



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.01.2017 Bulletin 2017/03

(51) Int Cl.:
B65B 19/12 (2006.01) **B65B 19/20** (2006.01)
B65B 19/22 (2006.01) **B65D 5/66** (2006.01)
B65D 85/10 (2006.01)

(21) Application number: **16176956.7**

(22) Date of filing: **29.06.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **G.D S.p.A.**
40133 Bologna (IT)

(72) Inventor: **BOLDRINI, Fulvio**
44100 Ferrara (IT)

(74) Representative: **Bianciardi, Ezio**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

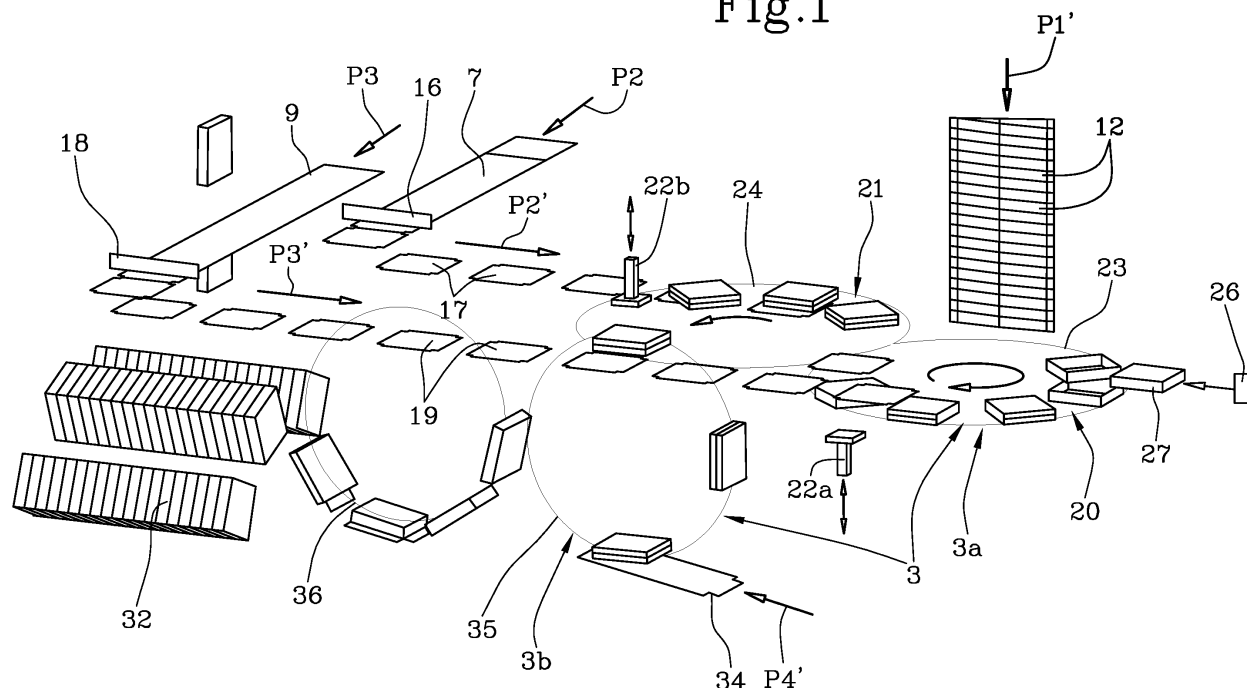
(30) Priority: **16.07.2015 IT UB20152244**

(54) **MACHINE AND METHOD FOR MAKING CIGARETTE PACKETS OF THE "SHOULDER BOX" TYPE**

(57) A machine for making cigarette packets (100) of the "shoulder box" type, comprising a making-up unit (2) configured to make up the base (101) and the lid (102) onto the collar (104) along a making-up path (3). First feeding means (4) are configured to move a first continuous band (5), which is suitable for making the collar (104) of each packet (100), along a first feed path (P1). Second feeding means (6) are configured to move a sec-

ond continuous band (7), which is suitable for making the base (101) of each packet (100), along a second feed path (P2). Third feeding means (8) are configured to move a third continuous band (9), which is suitable for making the lid (102) of each packet (100), along a third feed path (P3). The first, second and third feed paths (P1, P2, P3) meet the making-up unit (2) along the making-up path (3). [Figure 3]

Fig.1



Description

[0001] This invention relates to a machine and a method for making cigarette packets of the type commonly known as "shoulder boxes".

[0002] The term "shoulder box" is used to designate a packet comprising a base and a lid which is hinged to the base by means of an adhesive label which is glued both to the base and to the lid. Both the base and the lid have the shape of a low, open-top box. Inside the base there is a collar which protrudes from the side walls of the base towards the lid to act as a guide and reference for lid movement and, by interfering slightly with the free movement of the lid, to keep the lid in contact with the base when the lid is in the closed position. The base houses a group of cigarettes comprising two superposed layers of cigarettes.

[0003] At present, a "shoulder-box" packet of this kind is made from a first blank, which is gummed and folded to form the base, a second blank which is independent of the first blank and which is gummed and folded to form the lid, a third blank which is independent of the first and second blanks and which is folded to form the collar and then placed inside the base and glued to the side walls of the base, and, lastly, a label which is wrapped around and glued to the base and lid in order to hinge the base to the lid. The three blanks are made independently of each other and fed manually to the different wrapping units. That means making a "shoulder-box" packet is a somewhat slow and complex process because it involves not only separately handling and manually loading three distinct blanks but also having to use three independent wrapping units, each of which folds a corresponding blank.

[0004] This invention therefore has for an aim to provide a machine and a method for making cigarette packets of the "shoulder box" type to overcome the disadvantages described above with reference to the prior art.

[0005] More specifically, the aim of this invention is to provide a machine and a method for making cigarette packets of the "shoulder box" type capable of automating and simplifying the production of such packets and thereby reducing process times. Another aim of the invention is to provide a machine for making cigarette packets of the "shoulder box" type which is compact and versatile and suitable not only for making empty packets intended for subsequent filling with cigarettes but also complete packets with cigarettes inside them.

[0006] These aims are achieved by a machine and a method for making cigarette packets of the "shoulder-box" type having the features set out in one or more of the appended claims.

[0007] Advantageously, thanks to the machine and method of the invention, it is possible to reduce process times and floor space required to put the machine in operation and to make both empty packets and complete packets.

[0008] Further features and advantages of the inven-

tion are more apparent from the following exemplary and therefore non-limiting description of a preferred and hence non-exclusive embodiment of a machine and a method for making cigarette packets of the "shoulder-box" type.

[0009] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it and in which:

- 10 - Figure 1 shows a functional diagram of a machine for making cigarette packets of the "shoulder-box" type according to this invention;
- Figure 2 shows a detail of the machine for making cigarette packets of the "shoulder-box" type according to the invention;
- 15 - Figures 3 and 4 are schematic perspective views from different angles, showing the machine for making cigarette packets of the "shoulder-box" type according to the invention;
- 20 - Figure 5 is a schematic perspective view of a cigarette packet of the "shoulder-box" type.

[0010] With reference to Figures 3 and 4, the numeral 1 denotes in its entirety a machine for making cigarette packets 100 of the "shoulder box" type.

[0011] A packet 100 of the "shoulder-box" type is illustrated by way of example in Figure 5 and comprises a base 101 having the shape of a low box which is open at the top, and a lid 102 having the shape of a low box which is open at the bottom. A label 103 is glued both to the base and to the lid in order to hinge the lid to the base. A collar 104 is positioned inside the base 101 and protrudes from the side walls of the base towards the lid 102. The collar 104 constitutes a shoulder which helps keep the lid 102 in the closed position. In use, the collar 104 delimits the space occupied by a group of cigarettes intended to be contained in the packet 100.

[0012] The machine 1 comprises a making-up unit 2 configured to make up the base 101 and the lid 102 onto the collar 104 along a making-up path 3.

[0013] The numeral 4 denotes first feeding means for feeding a first continuous band 5 suitable for making the collar 104 of each packet 100. The first feeding means 4 are configured to move the first continuous band 5 along a first feed path P1, for example unwinding it from a roll B1.

[0014] The numeral 6 denotes second feeding means for feeding a second continuous band 7 suitable for making the base 101 of each packet 100. The second feeding means 6 are configured to move the second continuous band along a second feed path P2.

[0015] The numeral 8 denotes third feeding means for feeding a third continuous band 9 suitable for making the lid 102 of each packet 100. The third feeding means are configured to move the third continuous band along a third feed path P3.

[0016] The first, second and third feed paths P1, P2, P3 meet the making-up unit 2 along the making-up path 3.

[0017] Preferably, the first feeding means 4 are configured to fold the first continuous band 5 along its main direction of extension to form a narrow looped band 10. Preferably, the longitudinal edges of the first continuous band 5 are positioned at the centre of the band 5 itself and fixed by applying a longitudinal label, not illustrated here.

[0018] The numeral 11 denotes first cutting means located along the first feed path P1 and configured to cut the narrow looped band 10 transversely and to make a sequence of narrow collars 12. The first feeding means 4 are configured to move the sequence of narrow collars 12 along a final stretch P1' of the first feed path P1 towards an initial portion 3a of the making-up path 3.

[0019] The numeral 13 denotes a retractor device located at the end of the first feed path P1 (Figure 2) and configured to open out one narrow collar 12 at a time until reaching the shape of the side walls of the base 101, thus forming the collar 104. Preferably, the retractor device 13 comprises a rotary lever 14 operating on a movable portion 12a of the narrow collar 12. A transverse finger 15 is configured to transfer each collar 104 thus formed to the initial portion 3a of the making-up path 3.

[0020] The numeral 16 in Figure 1 denotes second cutting means located along the second feed path P2 and configured to cut the second continuous band 7 transversely and to make a sequence of blanks 17 for the base 101. The second feeding means 6 are configured to move the sequence of blanks 17 along a final stretch P2' of the second feed path P2 towards the initial portion 3a of the making-up path 3.

[0021] The numeral 18 denotes third cutting means located along the third feed path P3 and configured to cut the third continuous band 9 transversely and to make a sequence of blanks 19 for the lid 102. The third feeding means 8 are configured to move the sequence of blanks 19 along a final stretch P3' of the third feed path P3 towards the initial portion 3a of the making-up path 3.

[0022] Preferably, the initial portion 3a of the making-up path 3 is located on at least two levels 20, 21. The numeral 22a denotes transfer means, preferably a pusher, configured to transfer from one level 20 to the other level 21 an assembly made up of a collar 104 associated with the respective blank of the base 101 and/or of the lid 102. In the embodiment illustrated in Figure 1, the collar 104 is, by way of example, associated with the lid 102.

[0023] Preferably, the making-up unit 2 comprises at least two rotary conveyors, preferably carousels 23, 24, each located on one of the levels 20, 21 and each provided with hollows 25 configured to receive the assemblies. The hollows 25 define respective folding dies 25b of folding means 25a for folding the blanks 17, 19 onto the collar and configured to operate during the passage between one level 20 and the other 21. Preferably, to be able to transfer the assemblies from one level 20 to the other 21 through the hollows 25, the pusher 22a is movable transversely to the initial portion 3a.

[0024] As shown for example in Figure 1, the first feed path P1 meets the initial portion 3a of the making-up path upstream of the second and third feed paths P2 and P3 along a direction of travel defined by the making-up path 3.

[0025] Preferably, filling means 26 are provided which are configured to place a group 27 of cigarettes inside each collar 104 along the initial portion 3a of the making-up path 3. Preferably, the filling means 26 act in conjunction with respective bottoms 25c of the hollows 25 in that each bottom 25c is movable transversely to the initial portion 3a of the making-up path 3, relative to the respective collar 104, to receive a group 27 of cigarettes and place it inside the collar 104.

[0026] With reference to Figure 3, the second and third feeding means 6 and 8 comprise unwinding means 28, configured to unwind a roll B2 of a double continuous band 29, and longitudinal cutting means 30, configured to longitudinally divide the double continuous band 29 to form the second continuous band 7 and the third continuous band 9.

[0027] The numeral 31 denotes fourth feeding means for feeding a fourth continuous band 32 suitable for making the label 103 of each packet 100. The fourth feeding means 31 are configured to move the fourth continuous band 32 along a fourth feed path P4 which meets the making-up unit 2 along the making-up path 3.

[0028] The numeral 33 denotes fourth cutting means located along the fourth feed path P4 and configured to cut the fourth continuous band 32 transversely and to make a sequence of blanks 34 for the label 103. The fourth feeding means 31 are configured to move the sequence of blanks 34 along a final stretch P4' of the fourth feed path P4 towards a final portion 3b of the making-up path 3.

[0029] In use, the machine 1 is suitable for implementing a method for making cigarette packets 100 of the "shoulder box" type according to this invention.

[0030] The method comprises feeding the first continuous band 5, which is suitable for making each collar 104, moving it along the first feed path P1 and folding it along its main direction of extension to form the narrow looped band 10.

[0031] The narrow looped band 10 is cut transversely to make the sequence of narrow collars 12 which are moved along the final stretch P1' of the first feed path P1 towards the initial portion 3a of the making-up path 3. When they enter the making-up path 3, the narrow collars 12 are opened out until reaching the shape of the side walls of the base 101, and are inserted into the hollows 25 by means of the transverse finger 15.

[0032] The carousel 23 (which rotates clockwise in Figures 1 and 2) transports the open collars 104 along the initial portion 3a of the making-up path 3 as far as a filling station (if provided, because it is optional) where the filling means 26 place a group 27 of cigarettes inside each collar 104. More specifically, while the filling means 26 translate each group 27 of cigarettes horizontally, a bottom

25c of the respective hollow 25 rises to receive the group 27 of cigarettes. The bottom 25c is then lowered to place the cigarettes inside the collar 104. Alternatively, the filling station might not be provided or might not be enabled so as to make empty packets to be filled with groups of cigarettes at a later stage.

[0033] At the same time as this, the second continuous band 7 is fed along the second feed path P2 and cut transversely to make the sequence of blanks 17 which, along the final stretch P2' of the second feed path P2, reach the initial portion 3a of the making-up path 3.

[0034] In the same way, the third continuous band 9 is fed along the third feed path P3 and cut transversely to make the sequence of blanks 19 which, along the final stretch P3' of the third feed path P3, reach the initial portion 3a of the making-up path 3.

[0035] In the embodiment illustrated, the blanks 19, intended for example to form the lids 102, are fed along the making-up path 3 upstream of the blanks 17, intended for example to form the bases 101. More specifically, the blanks 19 are fed at the carousel 23 and the blanks 17 are fed at the carousel 24. It should be noted that the above procedure can be followed in reverse.

[0036] Generally speaking, the first, second and third feed paths P1, P2 and P3 meet the making-up unit 2 along the making-up path 3. Thus, the base 101 and the lid 102 are made up onto the collar 104 along the making-up path 3 inside the making-up unit 2.

[0037] To make up the base 101 and the lid 102, the method preferably comprises moving, along the initial portion 3a of the making-up path 3, the assembly made up of the collar 104 associated with the respective blank 17 of the base 101 (embodiment not illustrated) and/or associated with the respective blank 19 of the lid 102 (embodiment illustrated here). Thus, each assembly is transferred from one to the other of at least two levels 20 and 21 and the blanks 17 and 19 are folded during the passage from one level to the other. Preferably, the assemblies are transferred between the different levels 20 and 21 by being made to cross respective hollows 25 of rotary carousels 23 and 24. The hollows 25 thus act as folding dies 25b which at least partially fold the blanks 17 and 19.

[0038] With reference to the embodiment illustrated in the drawings, each blank 19 is positioned above the respective collar 104 at the carousel 23 and folded while it is transferred from the carousel 23 to the carousel 24 by the pushing action imparted to it by the pusher 22a, thus making the lid 102.

[0039] Next, each blank 17 is positioned under the respective collar 104 at the carousel 24 and folded while it is transferred from the carousel 24 to a further rotary carousel 35 located in the final portion 3b of the making-up path 3. The assembly now made up of the collar 104, the lid 102 and the blank 17 is transferred from the carousel 24 to the rotary carousel 35 by the pushing action imparted to it by the pusher 22b, and in particular, is transferred into respective hollows, similar to the hollows 25 of the

rotary carousel 35, thus making the base 101.

[0040] In effect, the final portion 3b of the making-up path comprises two further carousels 35 and 36 configured to receive the blanks 34 of the labels 103 and to apply them on the base 101 and lid 102 of each packet 100 using gumming means of known type not illustrated. The packets 100 thus obtained are then accumulated in rows 37 to give the glue joining the label 103 to the base 101 and lid 102 enough time to dry. Cutting means might also be provided to trim the label 103.

Claims

1. A machine for making cigarette packets (100) of the "shoulder box" type, the packet (100) comprising:

- a base (101) having the shape of a low, open-top box,
- a lid (102) having the shape of a low, open-bottom box,
- a label (103) glued to both the base (101) and the lid (102) to hinge the lid (102) to the base (101),
- a collar (104) protruding from the side walls of the base (101) towards the lid (102);

the machine being **characterized in that** it comprises:

- first feeding means (4) for feeding a first continuous band (5) suitable for making the collar (104) of each packet (100), the first feeding means (4) being configured to move the first continuous band (5) along a first feed path (P1);
- second feeding means (6) for feeding a second continuous band (7) suitable for making the base (101) of each packet (100), the second feeding means (6) being configured to move the second continuous band (7) along a second feed path (P2);
- third feeding means (8) for feeding a third continuous band (9) suitable for making the lid (102) of each packet (100), the third feeding means (8) being configured to move the third continuous band (9) along a third feed path (P3);
- a making-up unit (2) configured to make up the base (101) and the lid (102) onto the collar (104) along a making-up path (3);

and wherein the first, second and third feed paths (P1, P2, P3) meet the making-up unit (2) along the making-up path (3).

2. The machine according to claim 1, **characterized in that** the first feeding means (4) are configured to fold the first continuous band (5) along its main direction of extension to form a narrow looped band (10).

3. The machine according to claim 2, **characterized in that** it comprises first cutting means (11) located along the first feed path (P1) and configured to cut the narrow looped band (10) transversely and to make a sequence of narrow collars (12), the first feeding means (4) being configured to move the sequence of narrow collars (12) along a final stretch (P1') of the first feed path (P1) towards an initial portion (3a) of the making-up path (3). 5
4. The machine according to claim 3, **characterized in that** it comprises a retractor device (13) located at the end of the first feed path (P1) and configured to open out one narrow collar (12) at a time until reaching the shape of the side walls of the base (101), the retractor device (13) preferably comprising a rotary lever (14) operating on a movable portion (12a) of the narrow collar (12). 10
5. The machine according to claim 1, **characterized in that** it comprises: 15
 - second cutting means (16) located along the second feed path (P2) and configured to cut the second continuous band (7) transversely and to make a sequence of blanks (17) of the base (101), the second feeding means (16) being configured to move the sequence of blanks (17) along a final stretch (P2') of the second feed path (P2) towards an initial portion (3a) of the making-up path (3); 25
 - third cutting means (18) located along the third feed path (P3) and configured to cut the third continuous band (9) transversely and to make a sequence of blanks (19) of the lid (102), the third feeding means (18) being configured to move the sequence of blanks (19) along a final stretch (P3') of the third feed path (P3) towards the initial portion (3a) of the making-up path (3). 30
6. The machine according to claim 5, **characterized in that** the initial portion (3a) of the making-up path (3) is located on at least two levels (20, 21) and **in that** it comprises: 35
 - transfer means (22a), configured to transfer from one level (20, 21) to the other (20, 21) an assembly made up of a collar (104) associated with the respective blank of the base (101) and/or of the lid (102), and 40
 - folding means (25a) for folding the blanks (17, 19) onto the collar (104) and configured to operate during the passage between one level (20, 21) and the other (21, 20). 45
7. The machine according to claim 6, **characterized in that** the making-up unit (2) comprises rotary conveyors, preferably carousels (23, 24, 35, 36), at least two of the conveyors (23, 24) defining the two levels (20, 21), wherein the conveyors are provided with hollows (25) configured to receive the assemblies and define respective drawing dies (25b) of the folding means (25a). 50
8. The machine according to claim 7, **characterized in that** the transfer means (23, 24) comprise at least one pusher (22a, 22b) movable transversely to the initial portion (3a) of the making-up path (3) to transfer the assemblies between one level (20, 21) and the other (21, 20) preferably through respective hollows (25) of the conveyors (23, 24). 55
9. The machine according to one or more of the preceding claims, **characterized in that** the first feed path (P1) meets the initial portion (3a) of the making-up path (3) upstream of the second and third feed paths (P2, P3) along a direction of travel defined by the making-up path (3).
10. The machine according to claim 9, **characterized in that** it comprises filling means (26) configured to place a group (27) of cigarettes inside each collar (104) along the initial portion (3a) of the making-up path (3).
11. The machine according to claim 10, **characterized in that** the filling means (26) comprise respective bottoms (25c) of the hollows (25), each bottom (25c) being movable transversely to the initial portion (3a) of the making-up path (3), relative to the respective collar (104), to receive a group (27) of cigarettes and place it inside the collar (104).
12. The machine according to one or more of the preceding claims, **characterized in that** the second and third feeding means (6, 8) comprise unwinding means (28), configured to unwind a roll (B2) of a double continuous band (29), and longitudinal cutting means (30), configured to longitudinally divide the double continuous band (29) to form the second continuous band (7) and the third continuous band (9).
13. The machine according to one or more of the preceding claims, **characterized in that** it comprises:
 - fourth feeding means (31) for feeding a fourth continuous band (32) suitable for making the label (103) of each packet (100), the fourth feeding means (31) being configured to move the fourth continuous band (32) along a fourth feed path (P4) which meets the making-up unit (2) along the making-up path (3); and
 - fourth cutting means (33) located along the fourth feed path (P4) and configured to cut the fourth continuous band (32) transversely and to

make a sequence of blanks (34) of the label (103), the fourth feeding means (31) being configured to move the sequence of blanks (34) along a final stretch (P4') of the fourth feed path (P4) towards an end portion (3b) of the making-up path (3).

14. A method for making cigarette packets (100) of the "shoulder box" type, the packet (100) comprising:

- a base (101) having the shape of a low, open-top box,
- a lid (102) having the shape of a low, open-bottom box,
- a label (103) glued to both the base (101) and the lid (102) to hinge the lid (102) to the base (101),
- a collar (104) protruding from the side walls of the base (101) towards the lid (102);

the method being **characterized in that** it comprises the steps of:

- feeding a first continuous band (5), which is suitable for making the collar (104) of each packet (100), along a first feed path (P1);
- feeding a second continuous band (7), which is suitable for making the base (101) of each packet (100), along a second feed path (P2);
- feeding a third continuous band (9), which is suitable for making the lid (102) of each packet (100), along a third feed path (P3);
- making up the base (101) and the lid (102) onto the collar (104) along a making-up path (3) inside a making-up unit (2);

and wherein the first, second and third feed paths (P1, P2, P3) meet the making-up unit (2) along the making-up path (3).

15. The method according to claim 14, **characterized in that** it comprises the step of folding the first continuous band (5) along its main direction of extension to form a narrow looped band (10).

16. The method according to claim 15, **characterized in that** it comprises the step of cutting the narrow looped band (10) transversely to make a sequence of narrow collars (12), and moving the sequence of narrow collars (12) along a final stretch (P1') of the first feed path (P1) towards an initial portion (3a) of the making-up path (3), opening out the narrow collars (12) until reaching the shape of the side walls of the base (101) and forming the collar (104).

17. The method according to claim 14, **characterized in that** it comprises the steps of:

- cutting the second continuous band (7) transversely to make a sequence of blanks (17) of the base (101) and moving the sequence of blanks (17) along a final stretch (P2') of the second feed path (P2) towards an initial portion (3a) of the making-up path (3);
- cutting the third continuous band (9) transversely to make a sequence of blanks (19) of the lid and moving the sequence of blanks (19) along a final stretch (P3') of the third feed path (P3) towards the initial portion (3a) of the making-up path (3).

18. The method according to claim 17, **characterized in that** it comprises the steps of:

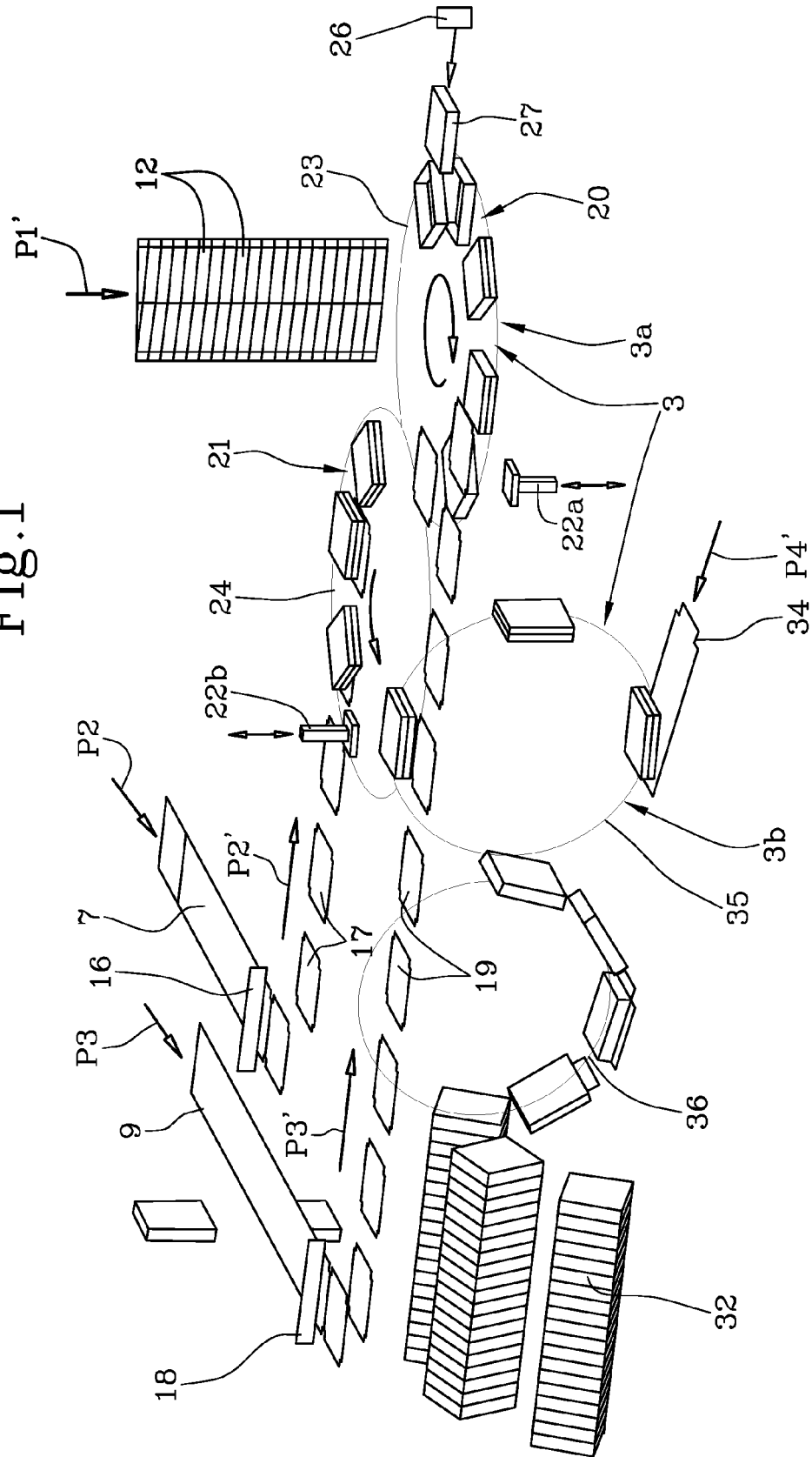
- moving an assembly made up of a collar (104) associated with the respective blank (17, 19) of the base (101) and/or of the lid (102) along an initial portion (3a) of the making-up path (3);
- transferring the assemblies between at least two levels (20, 21) of the initial portion (3a) of the making-up path (3);
- folding the blanks (17, 19) at least partially during the passage between one level (20, 21) and the other (21, 20).

19. The method according to claim 18, **characterized in that** the assemblies are transferred between the at least two levels (20, 21) by passing through respective hollows (25), which operate as respective drawing dies (25b) of rotary conveyors, preferably carousels (23, 24, 35).

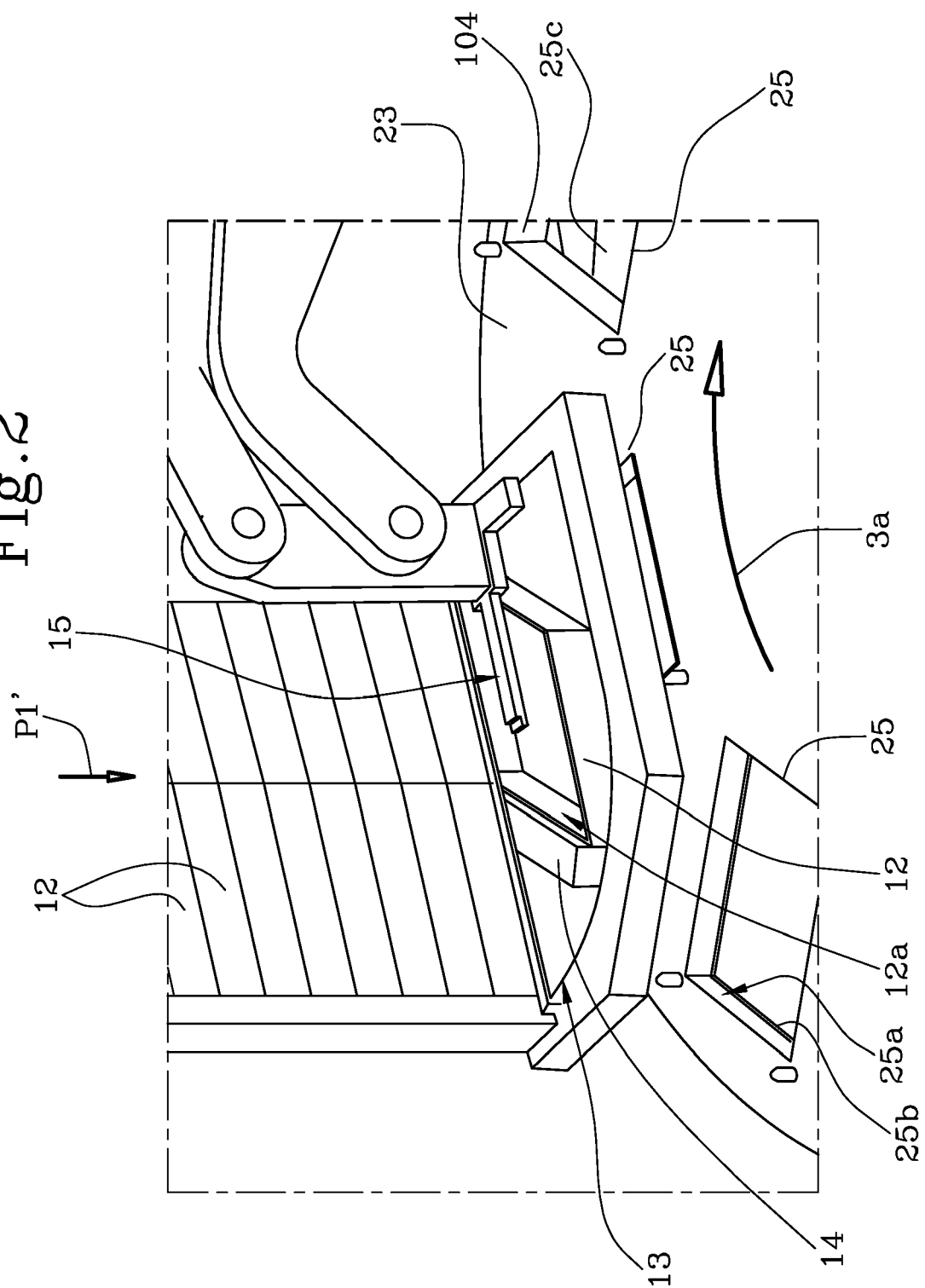
20. The method according to one or more of claims 14 to 19, **characterized in that** the first feed path (P1) meets the making-up path (3) upstream of the second and third feed paths (P2, P3) along a direction of travel defined by the feed path (3).

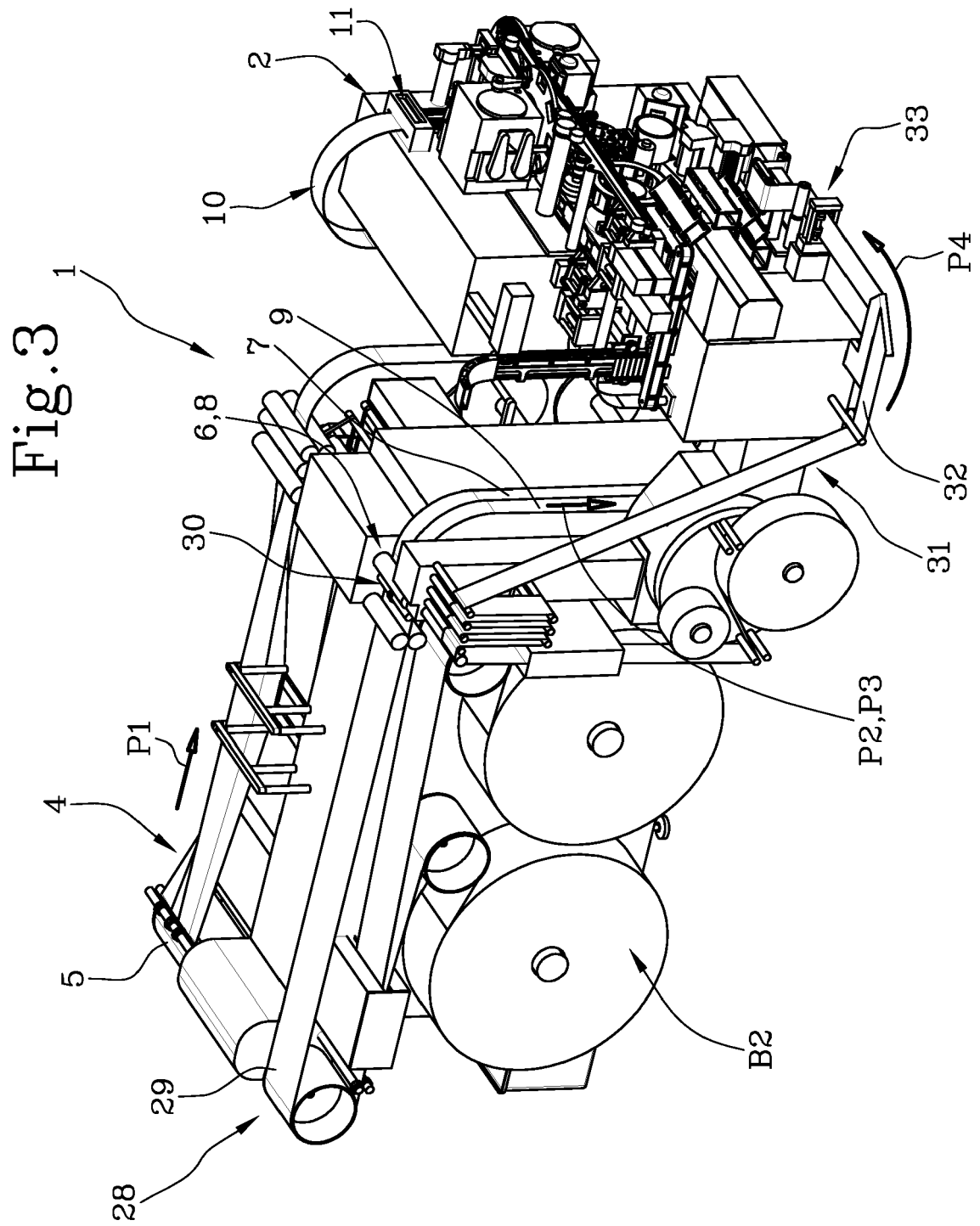
21. The method according to claim 20, **characterized in that** it comprises the step of feeding groups (27) of cigarettes and placing each group (27) of cigarettes inside each collar (104) along an initial portion (3a) of the making-up path (3).

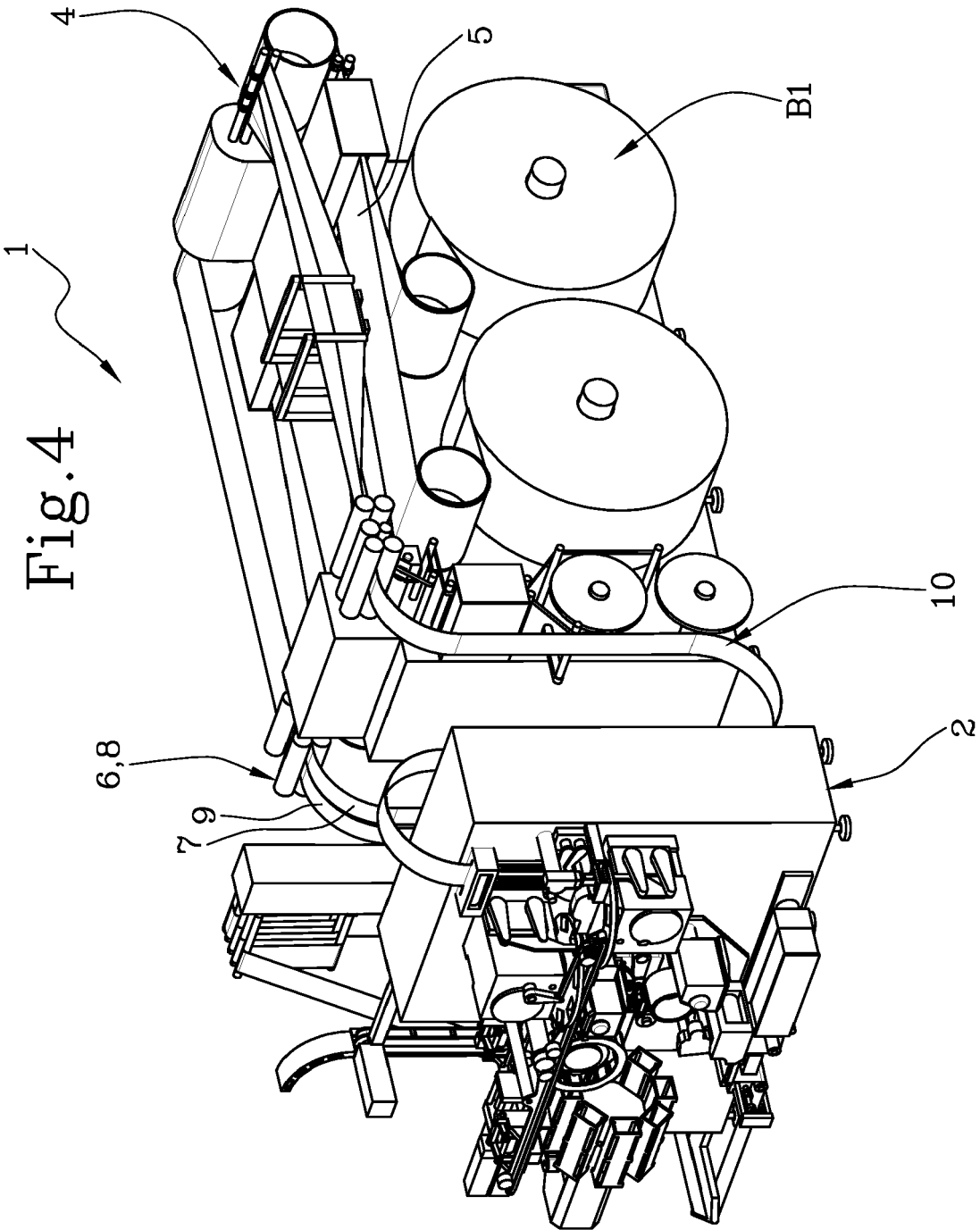
Fig.1



2.
Fi







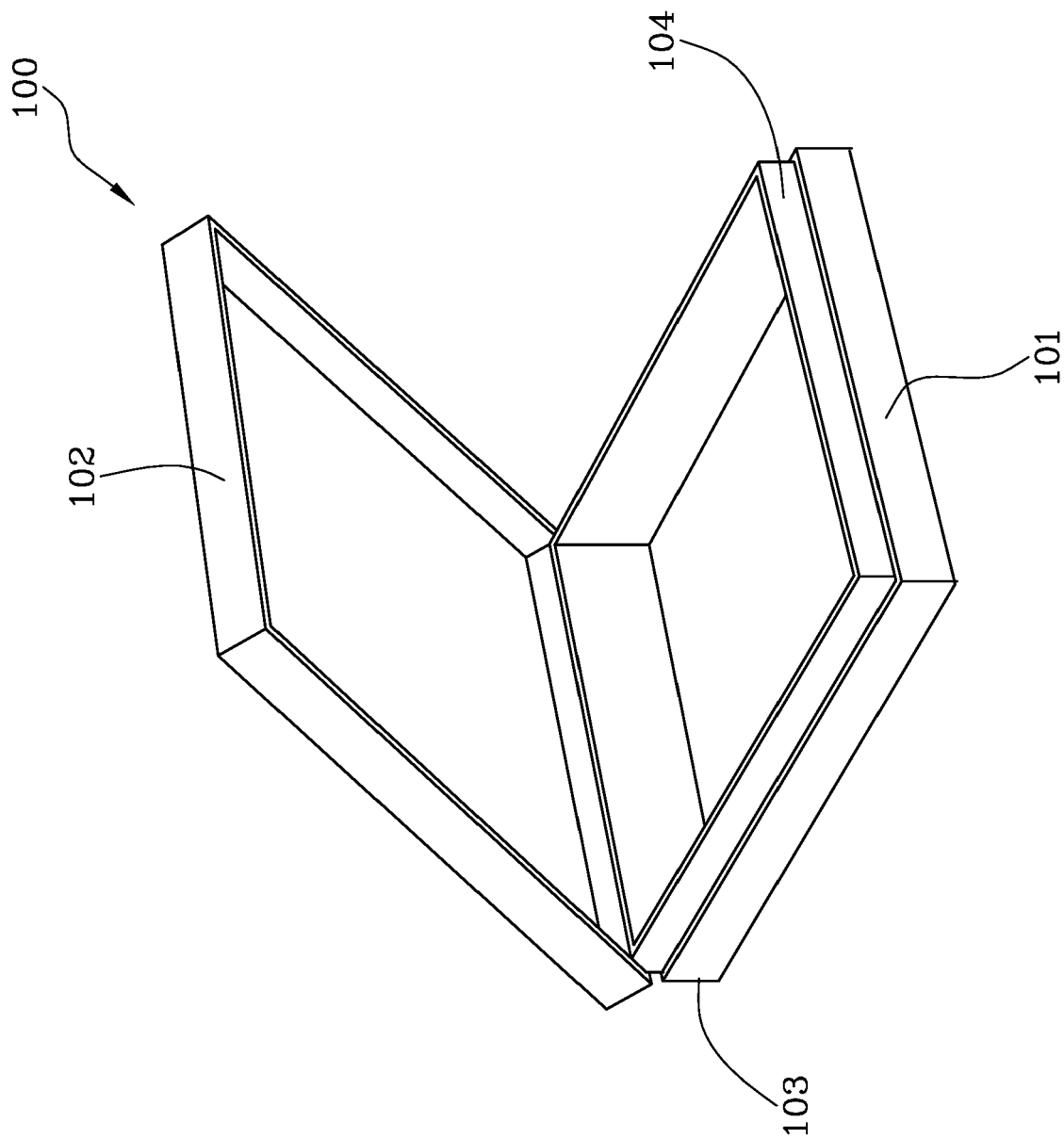


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 16 17 6956

5

10

15

20

25

30

35

40

45

50

55

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	US 2014/311930 A1 (BUSE HENRY [DE] ET AL) 23 October 2014 (2014-10-23)	1,5,9, 10,14, 17,20,21	INV. B65B19/12 B65B19/20 B65B19/22
Y	* paragraphs [0037], [0077], [0078]; figure 5 *	6-8,18, 19	
Y	----- WO 2005/087595 A1 (GD SPA [IT]; POLLONI ROBERTO [IT]; GHINI MARCO [IT]; SQUARZONI MICHELE) 22 September 2005 (2005-09-22) * page 3, line 8 - page 4, line 12; figure 1 *	6-8,18, 19	ADD. B65D5/66 B65D85/10
A	----- EP 2 450 282 A1 (GD SPA [IT]) 9 May 2012 (2012-05-09) * figures 6, 24 *	1-21	
A	----- GB 2 475 969 A (GD SPA [IT]) 8 June 2011 (2011-06-08) * figures 1, 2, 3 *	1-21	
A	----- DE 10 2007 031208 A1 (FOCKE & CO [DE]) 8 January 2009 (2009-01-08) * figures 1, 2, 6 *	1-21	TECHNICAL FIELDS SEARCHED (IPC)
A	----- US 2001/007187 A1 (FOCKE HEINZ [DE] ET AL) 12 July 2001 (2001-07-12) * figures 1, 2 *	1-21	B65B B65D B31B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 November 2016	Examiner Vassoille, Philippe
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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 17 6956

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-11-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014311930 A1	23-10-2014	CN 102892686 A	23-01-2013
		CN 104608950 A	13-05-2015
		DE 102009060134 A1	16-06-2011
		EP 2509889 A1	17-10-2012
		EP 2599734 A1	05-06-2013
		JP 5784035 B2	24-09-2015
		JP 2013513527 A	22-04-2013
		KR 20120105022 A	24-09-2012
		RU 2012128653 A	20-01-2014
		US 2012241339 A1	27-09-2012
		US 2014311930 A1	23-10-2014
		WO 2011069575 A1	16-06-2011
WO 2005087595 A1	22-09-2005	AT 406310 T	15-09-2008
		EP 1732809 A1	20-12-2006
		JP 2007527827 A	04-10-2007
		US 2008016822 A1	24-01-2008
		WO 2005087595 A1	22-09-2005
EP 2450282 A1	09-05-2012	EP 2450282 A1	09-05-2012
		IT 1402469 B1	13-09-2013
		JP 5869304 B2	24-02-2016
		JP 2012101858 A	31-05-2012
		US 2012137633 A1	07-06-2012
GB 2475969 A	08-06-2011	NONE	
DE 102007031208 A1	08-01-2009	AT 498568 T	15-03-2011
		DE 102007031208 A1	08-01-2009
		EP 2170734 A2	07-04-2010
		WO 2009003581 A2	08-01-2009
US 2001007187 A1	12-07-2001	BR 0100038 A	21-08-2001
		CN 1303806 A	18-07-2001
		DE 10000697 A1	12-07-2001
		DE 50011329 D1	17-11-2005
		EP 1116661 A1	18-07-2001
		JP 4859275 B2	25-01-2012
		JP 2001219483 A	14-08-2001
		US 2001007187 A1	12-07-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82