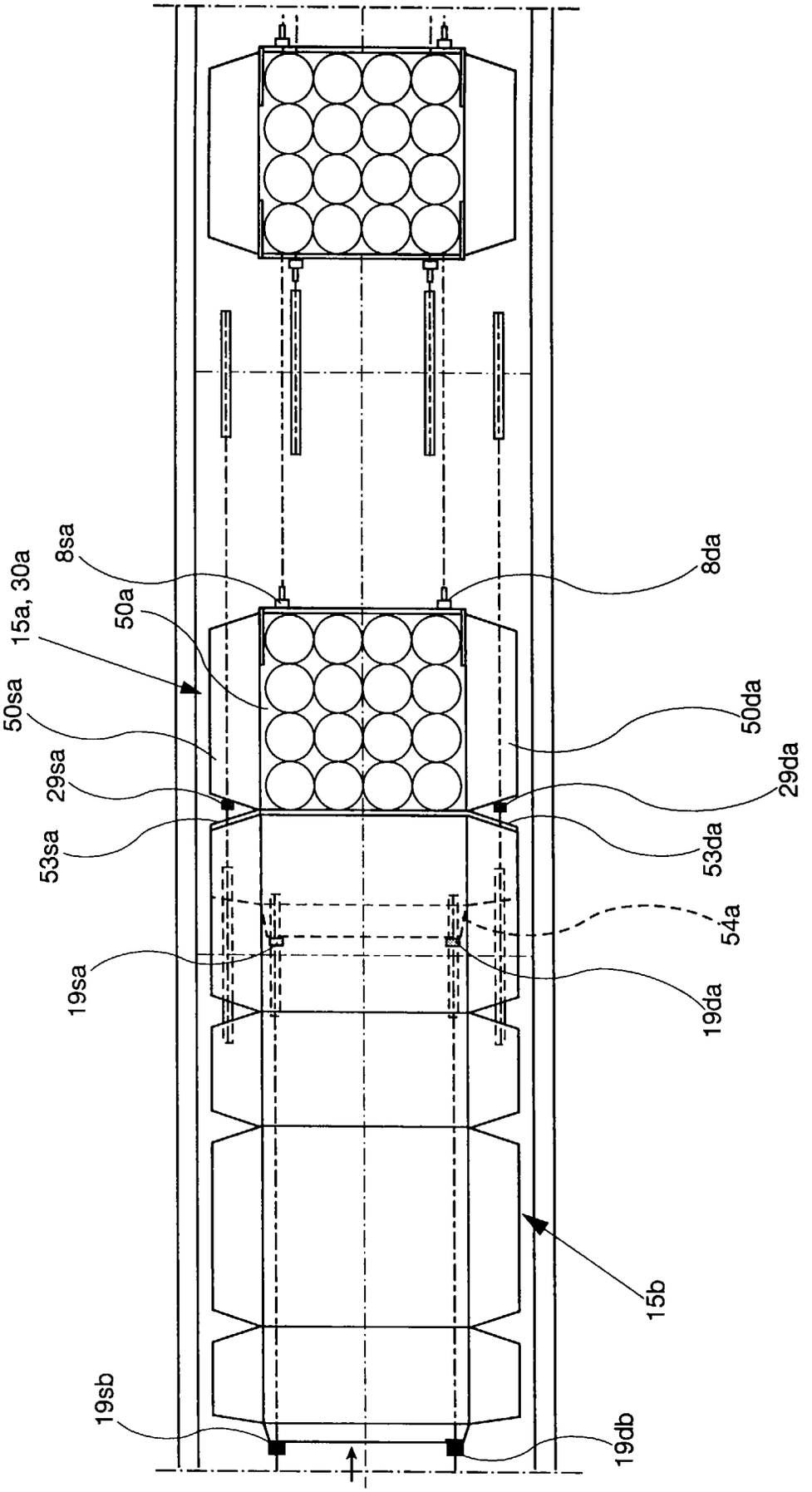

8sa
15a, 30a
50a
50sa
29sa
53sa
19sa
19sb
8da
50da
29da
53da
54a
19da
15b
19db

FIG-2A

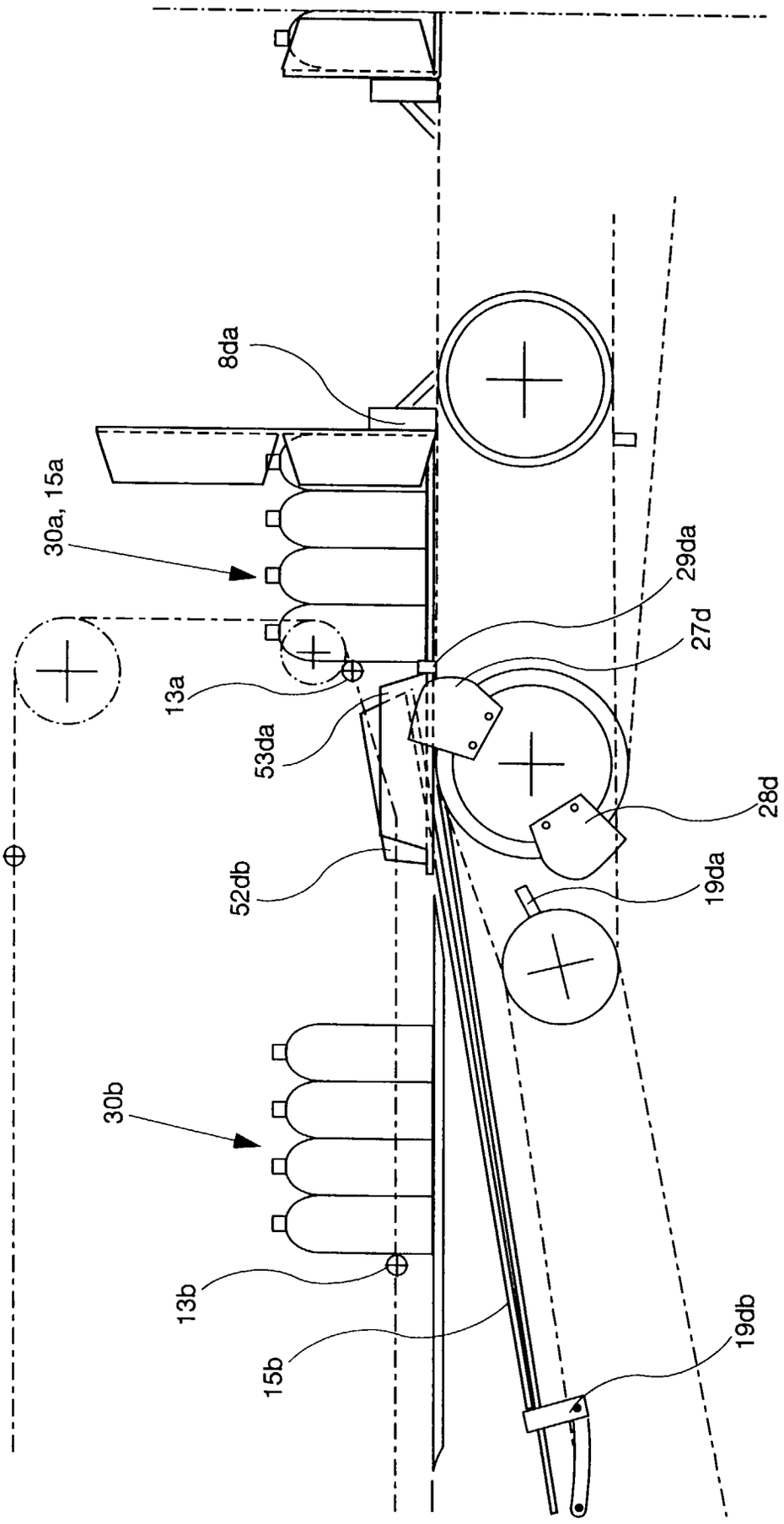


FIG-3

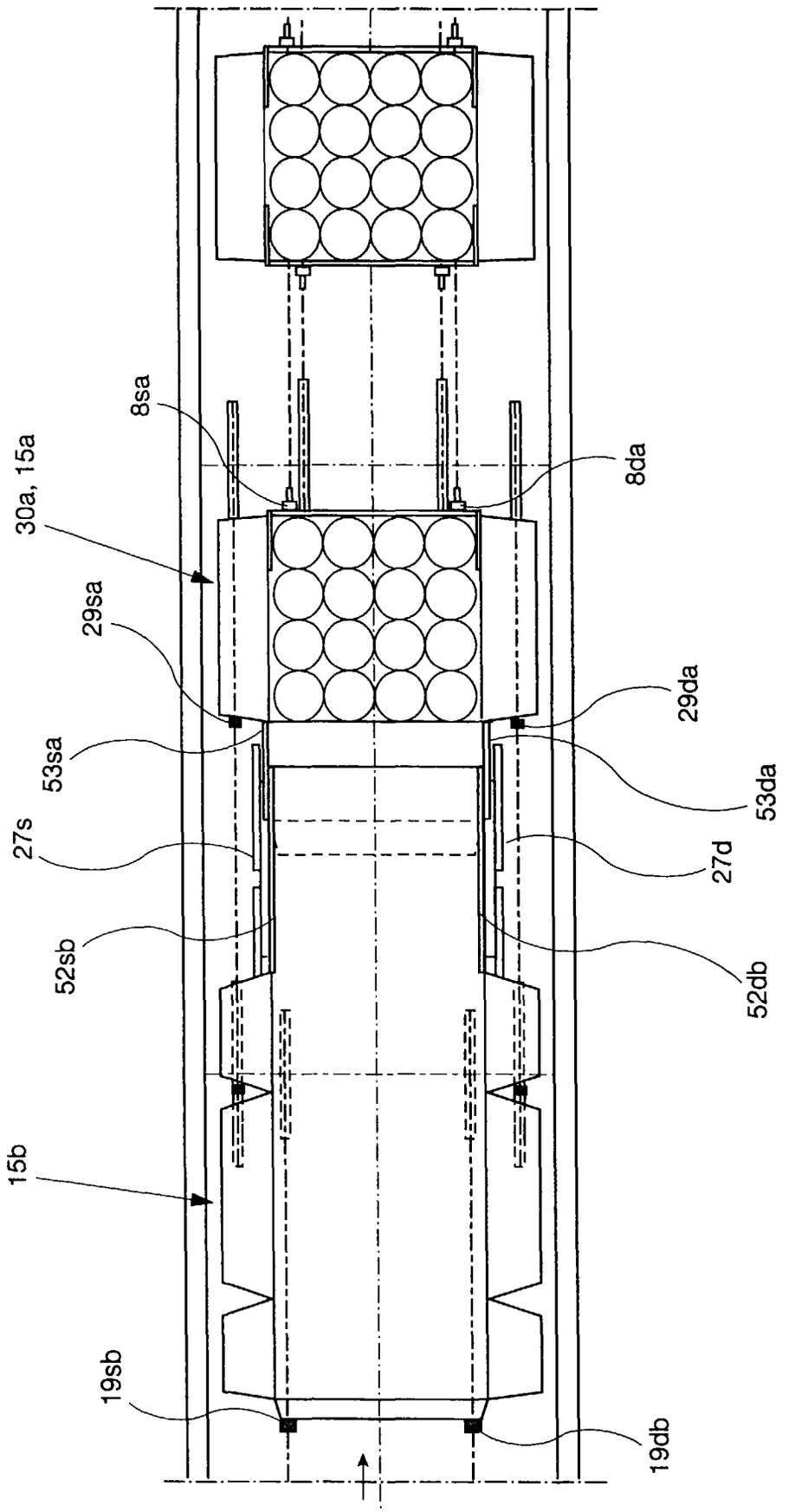

8sa
8da
30a, 15a
29sa
29da
53sa
53da
27s
27d
52sb
52db
15b
19sb
19db

FIG-3A

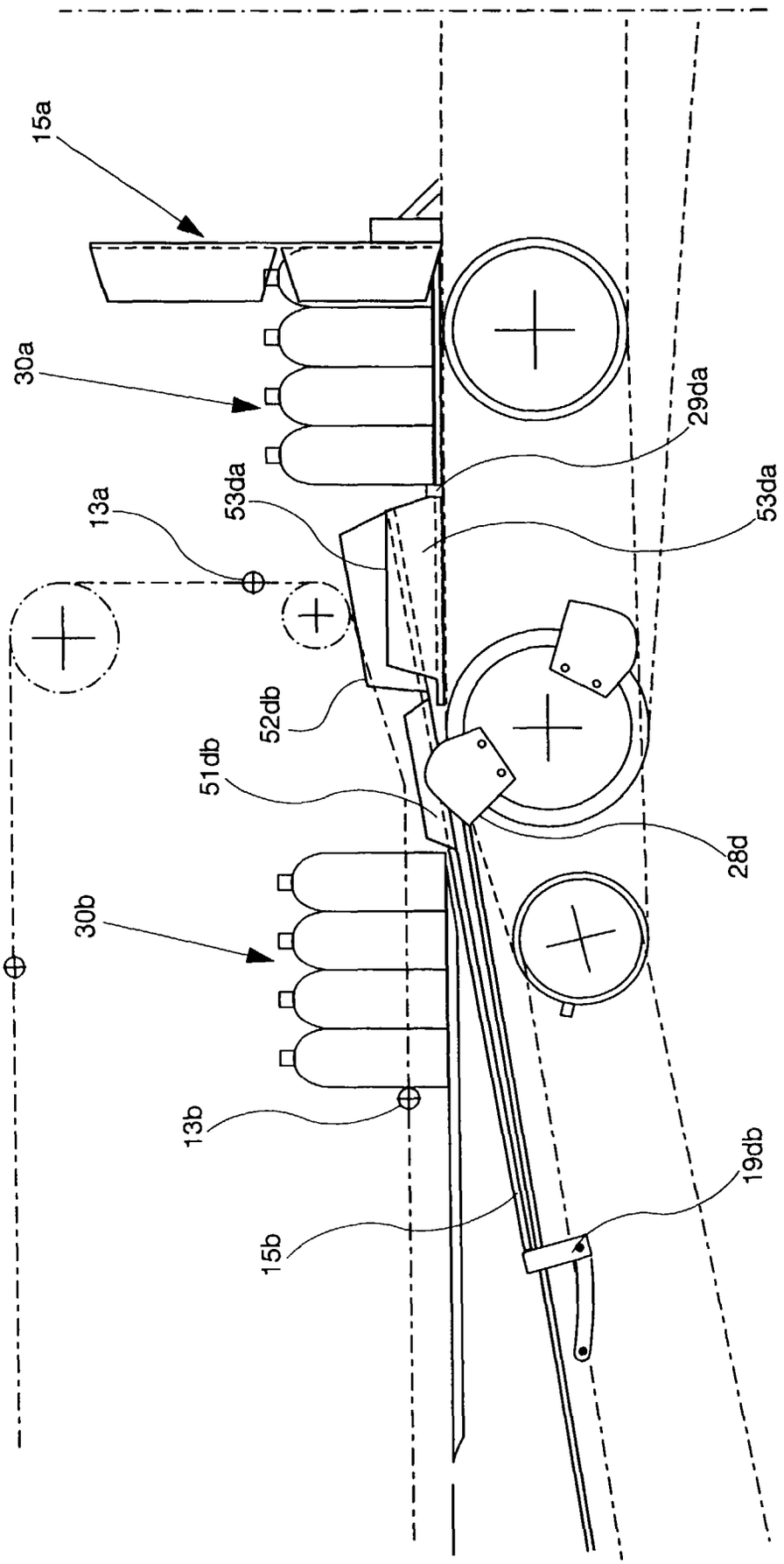


FIG-4

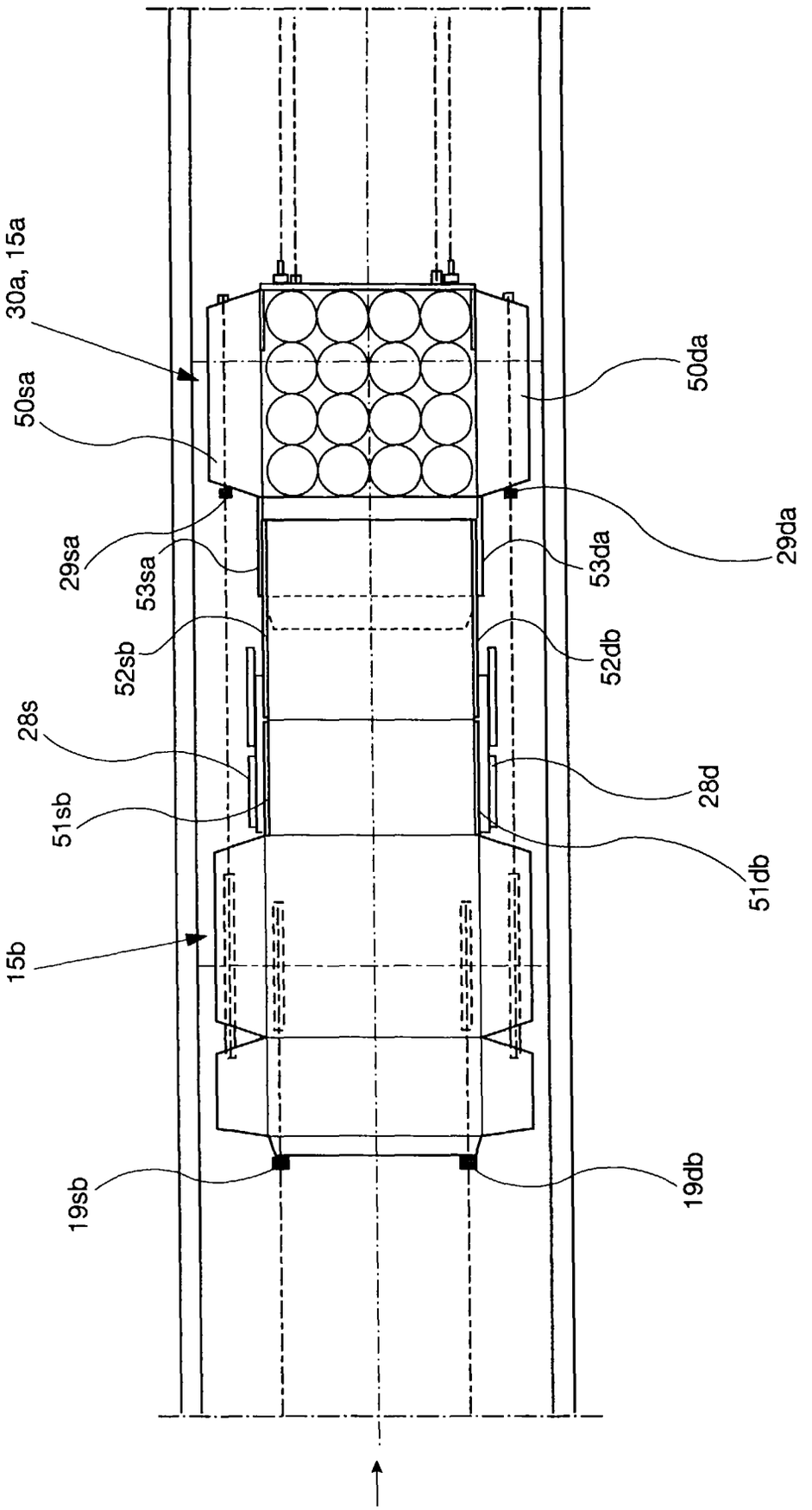

30a, 15a
50sa
50da
29sa
53sa
53da
29da
52sb
52db
28s
28d
51sb
51db
15b
19sb
19db

FIG. 4A

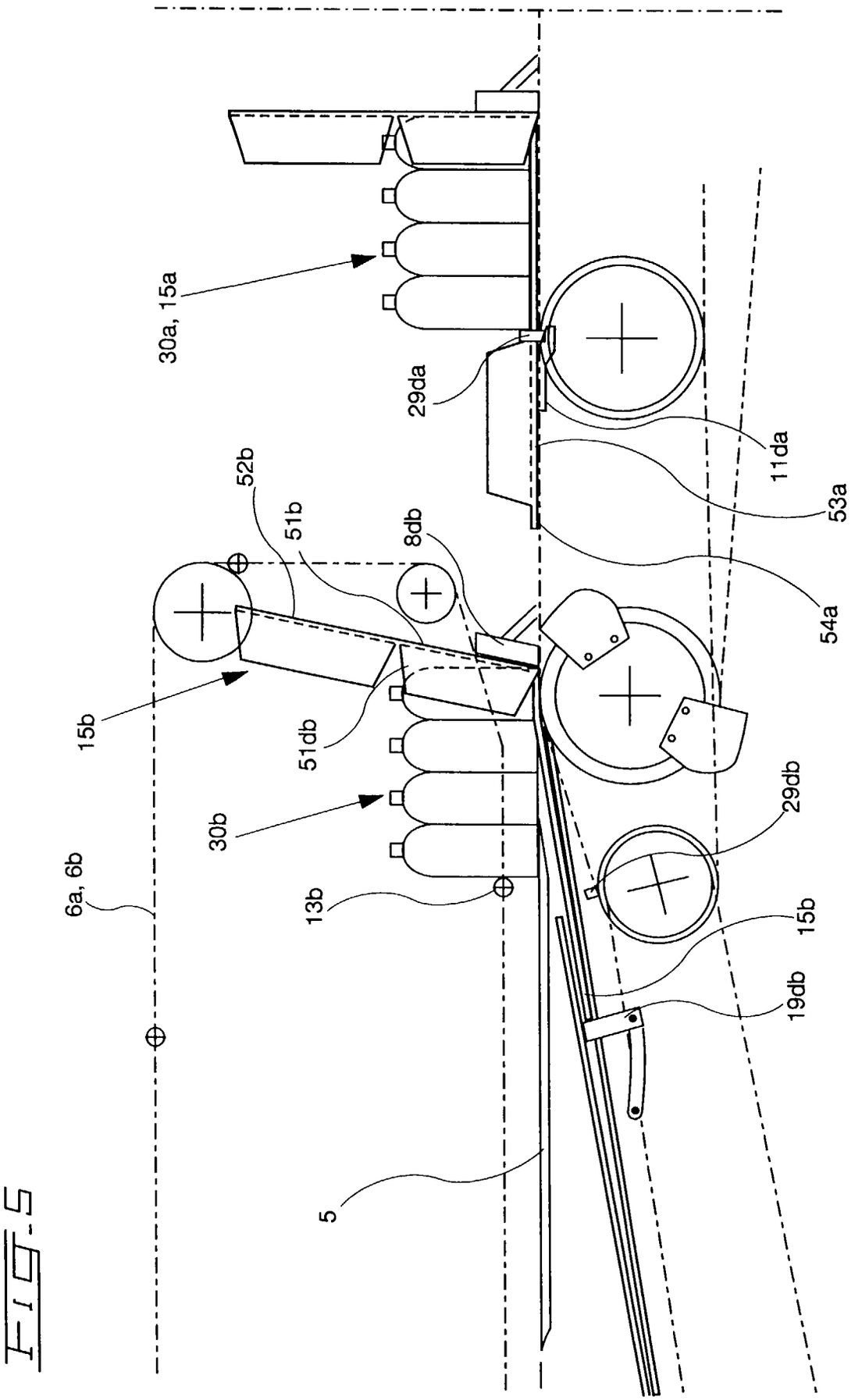

30a, 15a
29da
11da
53a
54a
52b
51b
8db
15b
51db
30b
13b
6a, 6b
5
29db
15b
19db

FIG.5

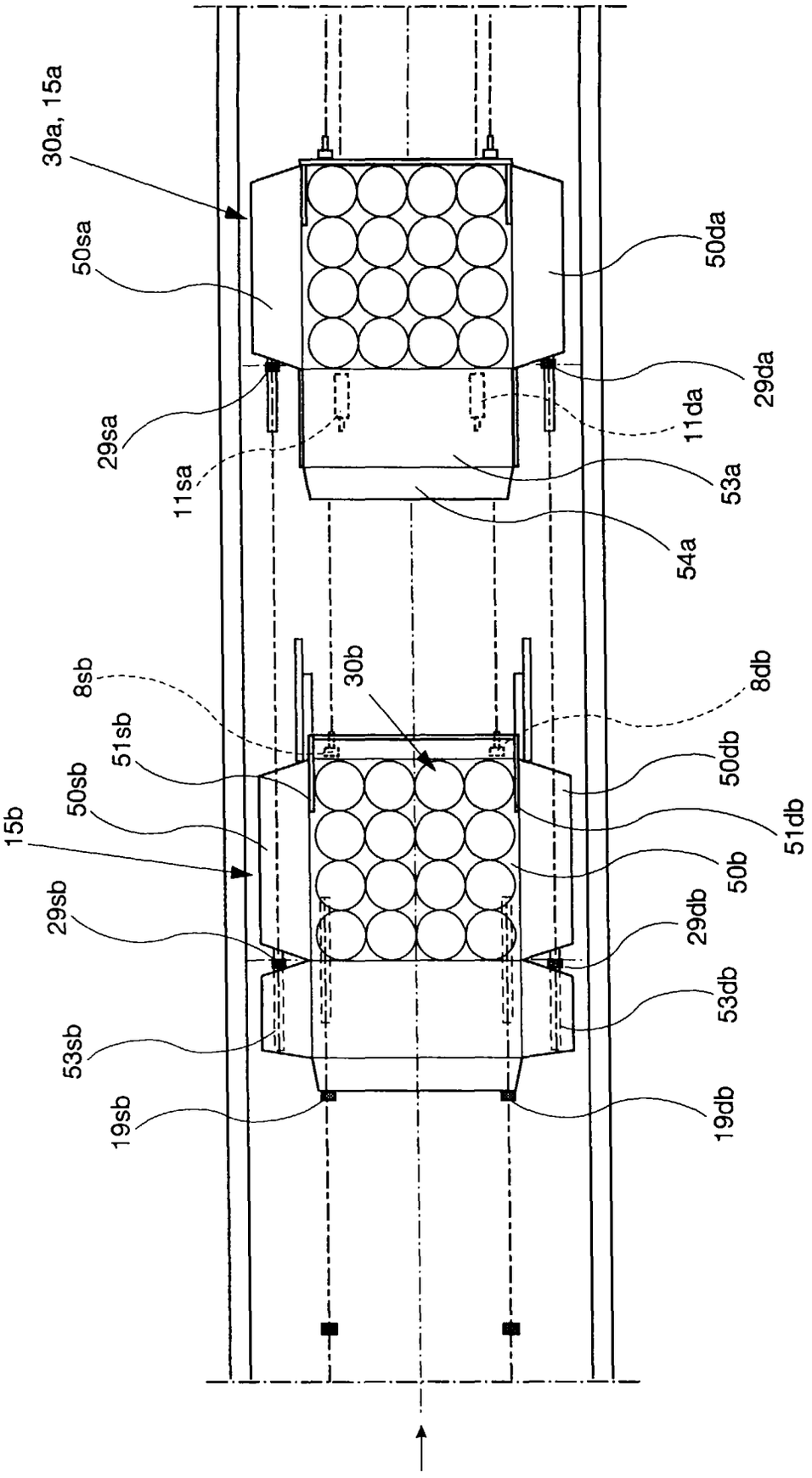

30a, 15a
50sa
50da
29sa
29da
11sa
11da
53a
54a
8sb
30b
8db
51sb
50db
50sb
51db
15b
50b
29sb
29db
53sb
53db
19sb
19db

FIG-5A

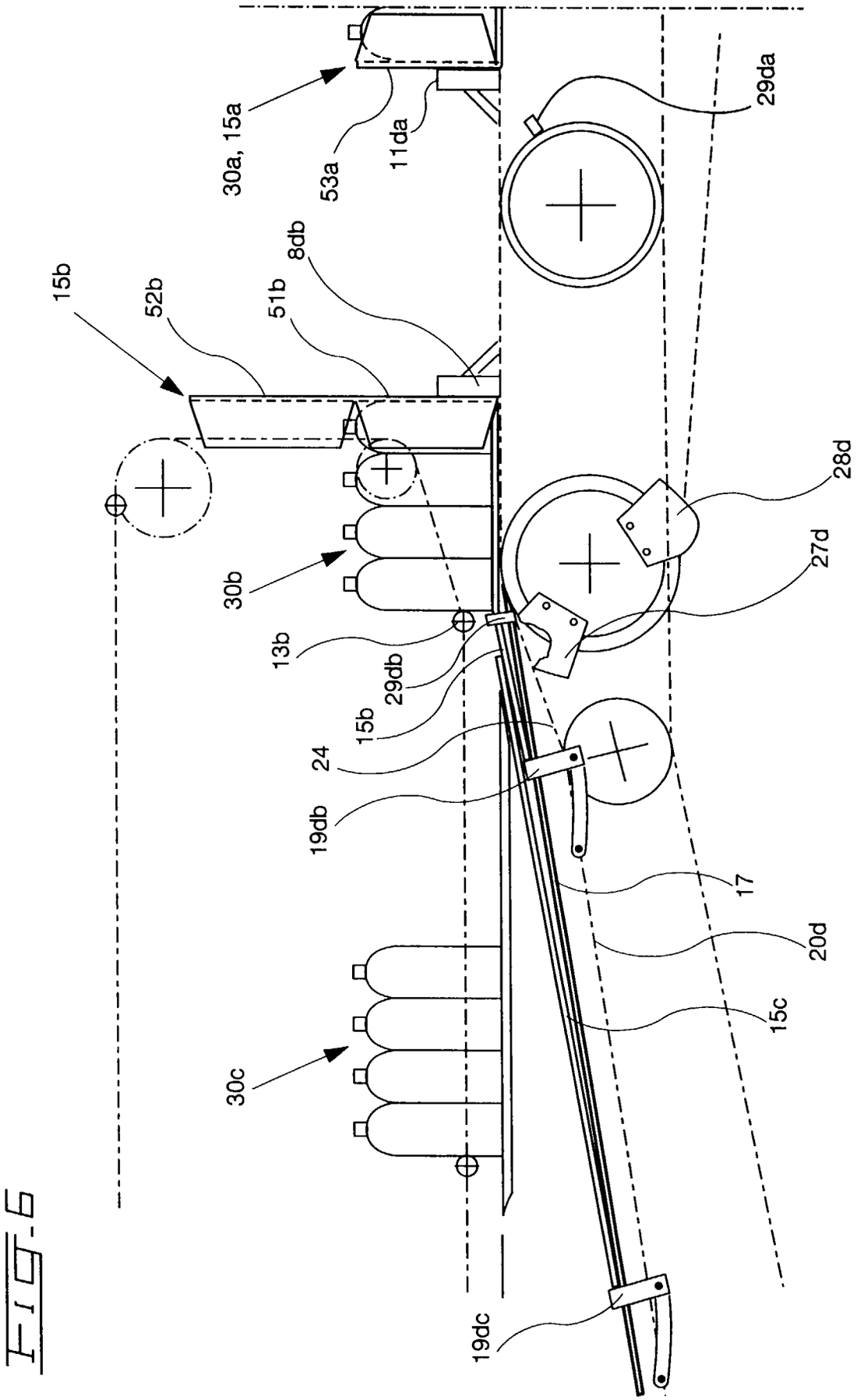

30a, 15a
53a
11da
29da
15b
52b
51b
8db
28d
27d
30b
13b
29db
15b
24
19db
17
20d
15c
30c
19dc

FIG-6

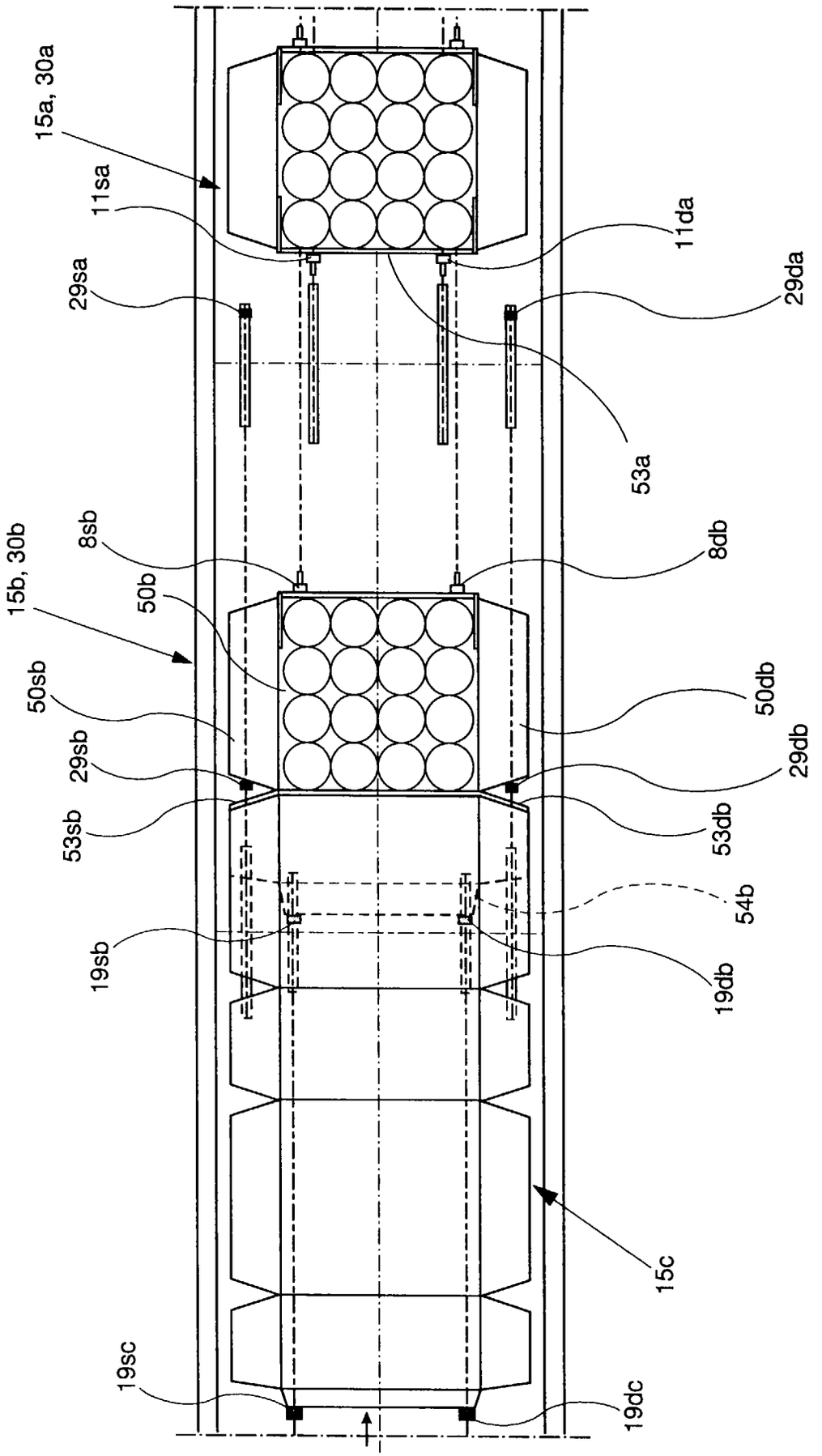
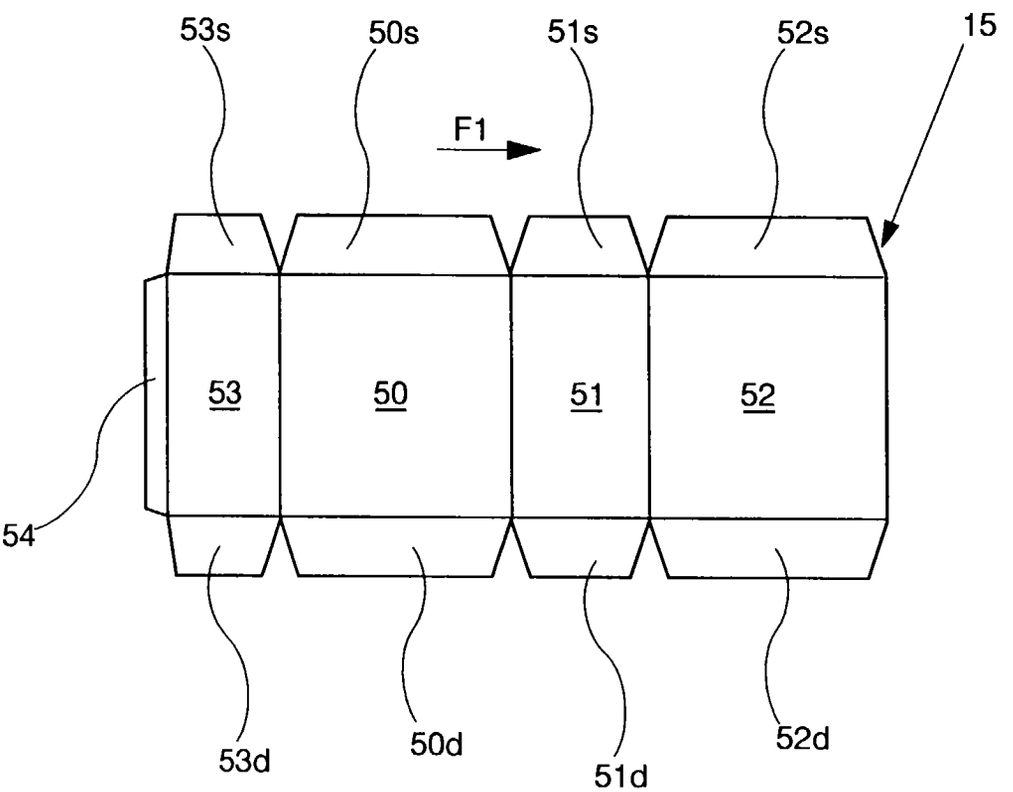

15a, 30a
11sa
11da
29sa
29da
53a
8sb
8db
15b, 30b
50b
50sb
50db
29sb
29db
53sb
53db
54b
19sb
19db
15c
19sc
19dc

FIG-6A

Fig.7



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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 0714

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 640 527 A (OCME) * abstract; figures 2-8 * ---	1,6	B65B21/24
A,D	GB 2 158 036 A (OCME) * abstract; figure 4 * & US 4 631 895 A -----	1,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 April 1997	Claeys, H

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