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(54) Method of transferring groups of cigarettes on a cigarette packing machine

(57) A method of transferring groups (3) of cigarettes on a packing machine (2), whereby a group (3) of cigarettes, as it travels along a first path (P1), is arrested in a pickup position inside a transfer station (5), in which a gripper device (46), after being closed about the group

(3) of cigarettes, is moved in a given transfer direction (50) to transfer the group (3) of cigarettes from the pickup position to a release position along a second path (P2), and is opened to release the group (3) of cigarettes in the release position.

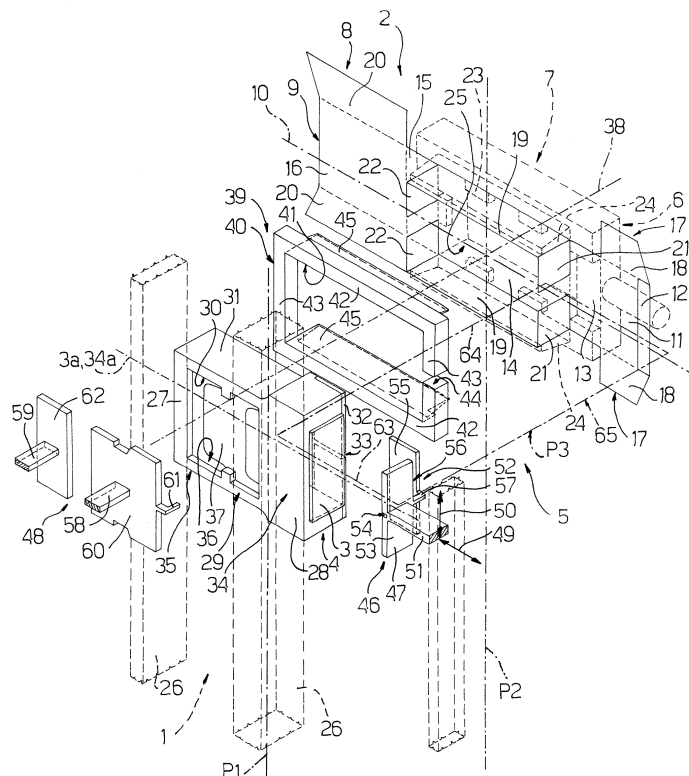


Fig.1

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Description

[0001] The present invention relates to a method of transferring groups of cigarettes on a cigarette packing machine.

[0002] On cigarette packing machines, a succession of groups of cigarettes is fed along a packing path defined by a succession of conveyors, each of which is connected to at least one adjacent conveyor at a respective transfer station, where each group of cigarettes is expelled from a relative seat or pocket on the upstream conveyor along the packing path, and is transferred into a relative seat or pocket on the downstream conveyor along the packing path.

[0003] When performing the above transfer operation, both the position and configuration of the group of cigarettes being transferred are normally controlled at all times. For which purpose, the group of cigarettes to be transferred is normally gripped between movable push members normally defined by a pusher movable through or with respect to the upstream conveyor, and a counter-pusher movable through or with respect to the downstream conveyor.

[0004] In some cases, on account of the design of the seats or pockets and/or conveyors, assembly of the movable push members, and particularly the counter-pusher, is extremely difficult, and involves major mechanical complications and fairly high cost.

[0005] It is an object of the present invention to provide a method of transferring groups of cigarettes on a cigarette packing machine, designed to eliminate the aforementioned drawback.

[0006] According to the present invention, there is provided a method of transferring groups of cigarettes on a cigarette packing machine, as claimed in the attached independent Claim or in any one of the Claims depending directly or indirectly on the independent Claim.

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

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of a device implementing the method according to the present invention and in a first operating position; Figures 2 and 3 show views in perspective of a detail of Figure 1 in a further operating position; Figure 4 shows a plan view of the Figure 2 and 3 detail.

[0008] Number 1 in Figure 1 indicates as a whole a packing wheel of a packing machine 2 for packing groups 3 of cigarettes, in particular, groups of cigarettes which are each already enclosed in an inner wrapping preferably made of foil and having a longitudinal axis 3a parallel to the axes of the relative cigarettes.

[0009] Packing wheel 1 comprises a number of pockets 4, each for housing and feeding a relative group 3 of

cigarettes in steps along a packing path P1 extending about an axis of rotation (not shown) of packing wheel 1 and through a transfer station 5, where packing path P1 is substantially tangent to a packing path P2, along which travel pockets 6 of a further packing wheel 7 rotating in steps about an axis (not shown) parallel to the axis of rotation (not shown) of packing wheel 1.

[0010] Each pocket 6 receives and partly houses a respective known blank 8, which is substantially rectangular and comprises a central portion 9 extending along a longitudinal axis 10, and in turn comprising a front lid panel 11 with a reinforcing flap 12; a top lid panel 13; a rear panel 14; a bottom panel 15; and a front panel 16. Blank 8 also comprises two longitudinal lateral wings 17 located on opposite sides of central portion 9, and each comprising a portion 18 extending along front lid panel 11; a portion 19 extending along rear panel 14; a portion 20 extending along front panel 16; a tab 21 extending from portion 19 towards portion 18; and a tab 22 extending from portion 19 towards portion 20.

[0011] Each pocket 6 is substantially U-shaped with its concavity facing outwards of packing wheel 7, and comprises a bottom wall 23 parallel to the axis of rotation (not shown) of packing wheel 7; and two lateral walls 24 perpendicular to bottom wall 23 and also parallel to the axis of rotation (not shown) of packing wheel 7. More specifically, the distance between lateral walls 24 is approximately equal to but no smaller than the width of central portion 9 of blank 8; lateral walls 24 and bottom wall 23 are the same length as rear panel 14 of blank 8; and the height of each lateral wall 24 is greater than the width of each longitudinal lateral wing 17 of blank 8.

[0012] Each blank 8 is fed into respective pocket 6, so that rear panel 14 contacts bottom wall 23, and the rest of central panel 9 projects outwards of pocket 6.

[0013] As it travels along packing path P2, each blank 8 is gradually folded in known manner with respect to relative pocket 6, so that it reaches transfer station 5 in a partly folded position, in which reinforcing flap 12 is folded onto front lid panel 11; portions 18 are folded squarely with respect to front lid panel 11; portion 19 of each lateral wing 17 is folded squarely with respect to rear panel 14 and contacting the inner surface of relative lateral wall 24; and tabs 21 and 22 are folded squarely with respect to portions 19 of relative lateral wings 17 and to rear panel 14, and are perpendicular to relative longitudinal axis 10. In this partly folded configuration, each blank 8 defines a cup-shaped seat 25, which is bounded by rear panel 14, tabs 21 and 22, and portion 19 of each lateral wing 17, and which receives a respective wrapped group 3 of cigarettes from packing wheel 1 at transfer station 5.

[0014] In addition to pockets 4, packing wheel 1 also comprises two coaxial disks 26 separated by a distance equal to the length of pockets 4, and supporting respective ends of each pocket 4. More specifically, each pocket 4 is positioned with its longitudinal axis 34a parallel to the axis of rotation (not shown) of wheel 1 and to the

cigarettes in relative group 3 of cigarettes, and comprises two end cross members 27 and 28, which are located at the periphery of respective disks 26, and define a bottom wall 29 having a central opening 30 between disks 26. Each pocket 4 also comprises two lateral walls 31 parallel to each other and to the axis of rotation (not shown) of packing wheel 1, and projecting radially outwards of disks 26; and an outer cross member 32 connected integrally to the free edges of lateral walls 31 and facing cross member 28. Outer cross member 32 is parallel to cross member 28, is relatively narrow, measured parallel to longitudinal axis 34a of relative pocket 4, with respect to the length of pocket 4, and is divided into two equal parts by an intermediate slit 33.

[0015] Outer cross member 32 defines, on pocket 4, a tubular portion 34 coaxial with longitudinal axis 34a of pocket 4 (coincident, in use, with longitudinal axis 3a of relative group 3 of cigarettes); and a portion 35, which is aligned with tubular portion 34 along longitudinal axis 34a, is C-shaped with its concavity facing radially outwards, and defines, with tubular portion 34, a seat 36 for housing a respective group 3 of cigarettes positioned with the cigarettes parallel to the axis of packing wheel 1 and to longitudinal axis 34a. A further seat (not shown) is formed inside seat 36, is located inside C-shaped portion 35 of pocket 4, flush with outer cross member 32, houses a U-folded collar 37, and is designed so that each collar 37, when inserted inside pocket 4, is locked axially inside pocket 4, is kept outside relative seat 36, and partly surrounds group 3 of cigarettes when this is housed inside seat 36.

[0016] At transfer station 5, each pocket 4, housing a respective group 3 of cigarettes and a respective collar 37, is arrested substantially facing - along a radial axis 38, but offset laterally with respect to radial axis 38 by a distance equal to the width of outer cross member 32 - a relative pocket 6, also arrested at transfer station 5. Pocket 6 houses a blank 8, the seat 25 of which is coaxial with radial axis 38 and positioned with its concavity facing relative pocket 4 and a funnel-shaped intermediate spindle 39, which is mounted inside transfer station 5 and is moved back and forth along radial axis 38 and between packing wheels 1 and 7 by a known actuating device not shown.

[0017] Spindle 39 comprises an annular, substantially rectangular frame 40 defining an inner passage 41, which is coaxial with radial axis 38 and has a rectangular cross section of approximately the same shape as and no smaller than rear panel 14 of blank 8, and substantially the same shape as the cross section of seat 25. Frame 40 has two long sides 42 crosswise to paths P1 and P2; and two short sides 43 parallel to paths P1 and P2, and one of which, located on the same side as outer cross members 32 of pockets 4, has an intermediate slit 44 of at least the same width as intermediate slits 33.

[0018] A respective tab 45 is connected integrally to the inner surface of each long side 42 of frame 40, is made of relatively elastic material, converges slightly with

the other tab 45, and projects from relative long side 42 towards packing wheel 7 by a distance at most equal to the width of longitudinal lateral wings 17 of blank 8, and therefore to the depth of seat 25.

[0019] Spindle 39 moves along radial axis 38 to and from a work position (not shown), in which tabs 45 engage seat 25 defined by a blank 8 inside a pocket 6 arrested at transfer station 5, and each tab 45 is positioned contacting the inner surface of portion 19 of relative longitudinal lateral wing 17 of blank 8.

[0020] Each group 3 of cigarettes is transferred in controlled manner from a stationary pocket 4 at transfer station 5 to seat 25, defined by relative blank 8 inside the relative stationary pocket 6 at transfer station 5, by means of a gripper device 46 located at transfer station 5 and comprising two jaws 47 and 48; jaw 47 performs a first reciprocating movement in a direction 49 parallel to axis 34a, and a second reciprocating movement to and from seat 25 in a radial direction 50; and jaw 48 performs one reciprocating movement in direction 50 to and from seat 25 and at least partly through opening 30 of relative pocket 4.

[0021] More specifically, jaw 47, at rest (Figure 1), is located alongside packing wheel 1, close to tubular portion 34 of the stationary pocket 4 at transfer station 5, and comprises an actuating arm 51 parallel to axis 34a and supporting, on the end, an L-shaped pusher 52 comprising a rectangular plate 53, which is perpendicular to axis 34a, engages tubular portion 34 when moved in direction 49 from said rest position, and has, on the side facing packing wheel 1, a central groove 54 parallel to radial axis 38. Pusher 52 also comprises a rectangular plate 55 crosswise to plate 53 and perpendicular to radial axis 38, and which extends from plate 53 towards packing wheel 1, is located outwards of a lateral edge 56 of plate 53 facing packing wheel 7, and is connected integrally to a central portion of lateral edge 56 by an L-shaped bracket 57 thinner than the width of intermediate slit 33 in outer cross member 32 of pocket 4.

[0022] Jaw 48, at rest, is located radially inwards of the stationary pocket 4 at transfer station 5, and comprises two actuating arms 58 and 59 integral with each other and parallel to radial axis 38. Actuating arm 58 is substantially coaxial with radial axis 38, and is fitted integrally, on the end facing packing wheel 7, with a plate 60, which is perpendicular to radial axis 38, is movable in direction 50 through opening 30, and has a central lateral appendix 61 parallel to radial axis 38 and which slides inside groove 54 in plate 53. Actuating arm 59 is located laterally outwards of the disk 26 opposite the one facing jaw 47 in the rest position, and is fitted integrally, on the end facing packing wheel 7, with a plate 62, which is coplanar with plate 60, moves with plate 60 in direction 50, and is substantially the same shape and size as outer cross member 32.

[0023] In actual use, when a pocket 4, housing a respective group 3 of cigarettes, and a pocket 6, housing a respective blank 8 folded to define seat 25, are arrested

at transfer station 25, as shown in Figure 1, jaws 47 and 48 of gripper device 46 are positioned in their respective rest positions, laterally outwards and radially inwards of packing wheel 1 respectively; spindle 39 is positioned in an intermediate rest position between packing wheels 1 and 7 and directly facing seat 25 along radial axis 38; and pocket 4 is positioned facing seat 25, but offset laterally in direction 49, together with relative group 3 of cigarettes and with respect to radial axis 38, by a distance equal to the width of outer cross member 32.

[0024] At this point, when actuating arm 51 is acted on by a known push device not shown, jaw 47 is moved in direction 49, so that plate 53 engages tubular portion 34 of pocket 4, bracket 57 engages intermediate slit 33 in outer cross member 32, and plate 55 is positioned parallel to and outwards of outer cross member 32 on the side facing spindle 39. Jaw 47 continues moving in direction 49 until the group 3 of cigarettes, moving along axis 34a from an initial stop position at transfer station 5, and sliding over relative collar 37, clears tubular portion 34 of pocket 4 and is positioned in a pickup position directly facing passage 41 in spindle 39 and seat 25 along radial axis 38. In the pickup position, group 3 of cigarettes is positioned partly outwards of pocket 4 and of the disk 26 located at end cross member 27, and plate 55 is positioned substantially contacting the surface of group 3 of cigarettes facing spindle 39.

[0025] At this point, jaw 47 stops moving in direction 49, and a known push device (not shown) acts on actuating arms 58 and 59 to move jaw 48 in direction 50, so that plates 60 and 62 contact the surface of group 3 of cigarettes opposite the surface facing spindle 39, and appendix 61 engages groove 54 in plate 53 to close gripper device 46 about group 3 of cigarettes and grip it between jaws 47 and 48.

[0026] In connection with the above closing sequence of gripper device 46, it should be pointed out that, during the closing sequence, neither of jaws 47 and 48 crosses packing paths P1 and P2 in direction 50. More specifically, in the rest positions shown in Figure 1, both jaws 47 and 48 are located on the same side of path P2, and jaw 47 reaches the closed position without crossing packing path P2.

[0027] As shown in Figures 2 to 4, when gripper device 46 is in the closed position, the group 3 of cigarettes between jaws 47 and 48 is perfectly controlled as to both position and shape, by virtue of plate 53 being positioned contacting one of the end surfaces of group 3 of cigarettes and so keeping the relative wrapping closed.

[0028] Next, gripper device 46, still in the closed position, is moved in direction 50 along radial axis 38 towards seat 25, and, at the same time, spindle 39 is moved in direction 50 to insert tabs 45 inside seat 25. Group 3 of cigarettes, still gripped between jaws 47 and 48, therefore reaches its release position inside seat 25 by passing through spindle 39 and stopping between tabs 45, which squeeze group 3 of cigarettes transversely; and actuating arm 51 first engages slit 44 in frame 40, and then the gap

between the opposite ends of tabs 21.

[0029] At this point, spindle 39 is moved back into the rest position, releasing group 3 of cigarettes in the release position inside seat 25; jaw 47 is extracted from seat 25 in direction 49, thus outwardly unfolding tabs 21 (which are folded back into the Figure 1 position by two known folding devices not shown), and is then moved in direction 50 back into the rest position; and jaw 48 is moved back into the rest position in direction 50.

[0030] In other words, when transferring group 3 of cigarettes, jaw 48 moves back and forth in direction 50, and jaw 47 moves along an annular path P3 comprising, as of the Figure 1 rest position, an initial portion 63 in direction 49, an intermediate portion 64 in direction 50, and a return portion 65 comprising a first movement in direction 49, and a second movement in direction 50.

Claims

1. A method of transferring groups (3) of cigarettes, on a cigarette packing machine (2), from a first (P1) to a second (P2) path at a transfer station (5), the method comprising the steps of:

- feeding a group (3) of cigarettes along the first path (P1) to the transfer station (5);
- positioning the group (3) of cigarettes in a pickup position inside the transfer station (5);
- moving the jaws (47, 48) of a gripper device (46) so as to close the gripper device (46) about the group (3) of cigarettes in the pickup position along the first path (P1); the gripper device (46) being closed by moving the jaws (47, 48) from respective rest positions, in which the jaws (47, 48) are located on the same side of one of the paths (P1, P2);
- moving the gripper device (46) inside the transfer station (5) and in a given transfer direction (50) to transfer the group (3) of cigarettes from the pickup position to a release position along the second path (P2); and
- opening the gripper device (46) to release the group (3) of cigarettes in the release position.

2. A method as claimed in Claim 1, wherein the gripper device (46) is closed by moving a first (47) of the jaws (47, 48) of the gripper device (46) between the first and second path (P1, P2) in a travel direction (49) crosswise to the first path (P1) and to the transfer direction (50) to position the first jaw (47) facing a second (48) of the jaws (47, 48) in the transfer direction (50); and then moving the second jaw (48) towards the first jaw (47) in the transfer direction (50).

3. A method as claimed in Claim 1 or 2, wherein the group (3) of cigarettes is arrested along the first path (P1) and inside the transfer station (5) in an initial

position, and is then moved into the pickup position in a travel direction (49) crosswise to the first path (P1) and to the transfer direction (50).

4. A method as claimed in Claim 3, wherein the group (3) of cigarettes is moved in the travel direction (49) by the gripper device (46). 5
5. A method as claimed in Claim 3 or 4, wherein the group (3) of cigarettes is moved in the travel direction (49) by the gripper device (46) and before the gripper device (46) is closed about the group (3) of cigarettes. 10
6. A method as claimed in one of the foregoing Claims, wherein the step of closing the gripper device (46) about the group (3) of cigarettes comprises the sub-steps of: 15
 - moving a first (47) of the jaws (47, 48) of the gripper device (46) in a travel direction (49) crosswise to the first path (P1) and to the transfer direction (50) to engage the group (3) of cigarettes arrested inside the transfer station (5) in an initial stop position along the first path (P1), and moving the group (3) of cigarettes in the travel direction (49) into the pickup position; and 20
 - moving a second (48) of the jaws (47, 48) of the gripper device (46) in the transfer direction (50) and towards the first jaw (47) to grip the group (3) of cigarettes in the pickup position between the first and second jaw (47, 48). 25
7. A method as claimed in one of the foregoing Claims, wherein the steps of closing the gripper device (46) about a group (3) of cigarettes and moving the gripper device (46) and the group (3) of cigarettes in the transfer direction (50) are performed by moving a first (47) of the jaws (47, 48) of the gripper device (46) along an annular path (P3) comprising a first portion (63) crosswise to the first path (P1) and to the transfer direction (50), and a second portion (64) parallel to the transfer direction (50), and by imparting to a second (48) of the jaws (47, 48) of the gripper device (46) a back and forth movement parallel to the transfer direction (50) and across only one of the two paths (P1, P2). 30
8. A method as claimed in Claim 7, wherein the path crossed by the second jaw (48) is the first path (P1). 35
9. A method as claimed in any one of the foregoing Claims, wherein the group (3) of cigarettes is moved along the first path (P1) inside a first pocket (4) defining a first seat (36) for a respective group (3) of cigarettes positioned crosswise to the first path (P1); the first seat (36) being arrested inside the transfer station (5) to position the group (3) of cigarettes in 40

an initial position offset laterally, with respect to the pickup position, in a travel direction (49) crosswise to the first path (P1) and to the transfer direction (50); and the group (3) of cigarettes then being moved longitudinally from the initial position to the pickup position in the travel direction (49).

10. A method as claimed in Claim 9, wherein the group (3) of cigarettes is moved between the initial position and the pickup position by moving the group (3) of cigarettes along the first pocket (4). 45
11. A method as claimed in Claim 10, wherein each first pocket (4) comprises a tubular portion (34), and a C-shaped portion (35) with its concavity facing the second path (P2) in the transfer station (5); the group (3) of cigarettes being moved in the travel direction (49) between the initial position and the pickup position by releasing the group (3) of cigarettes from the tubular portion (34). 50
12. A method as claimed in Claim 11, wherein the step of closing the gripper device (46) about the group (3) of cigarettes comprises the substeps of:
 - moving a first (47) of the jaws (47, 48) of the gripper device (46) in the travel direction (49) and through the tubular portion (34) of the first pocket (4) to engage the group (3) of cigarettes arrested in the transfer station (5) in the initial position, and to move the group (3) of cigarettes in the travel direction (49) along the first pocket (4) into the pickup position; and 55
 - moving a second (48) of the jaws (47, 48) of the gripper device (46) in the transfer direction (50), through an opening (30) in a bottom wall (29) of the first pocket (4) and towards the first jaw (47) to grip the group (3) of cigarettes in the pickup position between the first and second jaw (47, 48).
13. A method as claimed in any one of the foregoing Claims, wherein the group (3) of cigarettes is released, in the release position, inside a second seat (25) movable along the second path (P2); the method comprising the further step of squeezing the group (3) of cigarettes transversely as the group (3) of cigarettes moves in the transfer direction (50).
14. A method as claimed in any one of the foregoing Claims, wherein the group (3) of cigarettes is released, in the release position, inside a second seat (25) movable along the second path (P2); the method comprising the further steps of feeding the group (3) of cigarettes, as it moves in the transfer direction (50), into a tubular spindle (39) movable back and forth in the transfer direction (50) inside the transfer station (5); feeding the tubular spindle (39), and the

group (3) of cigarettes housed inside it, in the transfer direction (50), so that the tubular spindle (39) engages the second seat (25), and the group (3) of cigarettes is positioned in the release position; and withdrawing the tubular spindle (39) from the second seat (25) in the transfer direction (50), leaving the group (3) of cigarettes stationary in the release position.

15. A method as claimed in Claim 14, wherein the second seat (25) is defined by a sheet (8) of packing material folded partly inside a second pocket (6) movable along the second path (P2).

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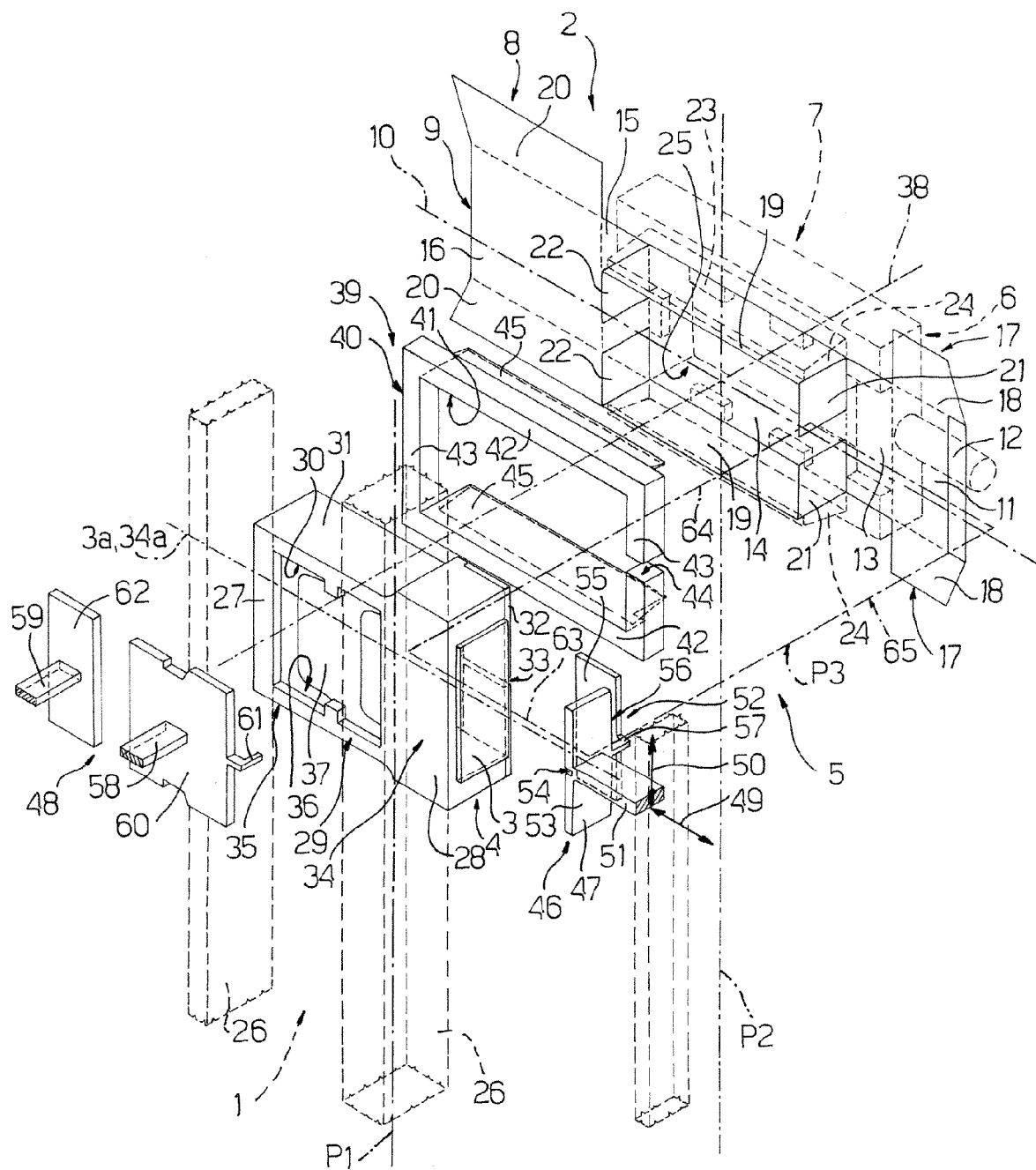


Fig.1

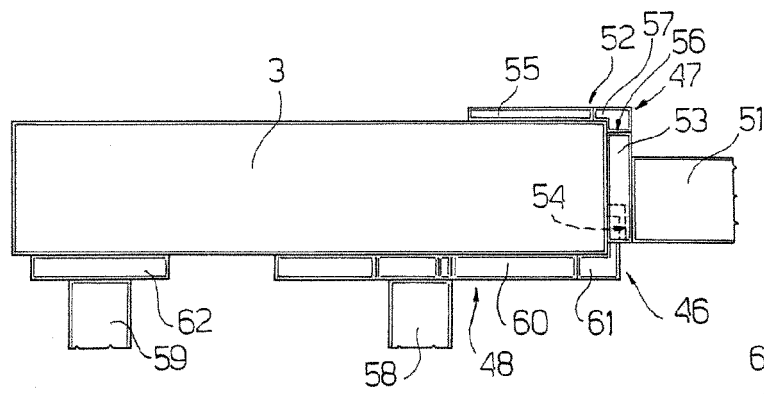
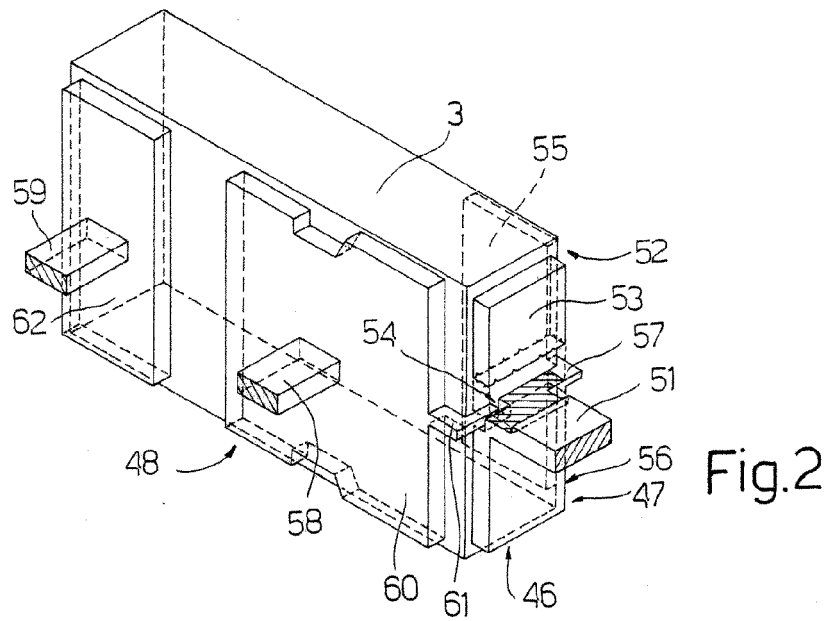
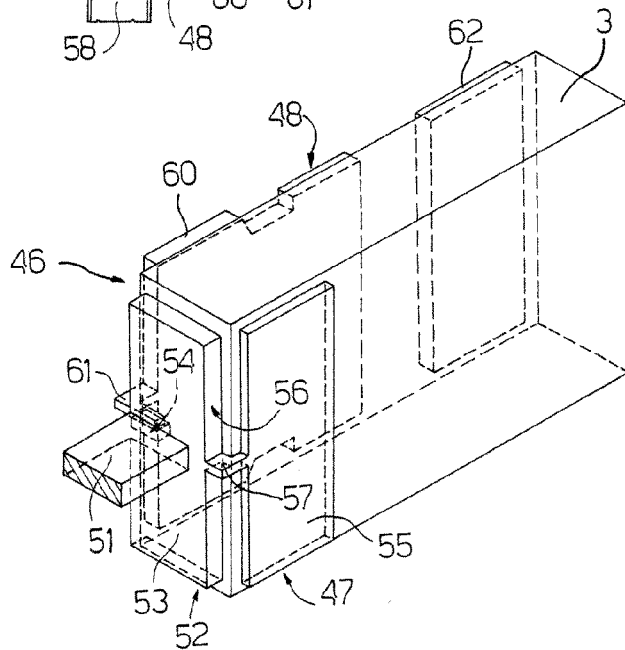


Fig. 4

Fig. 3





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**ANNEX TO THE EUROPEAN SEARCH REPORT
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