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(54) **Cigarette packing machine for producing rigid, hinged-lid packets**

(57) A cigarette packing machine (27) for producing rigid packets (1) with a hinged-lid (4), the packing machine (27) having a horizontal first packing wheel (35) having a number of first pockets (37), each of which is supplied with an inner package (3), and is supplied upwards with a collar (12); a first feed unit (38) for feeding the collars (12) to the first pockets (37) of the first packing wheel (35); a horizontal second packing wheel (39) having a number of second pockets (41), each of which re-

ceives an inner package (3), complete with a collar (12), from a first pocket (37) of the first packing wheel (35); a vertical third packing wheel (43) having a number of third pockets (45), each of which receives a blank (20), and receives an inner package (3), complete with a collar (12), from a second pocket (41) of the second packing wheel (39) to fold the blank (20) about the inner package (3) and over the collar (12); and a second feed unit (46) for feeding the blanks (20) to the third pockets (45) of the third packing wheel (43).

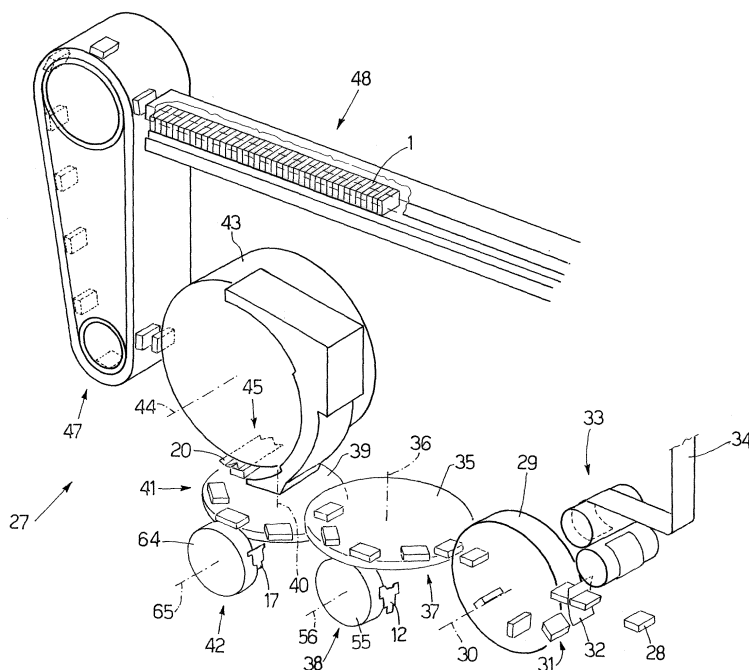


Fig.11

Description

TECHNICAL FIELD

[0001] The present invention relates to a cigarette packing machine for producing rigid, hinged-lid packets.

BACKGROUND ART

[0002] Rigid, hinged-lid packets of cigarettes are currently the most marketed, by being easy to produce, easy and practical to use, and by effectively protecting the cigarettes inside.

[0003] A rigid, hinged-lid packet of cigarettes comprises a group of cigarettes wrapped in a sheet of foil packing material; and a rigid outer package housing the group of cigarettes. The outer package comprises a cup-shaped container housing the group of cigarettes and having an open top end; and a cup-shaped lid hinged to the container along a hinge to rotate, with respect to the container, between an open position and a closed position opening and closing the open end respectively. A collar is normally folded and connected to the inside of the container, so as to project partly outwards of the open end and engage a corresponding inner surface of the lid when the lid is in the closed position.

[0004] In some cigarette packing machines, such as the type described in Patent US5163268A1, the collars are fed into seats on a packing wheel by a feed unit, which receives a continuous strip of collars unwound off a reel, and transversely cuts the individual collars off the strip. However, to produce certain types of packets of cigarettes (normally comprising non-standard collars), the packing machine must be able to operate with a stack of superimposed collars, as opposed to a continuous strip of collars wound into a reel; which means an existing machine (such as G.D. packing machine X3000 or X6) must be adapted to also operate with a stack of superimposed collars. Adapting an existing machine in this way is a highly complex job, on account of the numerous structural and dimensional factors involved, and the need, obviously, to still ensure adequate access to all the component parts of the packing machine for maintenance and cleaning.

DISCLOSURE OF THE INVENTION

[0005] It is an object of the present invention to provide a cigarette packing machine for producing rigid, hinged-lid packets, designed to also operate with a stack of superimposed collars, and which, at the same time, is cheap and easy to produce.

[0006] According to the present invention, there is provided a cigarette packing machine for producing rigid, hinged-lid packets, as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a front view in perspective of a rigid packet of cigarettes in a closed configuration;

Figure 2 shows a front view in perspective of the Figure 1 packet of cigarettes in an open configuration;

Figures 3, 4 and 5 show three side views of the Figure 1 packet of cigarettes when opening the lid;

Figure 6 shows a view in perspective of a collar and slide of the Figure 1 packet of cigarettes, as positioned mutually when the lid is closed;

Figure 7 shows an exploded view in perspective of the collar and slide in Figure 6;

Figure 8 shows a plan view of a flat blank by which to form an outer package of the Figure 1 packet of cigarettes;

Figure 9 shows a plan view of a flat collar, by which to form the Figure 1 packet of cigarettes;

Figure 10 shows a plan view of a flat slide, by which to form the Figure 1 packet of cigarettes;

Figure 11 shows a schematic view in perspective, with parts removed for clarity, of a cigarette packing machine in accordance with the present invention and for producing the Figure 1 packet of cigarettes;

Figure 12 shows a schematic view in perspective, with parts removed for clarity, of a collar feed unit of the Figure 11 cigarette packing machine;

Figure 13 shows a schematic view in perspective, with parts removed for clarity, of a slide feed unit of the Figure 11 cigarette packing machine;

Figure 14 shows a schematic front view, with parts removed for clarity, of a blank feed unit of the Figure 11 cigarette packing machine;

Figure 15 shows a schematic view in perspective, with parts removed for clarity, of a variation of the Figure 11 packing machine.

PREFERRED EMBODIMENTS OF THE INVENTION

[0008] Number 1 in Figure 1 indicates as a whole a rigid packet of cigarettes comprising a cup-shaped container 2, and an inner package 3 (Figure 2) housed inside container 2. Inner package 3 is defined by a parallelepiped-shaped group of cigarettes, and by a sheet of foil packing material completely enclosing the group of cigarettes. Container 2 has an open top end, and a cup-shaped lid 4 connected to container 2 to rotate and translate, with respect to container 2, between a closed position (Figure 1) and an open position (Figure 2) closing and opening the open top end respectively.

[0009] When lid 4 is in the closed position, container 2 is in the form of a rectangular-section parallelepiped comprising a top wall 5 and a bottom wall 6 opposite and

parallel to each other; a front wall 7 and a rear wall 8 opposite and parallel to each other; and two parallel, opposite lateral walls 9.

[0010] Four longitudinal edges 10 are defined between front wall 7, rear wall 8, and lateral walls 9; and eight transverse edges 11 are defined between front wall 7, rear wall 8, and lateral walls 9.

[0011] In the Figure 1 and 2 embodiment, edges 10 and 11 are all square. In a different embodiment not shown, the four longitudinal edges 10 are non-square rounded or bevelled edges. Alternatively, transverse edges 11 may be non-square rounded or bevelled edges, as in the packet of cigarettes described in Patent Application EP0764595A1. Both transverse edges 11 and longitudinal edges 10 may also be non-square rounded or bevelled edges.

[0012] In a different embodiment, packet 1 may resemble the packet of cigarettes described in Patent Application EP1066206A1, and comprise an outwardly convex front and rear wall, each of which has a flat central portion, and two curved, creased lateral bands connecting the flat central portion to two flat lateral walls of the packet at sharp longitudinal edges. In a further embodiment not shown, packet 1 may resemble the packet of cigarettes described in Patent Application W003026984A1, and comprise an outwardly convex front and rear wall, each of which comprises a flat central portion, and two curved, creased lateral bands connecting the flat central portion to two flat walls of the packet at sharp transverse edges. Clearly, changes may be made to the above embodiments of packet 1, such as forming partly convex walls, or only one convex wall as opposed to two opposite convex walls.

[0013] As shown in Figures 2, 6 and 7, packet 1 also comprises a collar 12, which surrounds the group of cigarettes, is glued to the inside of container 2, and projects partly outwards of the open top end to engage a corresponding inner surface of lid 4 when lid 4 is in the closed position.

[0014] As shown in Figures 6 and 7, collar 12 comprises a front wall 13, which contacts front wall 7 of container 2; two lateral walls 14 located on opposite sides of front wall 13, and which contact lateral walls 9 of container 2; and a bottom wall 15, which contacts bottom wall 6 of container 2. Each lateral wall 14 of collar 12 comprises a rear wing 16 folded squarely with respect to lateral wall 14 and contacting rear wall 8 of container 2.

[0015] Packet 1 also comprises a slide 17, which partly contacts rear wall 8 of container 2, has a top portion glued to lid 4, and has a hinge 18 of lid 4 to allow lid 4 to rotate with respect to container 2. Slide 17 only rests on rear wall 8 of container 2, so as to slide freely with respect to rear wall 8, and, preferably, is located underneath rear wings 16 of collar 12 (i.e. between rear wings 16 of collar 12 and inner package 3), and slides freely with respect to container 2, inner package 3, and collar 12.

[0016] In a preferred embodiment, slide 17 has two tabs 19 folded squarely with respect to slide 17 and

against lateral walls 14 of collar 12, and which serve to limit upward slide of slide 17. More specifically, upward slide of slide 17 is arrested upon tabs 19 contacting rear wings 16 of collar 12.

[0017] Figures 3, 4 and 5 show the lid 4 opening sequence. More specifically, Figure 3 shows a side view of packet 1 of cigarettes with lid 4 in the closed position; Figure 4 shows a side view of packet 1 of cigarettes with lid 4 in an intermediate position; and Figure 5 shows a side view of packet 1 of cigarettes with lid 4 in the open position. To move from the closed to the open position, lid 4 is first translated longitudinally upwards with respect to container 2 (i.e. parallel to longitudinal edges 10). Lid 4 is raised with respect to container 2 by slide 17 sliding upwards, and comes to a stop upon tabs 19 of slide 17 contacting rear wings 16 of collar 12. Once raised fully with respect to container 2 (Figure 4), lid 4 is rotated about hinge 18 with respect to container 2 into the open position (Figure 5).

[0018] As shown in Figure 8, container 2 is formed by folding a flat, substantially elongated rectangular blank 20 about inner package 3. In the following description, the component parts of blank 20 are indicated, where possible, using the same reference numbers, with superscripts, as for the corresponding parts of container 2.

[0019] Blank 20 has two longitudinal fold lines 21, and a number of transverse fold lines 22 defining, between the two longitudinal fold lines 21, a panel 7' forming a top portion of front wall 7 (more specifically, the portion forming part of lid 4); a panel 5' forming top wall 5; a panel 8' forming rear wall 8; a panel 6' forming bottom wall 6; and a panel 7'' forming a bottom portion of front wall 7 (more specifically, the portion forming part of container 2).

[0020] Each panel 7', 7'', 8' has two lateral wings 9', which are located on opposite sides of panel 7', 7'', 8', are separated from panel 7', 7'', 8' by longitudinal fold lines 21, and provide for forming lateral walls 9. Each wing 9' of panel 8' has two tabs 23 located at opposite ends of wing 9', and which provide for internally reinforcing top wall 5 and bottom wall 6 respectively.

[0021] Panel 7' has a lid 4 reinforcing flap 24 separated from panel 7' by a fold line 25. When folding blank 20 - more specifically, at the initial folding stage of blank 20, before blank 20 is applied to inner package 3 - reinforcing flap 24 is folded 180° about fold line 25 onto panel 7'. In a different embodiment not shown, panel 7' has two lid 4 reinforcing flaps 24 separated from panel 7' by two oblique fold lines 25, which are oppositely inclined, and slope at a 45° angle with respect to both longitudinal fold lines 21 and transverse fold lines 22. When folding blank 20 - more specifically, at the initial folding stage of blank 20, before blank 20 is applied to inner package 3 - reinforcing flaps 24 are folded 180° about oblique fold lines 25 onto panel 7'.

[0022] It is important to note that, in blank 20, lid 4 is connected to container 2 at rear wall 8, so, when forming packet 1 of cigarettes, a cut must be made along a parting line 26 (Figure 8) of blank 20 to separate lid 4 from con-

tainer 2 at rear wall 8. Preferably, blank 20 is cut along parting line 26 at rear wall 8 to completely separate lid 4 from container 2. Alternatively, blank 20 may be weakened (e.g. by an intermittent cut) along parting line 26 at rear wall 8, to form a tear-off line of parting line 26, along which the user tears lid 4 off container 2 when unsealing packet 1 of cigarettes.

[0023] Number 27 in Figure 11 indicates as a whole a packing machine for producing packets 1 of cigarettes as described above. Packing machine 27 comprises a forming unit (not shown) for forming groups 28 of cigarettes; and a vertical packing wheel 29 rotating in steps about a horizontal axis of rotation 30. Packing wheel 29 comprises a number of peripheral pockets 31, each of which receives a group 28 of cigarettes from the forming unit, and a sheet 32 of foil packing material from a feed unit 33, which cuts the individual sheets 32 of packing material off a continuous strip 34 unwound off a reel.

[0024] Packing machine 27 also comprises a horizontal packing wheel 35 rotating in steps about a vertical axis 36, and having a number of peripheral pockets 37, each of which is supplied downwards with an inner package 3 from a pocket 31 of packing wheel 29, and then upwards with a collar 12 from a feed unit 38. Each collar 12 is fed flat to pocket 37 of packing wheel 35, and is folded about package 3 when package 3 is pushed out of pocket 37.

[0025] Packing machine 27 also comprises a horizontal packing wheel 39, which rotates in steps about a vertical axis 40, is located below packing wheel 35, and had a number of peripheral pockets 41, each of which is supplied downwards with an inner package 3, complete with a collar 12, from a pocket 37 of packing wheel 35, and then downwards with a slide 17 from a feed unit 42. It is important to note that packing wheel 35 overlaps packing wheel 39, so that a pocket 37 of packing wheel 35 is superimposed over and aligned perfectly with a pocket 41 of packing wheel 39, and inner package 3 can be transferred vertically from pocket 37 of packing wheel 35 to pocket 41 of packing wheel 39.

[0026] Packing wheel 39 is equipped with fixed (helical) folding devices (not shown) located downstream from feed unit 42 in the rotation direction of packing wheel 39, and which fold rear wings 16 of each collar 12 onto inner package 3 and over slide 17. Tabs 19 of each slide 17, on the other hand, are folded onto inner package 3 and onto lateral walls 14 of collar 12 as inner package 3 is transferred from pocket 41 of packing wheel 39.

[0027] Finally, packing machine 27 also comprises a vertical packing wheel 43 rotating in steps about a horizontal axis 44, and having a number of peripheral pockets 45, each of which receives a blank 20 from a feed unit 46 (Figure 14), and then an inner package 3, complete with a collar 12 and a slide 17, from a pocket 41 of packing wheel 39. Packing wheel 43 folds each blank 20 about an inner package 3 and over collar 12 and slide 17, and the folding of each blank 20 is completed to form a packet 1 of cigarettes, as packet 1 of cigarettes is expelled from

pocket 45 of packing wheel 43.

[0028] Downstream from packing wheel 43, a vertical transfer conveyor 47 successively receives and transfers packets 1 of cigarettes from packing wheel 43 to a horizontal drying conveyor 48.

[0029] As stated, when forming each packet 1 of cigarettes, a cut must be made along parting line 26 (Figure 8) of blank 20 to separate lid 4 from container 2 at rear wall 8. The cut may be either one separating lid 4 from container 2 at the outset, or in the form of a tear line along which the lid is torn off container 2 when packet 1 is unsealed. The cut along parting line 26 of each blank 20 is made by a cutting device, which may be located downstream from drying conveyor 48, at a feed station supplying a cellophaning machine (not shown). Alternatively, the cutting device may be located along transfer conveyor 47 or along packing wheel 43. If only a tear line is formed along parting line 26 of each blank 20, the cutting device may even be located at blank 20 feed unit 46. In this connection, it should be pointed out that, each blank 20 cannot be cut completely along parting line 26 until at least part of blank 20 has been folded about respective inner package 3.

[0030] As shown in Figure 12, collar 12 feed unit 38 comprises a vertical hopper 49 housing a stack of collars 12 and having a bottom outlet located over a horizontal pickup wheel 50, which rotates in steps about a vertical axis of rotation 51, and has a number of peripheral suction seats 52. A pickup device 53 withdraws collars 12 successively from the bottom outlet of hopper 49, and feeds collars 12 to suction seats 52 of pickup wheel 50. More specifically, pickup device 53 comprises a suction pickup head 54, which moves vertically up and down through a suction seat 52 of pickup wheel 50 arrested facing the bottom outlet of hopper 49.

[0031] Collar 12 feed unit 38 also comprises a vertical feed wheel 55 rotating in steps about a horizontal axis of rotation 56, and having a number of peripheral suction seats 57. Feed wheel 55 is located between pickup wheel 50 and packing wheel 35 (i.e. over pickup wheel 50 and beneath packing wheel 35) to receive collars 12 successively from pickup wheel 50 and feed collars 12 upwards to packing wheel 35.

[0032] In a different embodiment not shown, feed unit 38 comprises a further vertical hopper housing a stack of coupons (e.g. vouchers or leaflets) and having a bottom outlet located over pickup wheel 50, upstream from vertical hopper 49 in the rotation direction of pickup wheel 50. The further hopper provides for also supplying coupons, each of which is inserted inside a packet 1 of cigarettes, between inner package 3 and collar 12. If the further coupon hopper is also provided, each suction seat 52 of pickup wheel 50 has two different suction areas, one for retaining a collar 12, and the other for retaining a coupon. This configuration is made possible by virtue of the different shape and size of collar 12 and the coupon, so that bottom portions of a collar 12 superimposed on a coupon are always left exposed by the coupon.

[0033] As shown in Figure 13, slide 17 feed unit 42 is very similar to collar 12 feed unit 38, and comprises a vertical hopper 58 housing a stack of slides 17 and having a bottom outlet located over a horizontal pickup wheel 59, which rotates in steps about a vertical axis of rotation 60, and has a number of peripheral suction seats 61. A pickup device 62 withdraws slides 17 successively from the bottom outlet of hopper 58, and feeds slides 17 to suction seats 61 of pickup wheel 59. More specifically, pickup device 62 comprises a suction pickup head 63, which moves vertically up and down through a suction seat 61 of pickup wheel 59 arrested facing the bottom outlet of hopper 58.

[0034] Slide 17 feed unit 42 also comprises a vertical feed wheel 64 rotating in steps about a horizontal axis of rotation 65, and having a number of peripheral suction seats 66. Feed wheel 64 is located over pickup wheel 59 and alongside packing wheel 39, so as to receive slides 17 successively from pickup wheel 59 and feed slides 17 to packing wheel 39. More specifically, each slide 17 is fed from a suction seat 66 of feed wheel 64 to a pocket 41 of packing wheel 39 by a horizontal feed arm 67, which rotates back and forth about a vertical axis of rotation 68 to move a suction pickup head 69 cyclically from a suction seat 66 of feed wheel 64 to a pocket 41 of packing wheel 39, and vice versa.

[0035] It should be pointed out that feed wheel 55 is located beneath packing wheel 35 to feed collars 12 upwards into pockets 37 of packing wheel 35; whereas feed wheel 64 is located alongside packing wheel 39 and connected to feed arm 67 to feed slides 17 downwards into pockets 41 of packing wheel 39.

[0036] In a different embodiment shown in Figure 15, packing machine 27 produces a conventional packet 1 of cigarettes having no slide 17, and wherein hinge 18 of lid 4 is therefore fixed (i.e. not movable longitudinally, as in the Figure 1-5 packet 1 of cigarettes) and located on rear wall 8 of container 2. In which case, slide 17 feed unit 42 is obviously eliminated (or at any rate is not active). Alternatively, feed unit 42 may be used to supply any type of material, such as coupons (vouchers or leaflets) or reinforcing panels, to be inserted between inner package 3 and rear wall 8 of container 2.

[0037] As shown in Figure 14, blank 20 feed unit 46 comprises a tilted hopper 70 housing a stack of blanks 20 and having a bottom outlet through which blanks 20 are withdrawn one by one. Feed unit 46 comprises a vertical pickup wheel 71 rotating about a horizontal axis of rotation 72, and supporting a number of suction pickup heads 73; and each suction pickup head 73 is hinged to pickup wheel 71 to rotate, with respect to pickup wheel 71 and under the control of a cam actuating system, about an axis of rotation parallel to axis of rotation 72.

[0038] Feed unit 46 also comprises a vertical intermediate wheel 74 rotating about a horizontal axis of rotation 75, and having a number of suction seats 76; and a belt feed conveyor 77 having a belt 78, which is looped about two end pulleys 79 and located partly beneath packing

wheel 43. More specifically, belt 78 of feed conveyor 77 has a number of projections, which push blanks 20 along a feed path defined by fixed guide rails.

[0039] In actual use, each suction pickup head 73 of pickup wheel 71 engages the bottom outlet of hopper 70 to withdraw a blank 20 from the stack; the blank 20 is then transferred by suction pickup head 73 of pickup wheel 71 to a suction seat 76 of intermediate wheel 74, and then from suction seat 76 of intermediate wheel 74 to feed conveyor 77; and, finally, feed conveyor 77 feeds blank 20 into a pocket 45 of packing wheel 43.

[0040] A known roller or spray gumming device (not shown) is located at intermediate wheel 74 to gum each blank 20. A folding device 80 is also located at intermediate wheel 74 to prefold reinforcing flaps 24 of lid 4 of each blank 20 about oblique fold lines 25. For example, prefolding of the two reinforcing flaps 24 comprises folding the two reinforcing flaps 24 about oblique fold lines 25 by an angle of at least 90° and generally no more than 100-110°. Folding reinforcing flaps 24 of lid 4 of each blank 20 is completed by a further folding device 81 having fixed folding rails (or fixed helical folding devices). In Figure 14, folding device 81 is located at intermediate wheel 74, downstream from folding device 80, but may alternatively be located at feed conveyor 77.

[0041] Folding device 80 is essential to fold reinforcing flaps 24 of each blank 20 a hundred and eighty degrees about oblique fold lines 25 onto panel 7'. That is, oblique fold lines 25 being oppositely inclined lengthwise of blank 20, at least one of the two reinforcing flaps 24 could never be folded 180° by a fixed folding rail (which cannot fold against the travelling direction of blank 20). By means of folding device 80, on the other hand, both reinforcing flaps 24 are prefolded at least 90° with respect to blank 20, and folding is then completed by the folding rails of folding device 81.

[0042] In a preferred embodiment, folding device 80 comprises a vertical folding wheel 82 rotating about a horizontal axis of rotation 83, and supporting a number of folding bodies 84 equally spaced about the periphery of folding wheel 82. Each folding body 84 comprises a wedge-shaped, triangular-section folding head; and a connecting rod fitted movably to folding wheel 82 and operated by a cam actuating system (not shown). It is important to note that the folding head has a triangular section to match the shape of oblique fold lines 25, about which the two reinforcing flaps 24 are folded.

[0043] In actual use, each folding body 84 is inserted between the two reinforcing flaps 24 to position the folding head on blank 20; and folding body 84 is then lowered with respect to blank 20, so that the folding head folds the two reinforcing flaps 24 ninety degrees with respect to blank 20.

[0044] Collar 12 feed unit 38 as described above has numerous advantages: it provides for withdrawing collars 12 from a stack of superimposed collars, and can be integrated quickly and easily in an existing packing machine (in particular, G.D. packing machine X3000 or X6),

while at the same time impairing none of the structural or dimensional factors involved, and ensuring adequate access to all the component parts of the packing machine.

[0045] Moreover, by virtue of slide 17 feed unit 42, packing machine 27 can efficiently produce the Figure 1-5 packet 1 of cigarettes, which calls for feeding a collar 12 onto a front wall of inner package 3, and a slide 17 onto a rear wall of inner package 3.

[0046] Finally, by virtue of folding device 80, the two reinforcing flaps 24 of each blank 20 can be folded easily and effectively 180° about the two oblique fold lines 25, despite at least one of the two oblique fold lines 25 calling for folding against the travelling direction of blank 20.

Claims

1. A cigarette packing machine for producing rigid, hinged-lid packets; the packing machine (27) comprising:

a horizontal first packing wheel (35) rotating about a vertical first axis (36), and having a number of first pockets (37), each of which is supplied with an inner package (3), and is supplied upwards with a collar (12);

a first feed unit (38) for feeding the collars (12) to the first pockets (37) of the first packing wheel (35);

a horizontal second packing wheel (39) rotating about a vertical second axis (40), and having a number of second pockets (41), each of which receives an inner package (3), complete with a collar (12), from a first pocket (37) of the first packing wheel (35);

a vertical third packing wheel (43) rotating about a horizontal third axis (44), and having a number of third pockets (45), each of which receives a blank (20), and receives an inner package (3), complete with a collar (12), from a second pocket (41) of the second packing wheel (39) to fold the blank (20) about the inner package (3) and over the collar (12); and

a second feed unit (46) for feeding the blanks (20) to the third pockets (45) of the third packing wheel (43);

the packing machine (27) being **characterized in that** the first feed unit (38) comprises:

a first hopper (49) housing a stack of collars (12) and having a bottom outlet;

a horizontal first pickup wheel (50), which rotates about a vertical fourth axis (51), has a number of first suction seats (52), and is located beneath the bottom outlet of the first hopper (49);

a first pickup device (53), which withdraws

the collars (12) successively from the bottom outlet of the first hopper (49), and feeds the collars (12) to the first suction seats (52) of the first pickup wheel (50); and a vertical first feed wheel (55), which rotates about a horizontal fifth axis (56), has a number of second suction seats (57), and is located between the first pickup wheel (50) and the first packing wheel (35) to receive the collars (12) successively from the first pickup wheel (50) and feed the collars (12) to the first packing wheel (35).

2. A packing machine as claimed in Claim 1, wherein the first pickup device (53) comprises a first suction pickup head (54), which moves vertically up and down through a first suction seat (52) of the first pickup wheel (50) arrested facing the bottom outlet of the first hopper (49).

3. A packing machine as claimed in Claim 1 or 2, wherein the first feed unit (38) comprises a second hopper housing a stack of coupons, and having a bottom outlet over the first pickup wheel (50).

4. A packing machine as claimed in Claim 3, wherein the second hopper is located upstream from the first hopper (49) in the rotation direction of the first pickup wheel (50).

5. A packing machine as claimed in Claim 3 or 4, wherein each first suction seat (52) of the first pickup wheel (50) has two different suction areas, one for retaining a collar (12), and the other for retaining a coupon.

6. A packing machine as claimed in any one of Claims 1 to 5, and comprising a third feed unit (42) for feeding a packing material to each second pocket (41) of the second packing wheel (39); each second pocket (41) of the second packing wheel (39) receiving an inner package (3), complete with a collar (12), from a first pocket (37) of the first packing wheel (35), and receiving a packing material from the third feed unit (42).

7. A packing machine as claimed in Claim 6, wherein the third feed unit (42) comprises:

a third hopper (58) housing a stack of packing materials, and having a bottom outlet;

a horizontal second pickup wheel (59), which rotates about a vertical sixth axis (60), has a number of third suction seats (61), and is located beneath the bottom outlet of the third hopper (58);

a second pickup device (62), which withdraws the packing materials successively from the bottom outlet of the third hopper (58), and feeds the

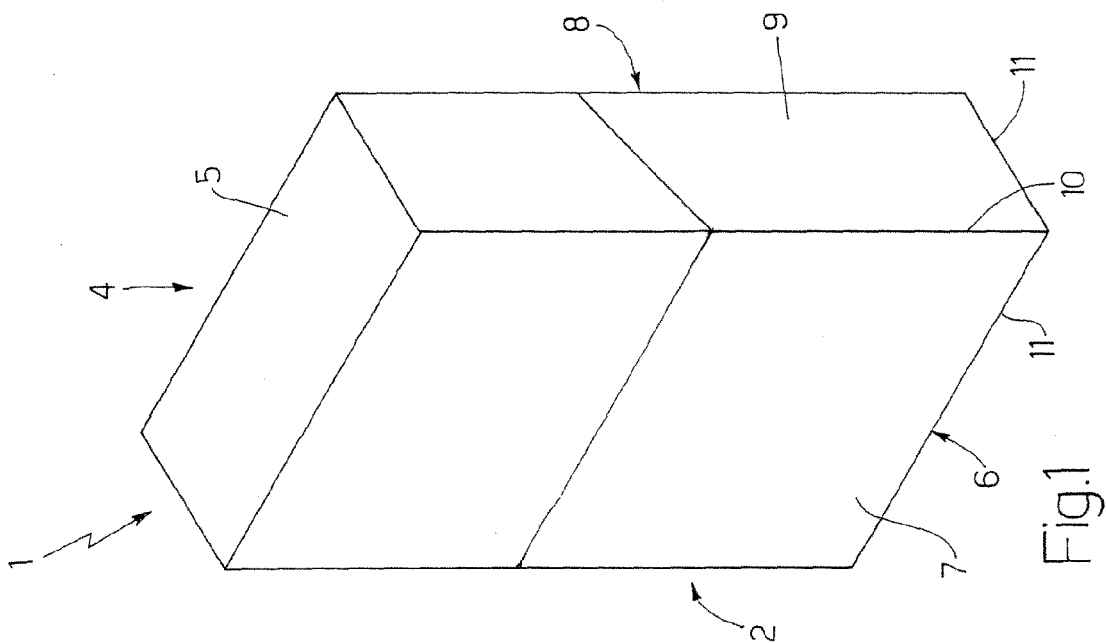
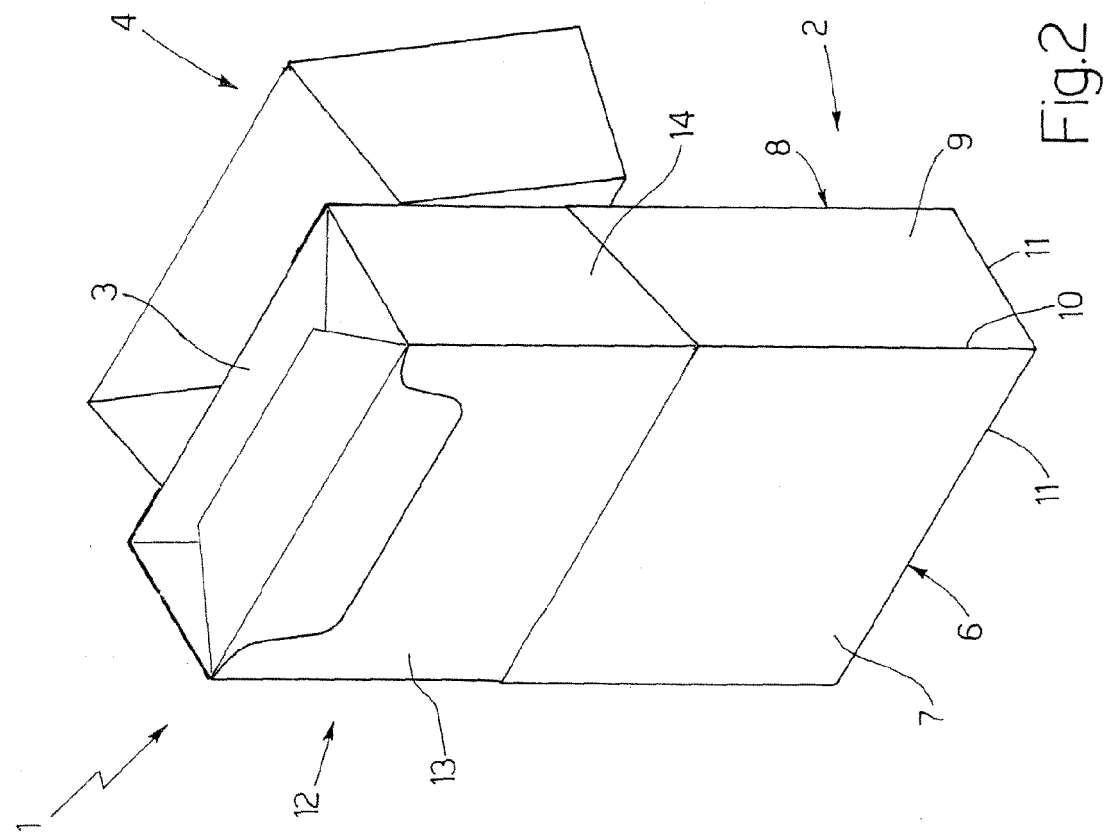
- packing materials to the third suction seats (61) of the second pickup wheel (59); and a vertical second feed wheel (64), which rotates in steps about a horizontal seventh axis (65), has a number of fourth suction seats (66), and is located over the second pickup wheel (59) and alongside the second packing wheel (39) to receive the packing materials successively from the second pickup wheel (59) and feed the packing materials to the second packing wheel (39).
8. A packing machine as claimed in Claim 7, wherein the second pickup device (62) comprises a second suction pickup head (63), which moves vertically up and down through a third suction seat (61) of the second pickup wheel (59) arrested facing the bottom outlet of the third hopper (58).
9. A packing machine as claimed in Claim 7 or 8, wherein the third feed unit (42) comprises a horizontal feed arm (67) having a suction pickup head (69), and which feeds the packing materials from the fourth suction seats (66) of the second feed wheel (64) to the second pockets (41) of the second packing wheel (39).
10. A packing machine as claimed in Claim 9, wherein the horizontal feed arm (67) rotates back and forth about a vertical eighth axis (68) to move the suction pickup head (69) cyclically from a fourth suction seat (66) of the second feed wheel (64) to a second seat (41) of the second packing wheel (39), and vice versa.
11. A packing machine as claimed in any one of Claims 6 to 10, wherein the packing materials fed by the third feed unit (42) to the second pockets (41) of the second packing wheel (39) comprise slides (17), each of which supports the lid (4) of a packet (1) of cigarettes to permit longitudinal slide of the lid (4).
12. A packing machine as claimed in Claim 11, wherein each collar (12) comprises a front wall (13); a bottom wall 15; and two lateral walls (14), each comprising a rear wing (16) which is folded squarely with respect to the lateral wall (14); the second packing wheel (39) having first fixed folding rails located downstream from the third feed unit (42) in the rotation direction of the second packing wheel (39), and which fold the rear wings (16) of each collar (12) onto an inner package (3) and over a slide (17).
13. A packing machine as claimed in Claim 12, wherein each slide (17) comprises two tabs (19), which are folded squarely with respect to the slide (17) onto the lateral walls (14) of a collar (12) to limit upward slide of the slide (17); the tabs (19) of each slide (17) being folded onto an inner package (3) and onto the lateral walls (14) of a collar (12) as the inner package (3) is transferred from a second pocket (41) of the second packing wheel (39) to a third pocket (45) of the third packing wheel (43).
14. A packing machine as claimed in any one of Claims 1 to 13, wherein each collar (12) is fed flat to a first pocket (37) of the first packing wheel (35), and is folded about the inner package (3) as the inner package (3) is pushed out of the first pocket (37) and transferred to a second pocket (41) of the second packing wheel (39).
15. A packing machine as claimed in any one of Claims 1 to 14, wherein the horizontal second packing wheel (39) is located below the first packing wheel (35), and is overlapped by the first packing wheel (35), so that a first pocket (37) of the first packing wheel (35) is superimposed over and aligned perfectly with a second pocket (41) of the second packing wheel (39), and an inner package (3) can be transferred vertically from the first pocket (37) of the first packing wheel (35) to the second pocket (41) of the second packing wheel (39).
16. A packing machine as claimed in any one of Claims 1 to 15, wherein the second feed unit (46) comprises:
- a fourth hopper (70) housing a stack of blanks (20), and having a bottom outlet through which the blanks (20) are withdrawn one by one;
 - a vertical third pickup wheel (71) rotating about a horizontal ninth axis (72), and supporting a number of suction pickup heads (73);
 - a vertical intermediate wheel (74) rotating about a horizontal tenth axis (75), and having a number of fifth suction seats (76); and
 - a belt feed conveyor (77), which has a belt (78) looped about two end pulleys (79), and is located partly beneath the third packing wheel (43).
17. A packing machine as claimed in Claim 16, wherein each suction pickup head (73) is hinged to the third pickup wheel (71) to rotate, with respect to the third pickup wheel (71) and under the control of a cam actuating system, about an eleventh axis parallel to the ninth axis (72).
18. A packing machine as claimed in Claim 16 or 17, wherein the second feed unit (46) comprises a gumming device located at the intermediate wheel (74) to gum each blank (20).
19. A packing machine as claimed in Claim 16, 17 or 18, wherein each blank (20) comprises at least one reinforcing flap (24) for reinforcing the lid (4), and which is separated from the blank (20) by a fold line (25), and is folded 180° onto the blank (20); and the sec-

ond feed unit (46) comprises:

a first folding device (80) located at the intermediate wheel (74) to prefold the reinforcing flap (24) of the lid (4) of each blank (20) about the fold line (25); and
a second folding device (81) which completes the folding the reinforcing flap (24) of the lid (4) about the fold line (25) and onto the blank (20).

1 to 26, and comprising a vertical transfer conveyor (47) which receives the packets (1) of cigarettes successively from the third packing wheel (43); and a horizontal drying conveyor (48) which receives the packets (1) of cigarettes successively from the transfer conveyor (47).

20. A packing machine as claimed in Claim 19, wherein the second folding device (81) is located at the feed conveyor (77). 10
21. A packing machine as claimed in Claim 19, wherein the second folding device (81) is located at the intermediate wheel (74), downstream from the first folding device (80). 15
22. A packing machine as claimed in Claim 19, 20 or 21, wherein the second folding device (81) comprises second fixed folding rails. 20
23. A packing machine as claimed in any one of Claims 19 to 22, wherein each blank (20) comprises two reinforcing flaps (24) for reinforcing the lid (4), and which are defined by two oblique, oppositely-inclined fold lines (25). 25
24. A packing machine as claimed in any one of Claims 19 to 23, wherein the first folding device (80) prefolds the reinforcing flap (24) of the lid (4) of each blank (20) by an angle of at least 90° about the fold line (25). 30
25. A packing machine as claimed in any one of Claims 19 to 24, wherein the first folding device (80) comprises a vertical folding wheel (82) rotating about a horizontal twelfth axis (83), and supporting a number of folding bodies (84) equally spaced about the periphery of the folding wheel (82); and each folding body (84) comprises a folding head, and a connecting rod fitted movably to the folding wheel (82) and operated by a cam actuating system. 35 40
26. A packing machine as claimed in Claim 25, wherein the folding head is wedge-shaped and has a triangular cross section; each blank (20) has two reinforcing flaps (24) for reinforcing the lid (4), and which are defined by two oblique, oppositely-inclined fold lines (25); and, in use, each folding body (84) is inserted between the two reinforcing flaps (24) of a blank (20) to position the folding head on the blank (20), and the folding body (84) is then lowered with respect to the blank (20), so that the folding head folds the two reinforcing flaps (24) with respect to the blank (20). 45 50 55
27. A packing machine as claimed in any one of Claims



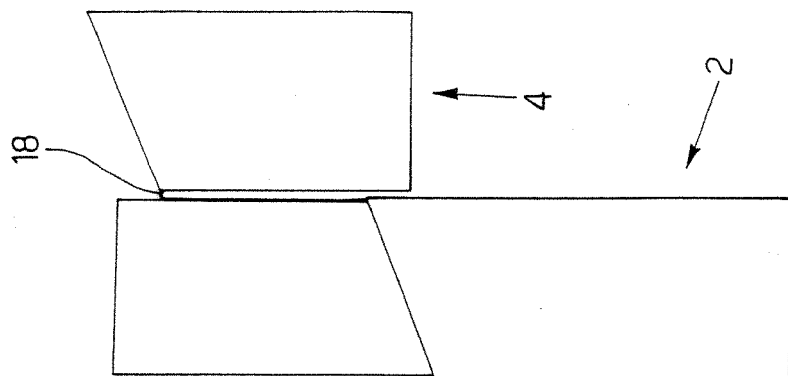


Fig. 5

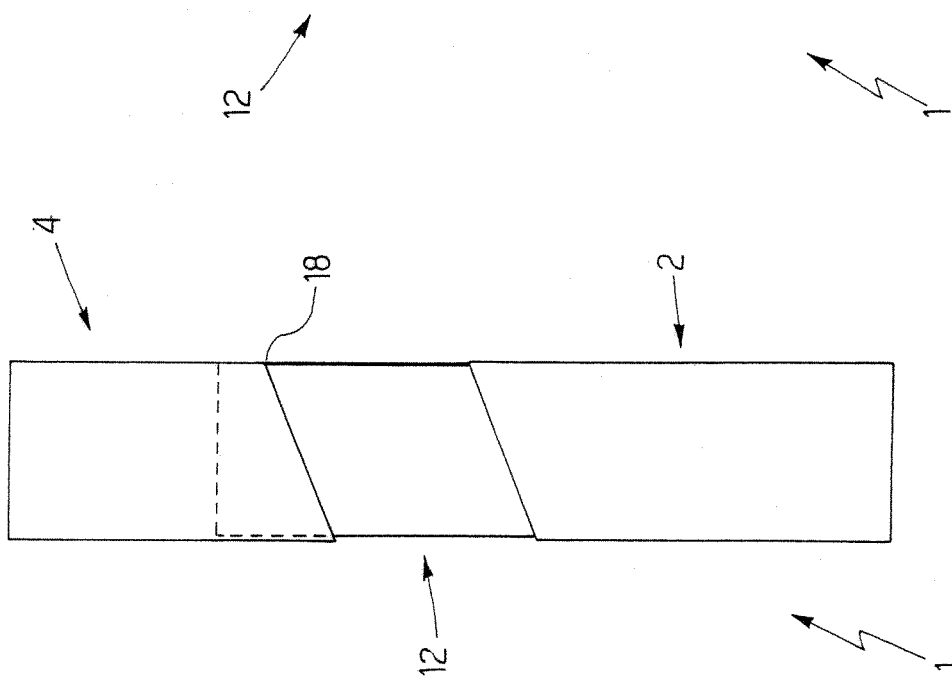


Fig. 4

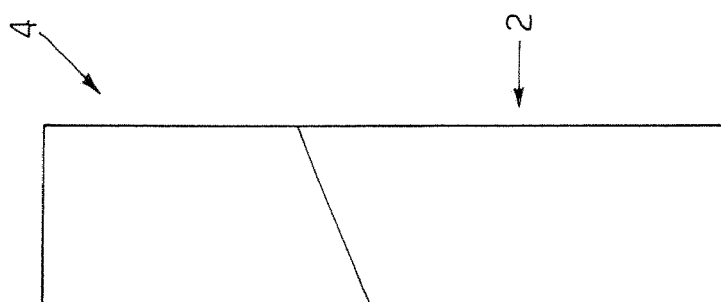
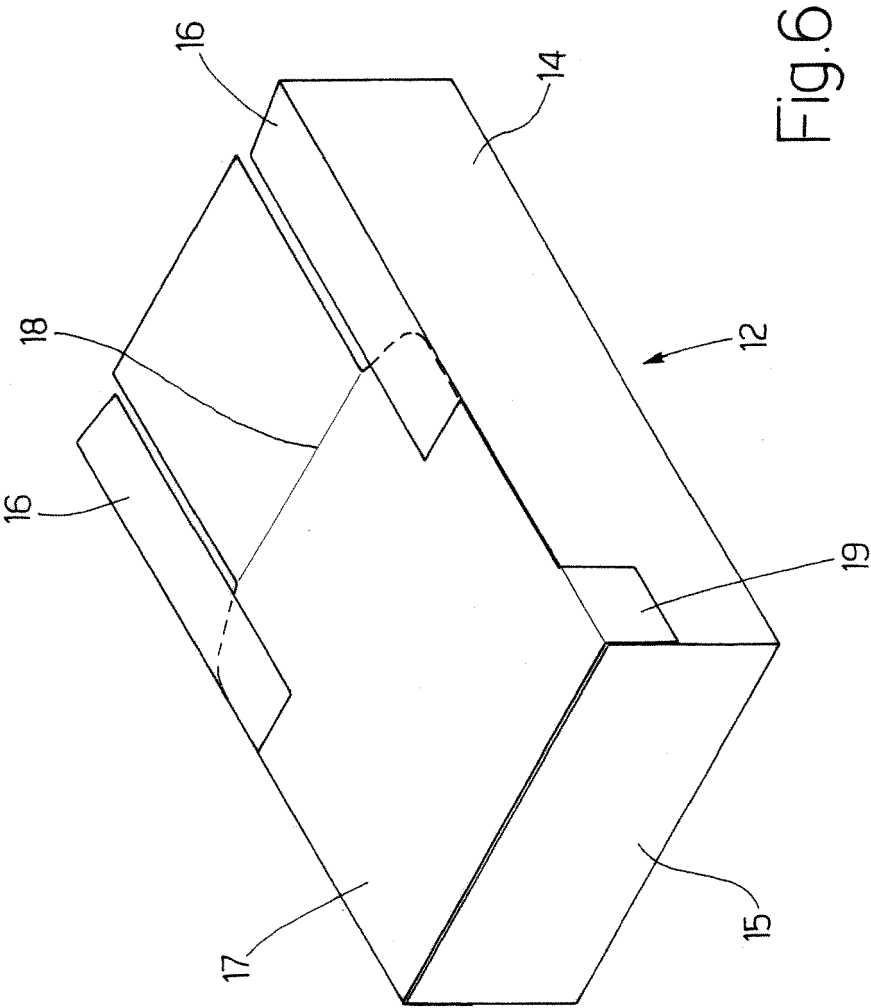
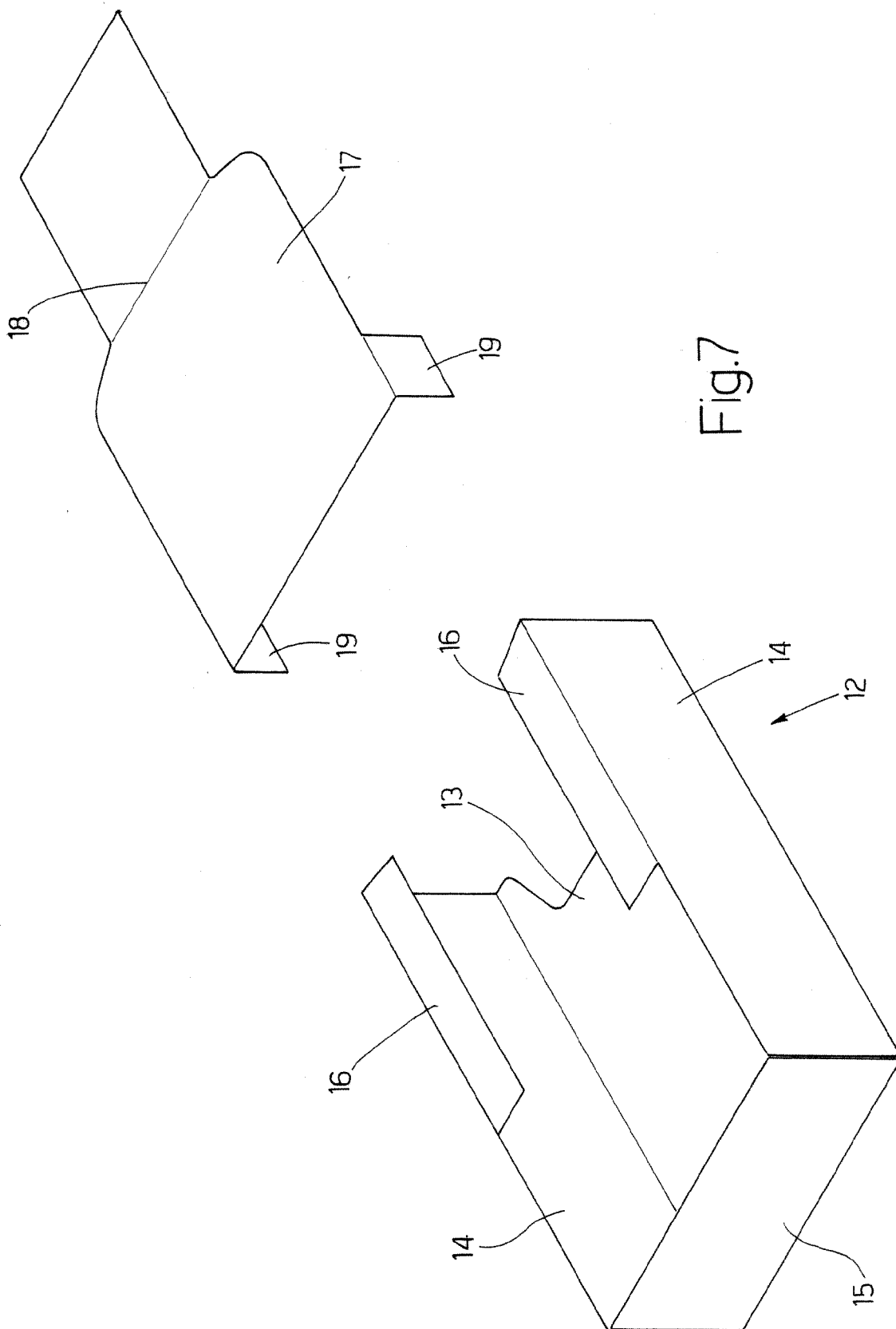


Fig. 3





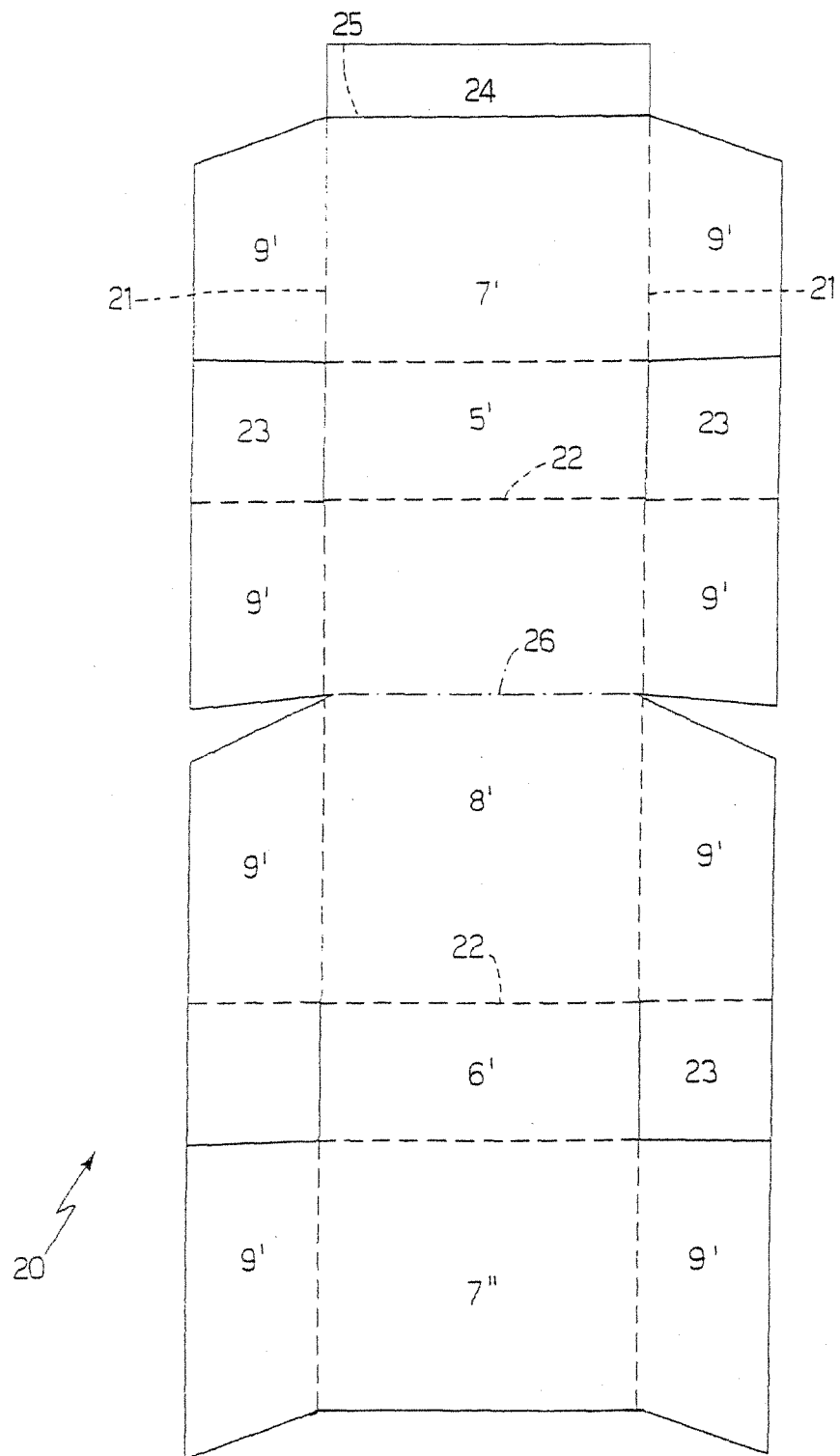


Fig.8

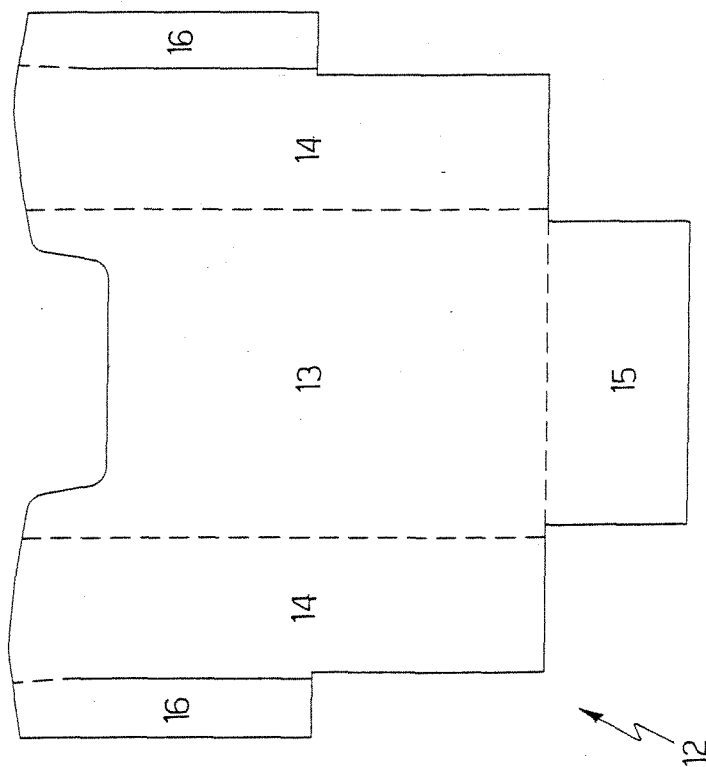


Fig.9

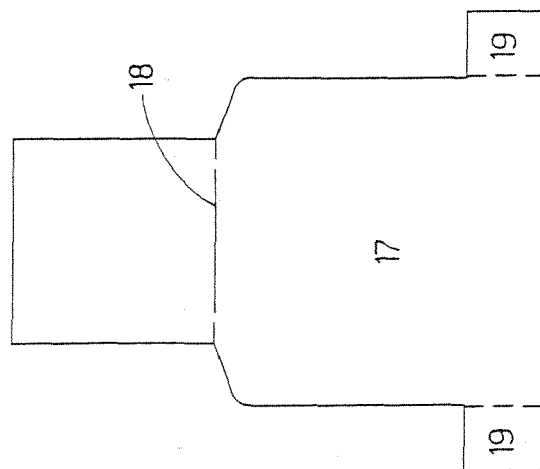


Fig.10

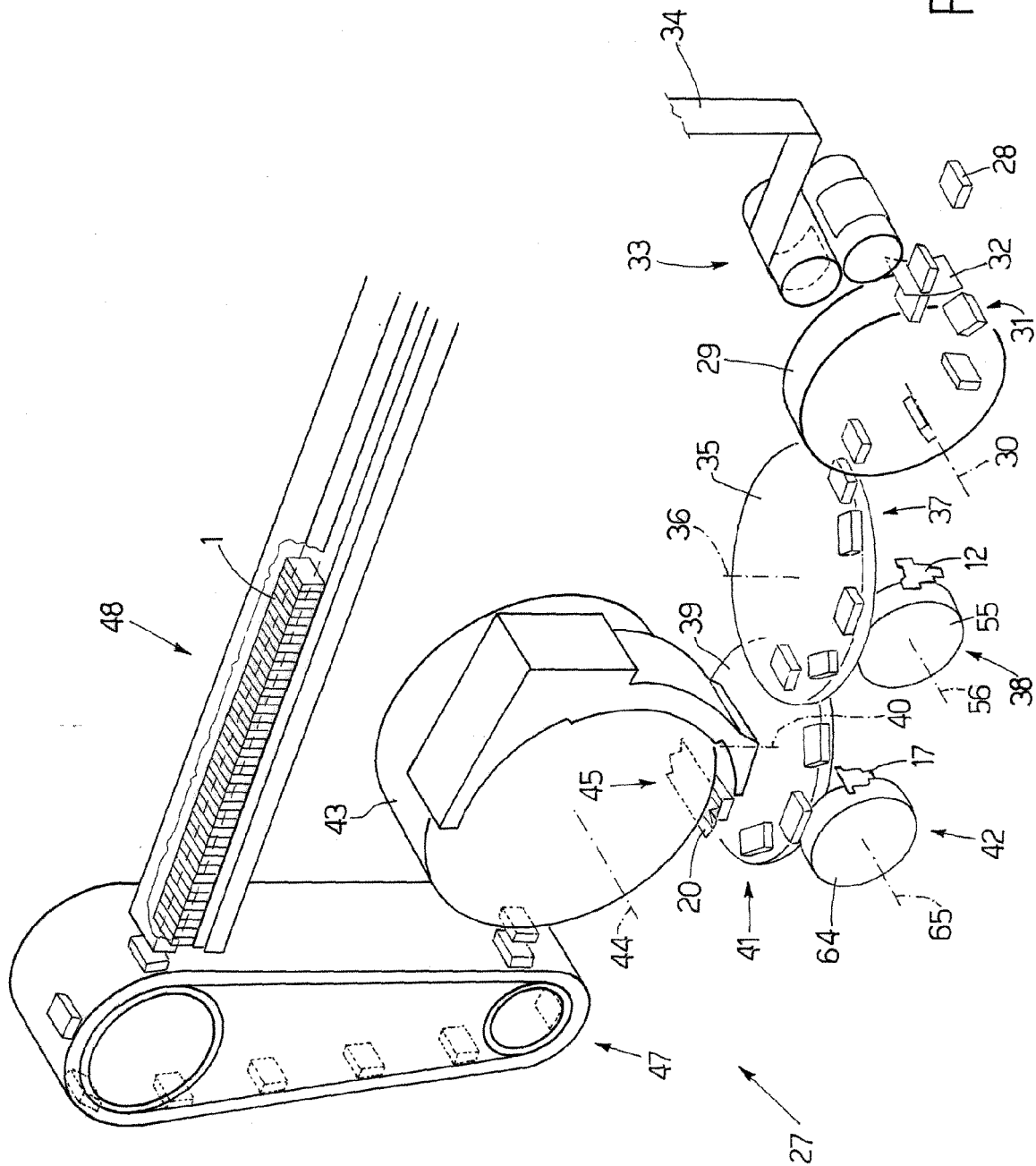
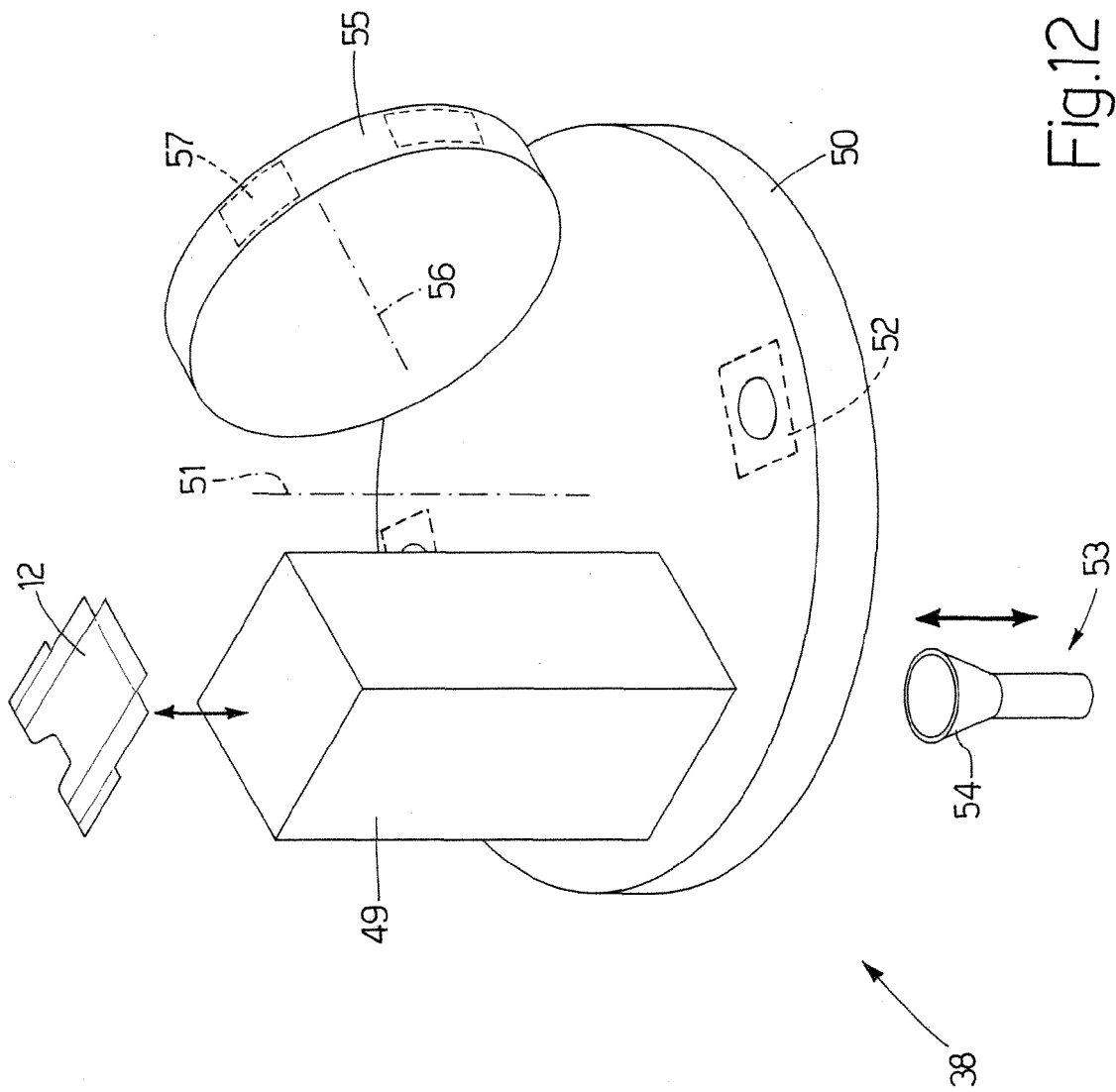


Fig.11



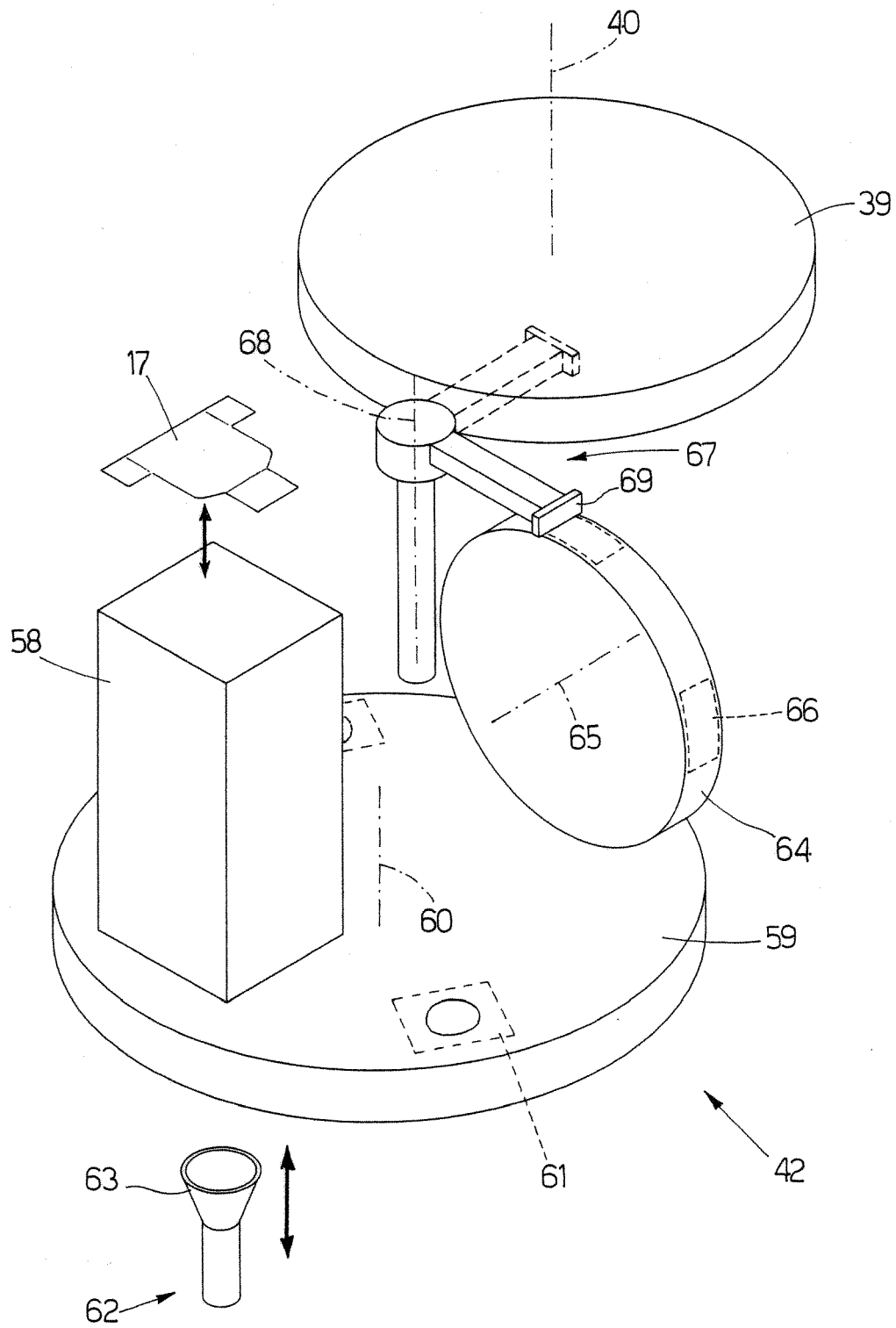
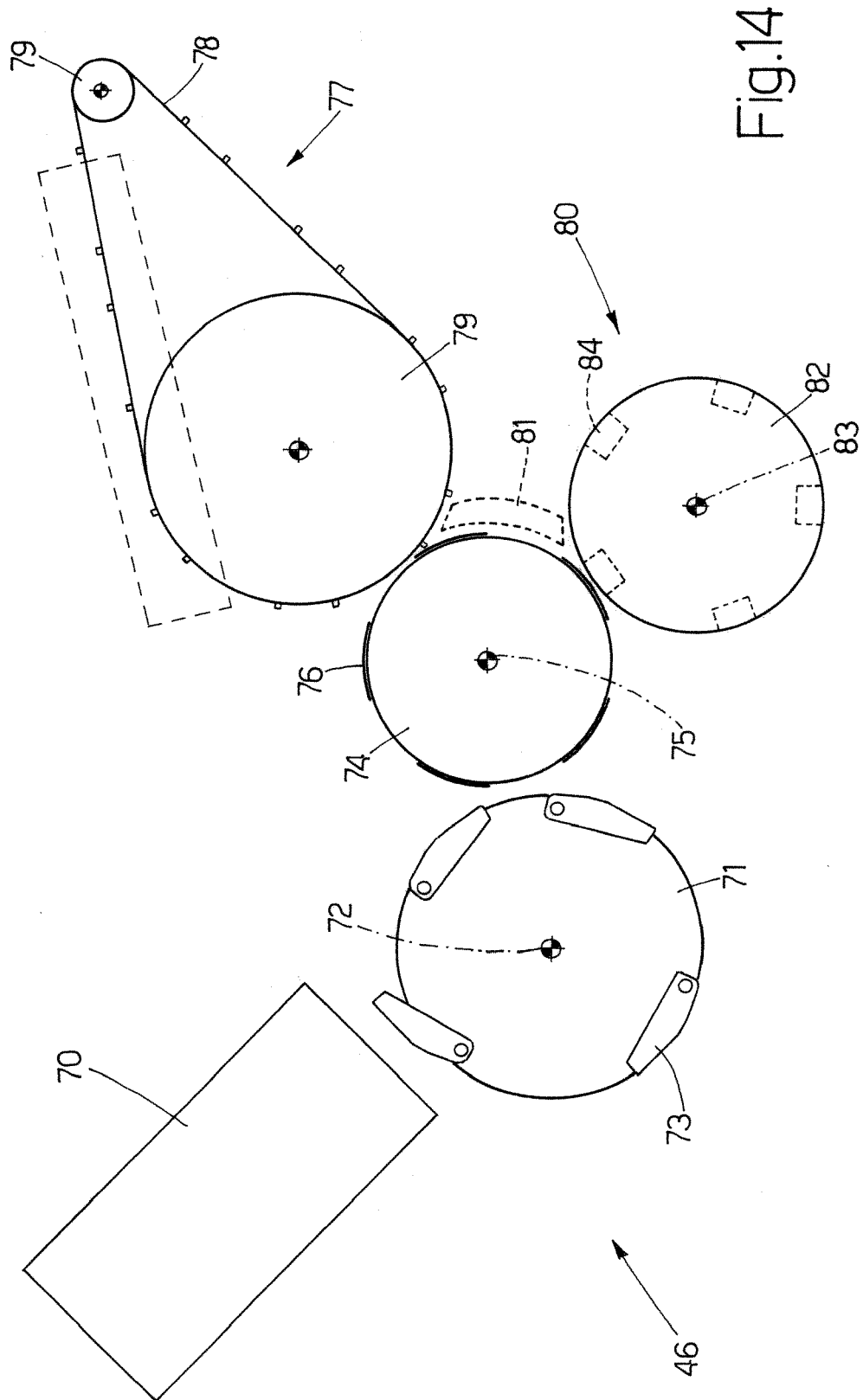
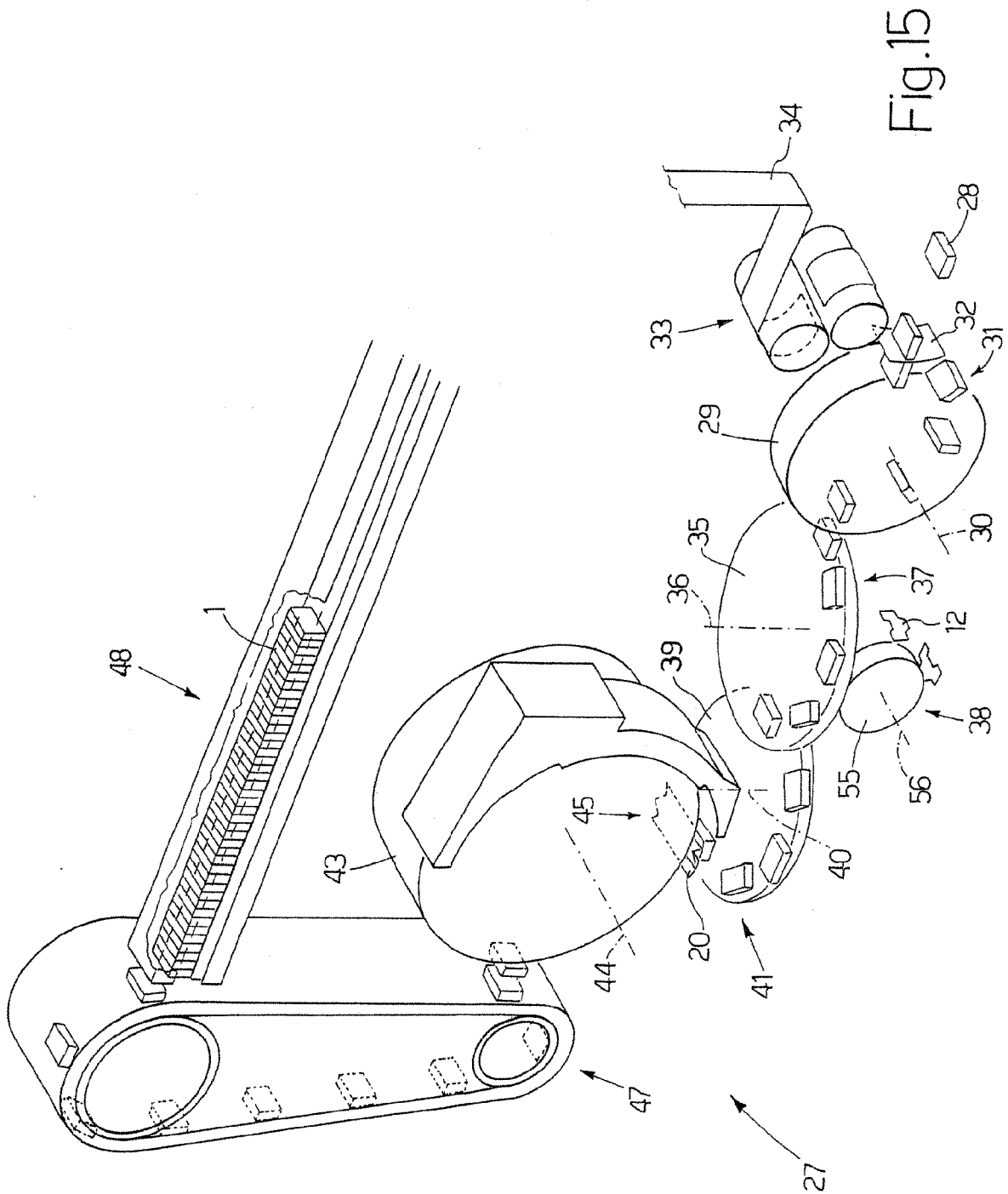


Fig.13







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EUROPEAN SEARCH REPORT

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			B65B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 November 2007	Examiner Jagusiak, Antony
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