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Description

[0001] According to a first aspect, the present disclosure relates to an apparatus for manufacturing a package from a sheet of material.

[0002] According to a second aspect, the present disclosure relates to a method of manufacturing a package from a sheet of material using an apparatus according to the first aspect of the present disclosure.

[0003] Packages made from cardboard, preferably a corrugated material, are widely used for different applications and are available in numerous forms and dimensions.

[0004] The present disclosure provides an apparatus and a method for manufacturing a package from a sheet of material, preferably a sheet of cardboard or corrugated material, wherein said sheet of material comprises sheet portions defining a bottom wall and a side wall connected, via a folding line, to said bottom wall. In an embodiment the side wall may be comprise a two or more side wall sections that are each connected to the bottom wall.

[0005] The apparatus according to the first aspect of the present disclosure is provided with a module comprising:

- a plurality of receiving organs comprising a receiving space bound by a wall defining at least partly an outer shape of said package and each arranged for receiving said package, wherein said plurality of receiving organs are each attached to a rotation axis for simultaneously rotating said plurality of receiving organs about said rotation axis;
- a folding unit arranged for folding said sheet of material, thereby creating a folded sheet of material, and pressing said folded sheet of material into said receiving space of one of said plurality of receiving organs;
- a locking unit arranged for locking a section of said sheet of material, preferably said side wall, to another section of said sheet of material, preferably said side wall, while said folded sheet of material is located in said receiving space of said one of said plurality of receiving organs thereby creating said package.

[0006] By providing each of the plurality of receiving organs to the rotation axis, a relative compact apparatus is realised. A relative compact apparatus is beneficial for realising a relative large production output while occupying a relative small footprint.

[0007] The locking unit and the folding unit may be positioned such that by a rotation over a predetermined angle of the plurality of receiving organs about the rotation axis the one of the plurality of receiving organs is moved from the folding unit to the locking unit and subsequently back to the folding unit while another of the plurality of receiving organs is moved to the folding unit and subsequently to the locking unit.

[0008] By providing the receiving organs with the re-

ceiving space, the sheet of material may subsequently be formed into the folded sheet of material and into the package without the need for removing the material from the receiving organ. This is beneficial for realising a relative large production output.

[0009] The term cardboard may refer to a variety of heavy paper-like materials, including but not limited to, corrugated fibreboard or paperboard. Cardboard is a recyclable and/or reusable material. Producing the cardboard tray from a single sheet of cardboard prevents unnecessary waste of materials of which the cardboard is produced.

[0010] Preferably, said folding unit comprises a mandrel and a first movement arrangement arranged for moving said mandrel between a first position in which said mandrel is located outside said receiving space of said one of said plurality of receiving organs and a second position in which said mandrel is located inside said receiving space of said one of said plurality of receiving organs for said folding of said sheet of material.

[0011] It is advantageous, if said locking unit is provided with a locking element and a second movement arrangement arranged for moving said locking element between a first position in which said locking element is located outside said receiving space of said one of said plurality of receiving organs and a second position in which said locking element is located inside said receiving space of said one of said plurality of receiving organs for said locking of said section of said sheet of material to said other section of said sheet of material.

[0012] In this regard, it is beneficial if said wall of each of said plurality of receiving organs is provided with a through hole for allowing said locking element to be located inside said receiving space of said one of the plurality of receiving organs, via said through hole, for said locking of said section of said sheet of material to said other section of said sheet of material. Providing the through hole in the wall allows for locking the section to the other section in a preferred and predetermined position while maintaining the folded sheet of material in the receiving section. In other words, by providing the through hole locking of the section and the other section is not limited to parts of the section and the other section that may be extending outside the receiving space. Furthermore, the through hole allows for realizing a locking wherein the locking may extend into the inside of the package thereby allowing a relative reliable removal of the package from the receiving organ.

[0013] In an embodiment of the apparatus according to the first aspect of the present disclosure, said locking unit comprises a further mandrel provided with a recess for at least partly receiving said locking element when said locking element is in said second position. This is beneficial for maintaining a shape of the folded sheet of paper while realising the locking.

[0014] In this regard, it is advantageous, if said locking unit is provided with a third movement arrangement arranged for moving said further mandrel from a first posi-

tion in which said further mandrel is located outside said receiving space of said one of said plurality of receiving organs to a second position wherein said further mandrel is located inside said receiving space of said one of said plurality of receiving organs.

[0015] Preferably, said third movement arrangement is arranged for simultaneously moving said locking element from a third position in which said locking element is located outside said receiving space of said one of said plurality of receiving organs to said first position thereof with said further mandrel. By simultaneously moving the locking element and the further mandrel, a predetermined alignment of the locking element with the recess provided in the further mandrel may be realised and/or maintained. This is beneficial for realising a relative reliable locking of the section and the other section.

[0016] Preferably, said further mandrel is arranged, in said second position thereof, for further folding said folded sheet of material. This is beneficial for realising a relative accurate predetermined shaped of said folded sheet of material before locking said section of said sheet of material to said other section of said sheet of material.

[0017] In an embodiment of the apparatus according to the first aspect of the present disclosure, said module further comprises a removal unit arranged for removing said package, formed by said folding unit and said locking unit, from said receiving space of said one of said plurality of receiving organs. This is beneficial for avoiding, or at least reducing, the risk that the package is removed from the receiving organ due to gravity acting on the package.

[0018] An alternative benefit of the removal unit is that there is no longer a need for positioning the receiving unit such that gravity may pull the package from the receiving space. In other words, the removal unit allows to position the receiving organ in an orientation that allows for a footprint of the apparatus that is relatively small.

[0019] In this regard, it is advantageous, if said removal unit comprises a griper for gripping said package and removing said package from said receiving organ. This is beneficial for allowing to pull the package from the receiving organ as opposed to for instance a pressure means that pushes the package from the receiving organ. A griper is beneficial for allowing a relative compact apparatus since receiving organs may be attached at a relative short distance from the rotation axis.

[0020] Preferably, said removal unit is provided with a pressure device arranged for generating a pressure lower than an ambient pressure and wherein said griper is arranged for gripping said package via a suction force realised by said pressure device. This is beneficial for realising a relative good connection between the griper and the package while avoiding, or at least significantly reducing, the risk of damaging the package.

[0021] In an embodiment of the apparatus according to the first aspect of the present disclosure, said removal unit is provided with a fourth movement arrangement arranged for moving said griper from a first position in which said griper is located outside said receiving space of said

one of said plurality of receiving organs to a second position wherein said griper is located inside said receiving space of said one of said plurality of receiving organs for gripping said package.

[0022] In this regard, said fourth movement arrangement is further arranged for moving said griper from said first position to a third position for releasing said package. Releasing the package from the griper while the griper is in the third position is beneficial for allowing the packages to be removed for instance in a predetermined position that corresponds to an orientation required by a handling system that is receiving the packages from the apparatus, wherein the handling system may for instance be directed to an intermediate storage of the packages or filling of the packages with goods.

[0023] Preferably, said folding unit comprises a positioning unit arranged for positioning said sheet of material in front of a sheet support, preferably in front of an opening of a folding shoulder. This is beneficial for realising a relative reliable folding of the sheet of material by the folding unit.

[0024] In this regard, it is beneficial if said positioning unit is arranged for positioning said sheet of material in front of an opening of said one of said plurality of receiving organs. This is beneficial for realising a relative reliable folding of the sheet of paper by the folding unit.

[0025] It is advantageous, if an opening of said sheet support, preferably said opening of said folding shoulder, is aligned with said opening of said one of said plurality of receiving organs. This is beneficial for realising a relative reliable folding of the sheet of paper by the folding unit and a relative reliable movement of the folded sheet of material into the receiving space of the one of the plurality of receiving organs.

[0026] In this regard, it is beneficial if said positioning unit is arranged for positioning said sheet of material in a predetermined position in front of said opening. This is beneficial for realising packages that are relative uniform as regards their folding, by the folding unit, along the folding lines.

[0027] In an embodiment of the apparatus according to the first aspect of the present disclosure, said apparatus comprises a plurality of said modules, wherein said rotation axes of said plurality of modules are concentric. This is beneficial for allowing a relative large production output from a single apparatus thereby avoiding, or reducing the need for, relative complex logistics in a factory requiring a plurality of apparatuses according to the first aspect of the present disclosure. In other words, the risk of a single apparatus forming a bottleneck in the production facility is reduced by increasing the output of the apparatus.

[0028] According to the second aspect, the present disclosure relates to a method of manufacturing a package from a sheet of material, preferably a sheet of cardboard or corrugated material, using an apparatus according to the first aspect of the present disclosure, wherein said sheet of material comprises sheet portions defining a bot-

tom wall and a side wall connected, via a folding line, to said bottom wall, wherein said method comprises the steps of:

- folding, by said folding unit, said sheet of material and thereby creating a folded sheet of material;
- pressing, by said folding unit, said folded sheet of material into said receiving space of one of said plurality of receiving organs;
- moving, said one of said plurality of receiving organs, by rotation of said plurality of receiving organs about said rotation axis, to said locking unit;
- locking, by said locking unit, said section of said sheet of material to said other section of said sheet of material while said folded sheet of material is located in said receiving space of said one of said plurality of receiving organs thereby creating said package.

[0029] Embodiments of the apparatus according to the first aspect of the present disclosure as presented above are also applicable to the method to the second aspect of the present disclosure, and vice versa.

[0030] Effects of the apparatus according to the first aspect of the present disclosure as presented above correspond to or are similar to effects of the method according to the second aspect of the present disclosure.

[0031] Preferably, said method further comprises the steps of:

- moving, said one of said plurality of receiving organs, by rotation of said plurality of receiving organs about said rotation axis, to said removal unit;
- removing, by said removal unit, said package from said receiving space of said one of said plurality of receiving organs.

[0032] In an embodiment of the method according to the second aspect of the present disclosure, said sheet of material is made of corrugated material in which corrugations of said corrugated material are provided on the outside surfaces of said package. This is beneficial for realising a relative strong package while allowing for realising a package having a curved wall.

[0033] Preferably, said corrugated material consist of two layers, wherein only one of said two layers is corrugated. Corrugated material of only two layers is beneficial for realising a relative strong package while allowing for realising a package having a curved wall.

[0034] Preferably, said a weight of said corrugated material is in the range of 60 to 140 gram/m², more preferably in the range of 80 to 100 gram/m². Corrugated material having a weight in this range is beneficial for realising a relative strong package while allowing for realising a package having a curved wall.

[0035] Preferably, during said step of folding, said mandrel is pushing said sheet of material through said opening of said sheet support for folding said sheet of

material. This is beneficial for decoupling a positioning accuracy of said receiving organs from a positioning accuracy of said folding unit for said folding. In other words, the positioning accuracy of the receiving organs relative to the folding unit may be reduced as opposed to a configuration wherein the wall of receiving organs is used for folding the sheet of material into the folded sheet of material.

[0036] Preferably, during said step of pressing, said mandrel is moved, by said first movement arrangement, between said first position thereof in which said mandrel is located outside said receiving space of said one of said plurality of receiving organs and said second position thereof in which said mandrel is located inside said receiving space of said one of said plurality of receiving organs for said folding of said sheet of material.

[0037] Preferably, during said step of locking, said locking element is moved, by said second movement arrangement, between said first position thereof in which said locking element is located outside said receiving space of said one of said plurality of receiving organs and said second position thereof in which said locking element is located inside said receiving space of said one of said plurality of receiving organs for said locking of said section of said sheet of material to said other section of said sheet of material.

[0038] Preferably, during said step of locking, said locking element is moved, by said second movement arrangement, between said first position thereof in which said locking element is located outside said receiving space of said one of said plurality of receiving organs and said second position thereof in which said locking element is located inside said receiving space of said one of said plurality of receiving organs for said locking of said section of said sheet of material to said other section of said sheet of material.

[0039] In this regard, it is beneficial if, during said step of locking, said locking element is located inside said receiving space of said one of the plurality of receiving organs, via said through hole, for said locking of said section of said sheet of material to said other section of said sheet of material.

[0040] Preferably, during said step of locking, said locking element is at least partly received in said recess of said further mandrel when said locking element is in said second position thereof.

[0041] In this regard, it is beneficial if, during said step of locking, said further mandrel is moved, by said third movement arrangement, from said first position thereof in which said further mandrel is located outside said receiving space of said one of said plurality of receiving organs to said second position thereof wherein said further mandrel is located inside said receiving space of said one of said plurality of receiving organs.

[0042] It is advantageous, if, during said step of locking, said locking element is moved, by said third movement arrangement, from said third position thereof in which said locking element is located outside said receiv-

ing space of said one of said plurality of receiving organs to said first position thereof simultaneously with said further mandrel.

[0043] Preferably, during said step of removing, said package is removed, by said removal unit, from said receiving space of said one of said plurality of receiving organs.

[0044] In this regard, it is advantageous if, during said step of removing, said package is removed, by said gripper, from said receiving organ.

[0045] It is advantageous, if during said step of removing, said gripper is connected to said package using said suction force.

[0046] Preferably, during said step of removing, gripper is moved, by said fourth movement arrangement, from said first position in which said gripper is located outside said receiving space of said one of said plurality of receiving organs to said second position wherein said gripper is located inside said receiving space of said one of said plurality of receiving organs for gripping said package.

[0047] In this regard, it is beneficial if, during said step of removing, said gripper is moved, by said fourth movement arrangement, from said first position thereof to said third position thereof for releasing said package.

[0048] The present disclosure will now be explained by means of a description of an apparatus for manufacturing a package in accordance to the first aspect of the present disclosure and a method of manufacturing a package in accordance to the second aspect of the present disclosure, in which reference is made to the following schematic figures, in which:

Fig. 1 shows an example of a sheet of material for manufacturing a package by an apparatus according to the first aspect of the present disclosure.

Fig. 2 show the package manufactured from the sheet of material of Fig. 1 by an apparatus according to the first aspect of the present disclosure.

Fig. 3 shows an embodiment of an apparatus according to the first aspect of the present disclosure, wherein the apparatus comprises three modules for manufacturing the package of Fig. 2;

Fig. 4 shows in more detail a schematic view of each of the modules of the apparatus of Fig. 3;

Fig. 5A shows in more detail a schematic front view of the locking unit of Fig. 4, wherein the respective locking elements and mandrel are in a first position; Fig 5B shows in more detail a schematic side view of the locking unit of Fig. 5A;

Fig. 6A shows in more detail a schematic front view of the locking unit of Fig. 4, wherein the respective locking elements and mandrel are in a second position;

Fig 6B shows in more detail a schematic side view of the locking unit of Fig. 6A;

Fig. 7 shows a schematic view of a method according to the second aspect of the present disclosure.

[0049] Fig. 1 shows an example of a sheet of material 13 for manufacturing the package 11 shown in Fig. 2. The sheet of material 13 is made of corrugated material in which corrugations of the corrugated material are provided on the outside surfaces of the package 11. The sheet of material 13 comprises sheet portions defining a bottom wall 17 and side walls 15. The side walls 15 is connected via folding lines 19 to the bottom wall 17. A first side wall 15 of the sheet of material 13 comprises locking parts 21 connected via folding lines 23 to the first side wall 15. A second side wall 15 of the sheet of material 13 comprises locking openings 25 for receiving the locking parts 21. The sheet of material 13 in this example is provided with six locking parts 21 and six corresponding locking opening 25.

[0050] Fig. 3 shows an embodiment of an apparatus 101 for manufacturing the package 11 from the sheet of material 13 according to the first aspect of the present disclosure. The apparatus 101 comprises three identical modules 103, each arranged for manufacturing the package 11 from the sheet of material 13, wherein the rotation axes R of the modules are concentric. Fig. 4 shows in more detail a schematic view of the module 103 of the apparatus 101 of Fig. 3.

[0051] The module 103 comprises four receiving organs 105 each attached to a rotation axis R for simultaneously rotating said the receiving organs 105 about the rotation axis R. The receiving organs 105 are each positioned at an angle of 90 degrees with respect to each other and with an opening of the respective receiving organ 105 facing away the rotation axis R. The module 103 is arranged for (counter clockwise in Fig.4) rotating the receiving organs 105 in subsequent steps, wherein in each step the receiving organs 105 are rotated about the rotation axis R at an angle of 90 degrees with respect to each other, such that in each subsequent step the receiving organs 105 are in an upward, leftward, downward, rightward position respectively. Each receiving organ 105 comprises a receiving space 107 arranged for receiving the package 11 and bound by a wall, such that the inner shape of the receiving space 107 at least partly corresponds to and defines an outer shape of the package 11.

[0052] The module 103 further comprises a folding unit 111, facing the opening of the one of the receiving organs 105 positioned upward, a locking unit 113, facing the opening of the one of the receiving organs 105 positioned downward, and a removal unit 131, facing the opening of the one of the receiving organs 105 positioned side-wards to the right.

[0053] The folding unit 111 is arranged for pressing the sheet of material 13, via a sheet support 145, formed as a folding shoulder, into the receiving space 107 of the one of the receiving organs 105 positioned upward. By pressing the sheet of material 13 through an opening of the folding shoulder 145, the sheet of material 13 is folded and a folded sheet of material is created.

[0054] The folding unit 111 comprises a positioning unit

139 for removing the sheet of material 13, in a first position of the positioning unit 139, from a container 151 containing a plurality of sheets of material 13. The positioning unit 139 is provided with a griper 143 and a pressure device 141 arranged for generating a pressure lower than an ambient pressure. The griper 143 is arranged for gripping the sheet of material 13 via a suction force realised by the pressure device 141. In a second position of the positioning unit 139, rotated around a rotation axis R' and opposite to the first position of the positioning unit 139, the positioning unit 139 is arranged for positioning the sheet of material 13 on the sheet support 145, in front of an opening of the respective receiving organ 105.

[0055] The folding unit further comprises a mandrel 115 and a first movement arrangement 117. The circumference of the mandrel 115 is shaped such that the outer shape of the mandrel 115 at least partly corresponds to and defines an inner shape of the package 11. The first movement arrangement 117 is arranged for moving the mandrel 115 from a first position, indicated with the solid line in Fig. 4, in which the mandrel 115 is located outside the receiving space 107 of the respective receiving organ 105, into a second position, indicated by the dashed line in Fig. 4, in which the mandrel 115 is located inside the receiving space 107 of the respective receiving organ 105, and vice versa. When moving the mandrel 115 from the first position into the second position, the sheet of material 13 is pushed through the opening of the folding shoulder 145, for the folding of the sheet of material 13, into the receiving space 107.

[0056] The locking unit 113 is arranged for locking the first side wall 15 of the sheet of material 13 to the second side wall 15 of the sheet of material 13, while the folded sheet of material is located in the receiving space 107 of the respective receiving organ 105, for creating the package 11.

[0057] The locking unit 113, showed in more detail in Fig. 5A - 5B and Fig. 6A - 6B, is provided with locking elements 119 and second movement arrangements 121 arranged for moving the locking elements 119 from a first position, indicated in Fig. 5A - 5B, in which the locking elements 119 are located outside the receiving space 107 of the respective receiving organ 105 into a second position, indicated in Fig. 6A - 6B, in which the locking elements 119 are located inside the receiving space 107 of the respective receiving organ, and vice versa. The locking elements 119 each comprise three pins extending from a base part of the locking element 119, facing away the second movement arrangement 121.

[0058] The locking unit 113 further comprises a further mandrel 125 and a third movement arrangement 129 arranged for moving the further mandrel from a first position, indicated in Fig. 5A - 5B, in which the further mandrel is located outside the receiving space 107 of the respective receiving organ 105 into a second position, indicated in Fig. 6A-6B, wherein the further mandrel 125 is located inside the receiving space 107 of the respective receiving organ 105, and vice versa.

[0059] Each of the receiving organs 105 is provided with through holes 123 for allowing the three pins of the locking element 119 to be located inside the receiving space 107 of the respective of receiving organ 105, when the locking element 119 is in the second position. The circumference of the further mandrel 125 is shaped such that the outer shape of the further mandrel 125 at least partly corresponds to and defines an inner shape of the package 11. The further mandrel 125 is provided with recesses 127 for receiving the pins of the locking element 119 when the locking element 119 is in the second position. The through holes 123 in the respective receiving organ 105 and the recesses 127 in the further mandrel are aligned with respect to each other, when the further mandrel 125 is in the second position.

[0060] By first moving the further mandrel 125 and subsequently moving the locking elements 119 from the first position into the second position respectively, the pins of the locking elements 119 are forcing the locking parts 21 of the first side wall 15, via the through hole 123 and the recesses 127, through the corresponding locking openings 25 in the second side wall 15, while the further mandrel 125 holds the folded sheet of material 13 present in the receiving space 107 into the appropriate position, thereby locking the first side wall 15 of the folded sheet of material to the second side wall 15 of the folded sheet of material 13 present in the receiving space 107 and thereby realizing the package 11.

[0061] The removal unit 131 is arranged for removing the package 11, formed by the folding unit 111 and the locking unit 113, from the receiving space 107 of the respective receiving organ 105.

[0062] The removal unit 131 is provided with a griper 133 and a pressure device 135 arranged for generating a pressure lower than an ambient pressure. The griper 133 is arranged for gripping the package 11 via a suction force realised by the pressure device 135.

[0063] The removal unit 131 comprises a fourth movement arrangement 135 arranged for moving the griper from a first position, indicated by the solid line in Fig. 4, in which the griper is located outside the receiving space 107 of the respective receiving organ 105, to a second position, indicated by the dashed line 137' in Fig. 4, wherein the griper 133 is located inside the receiving space 107 of the respective receiving organ 105 for gripping the package, and vice versa. The fourth movement arrangement 135 is further arranged for moving the griper from the first position, to a third position, indicated by the dashed line 137" in Fig. 4, for releasing the package 11 on a conveyer belt 153, and vice versa. The griper is moved from the first position to the third position, by rotating the fourth movement arrangement 135 around a rotation axis R" by an angle of 90 degrees (counter clockwise in Fig.4). With the use of the conveyer belt 153, the packages 11 realized by the modules 103 are transported out of the apparatus 101.

[0064] Fig. 7 shows a schematic view of a method 201 according to the second aspect of the present disclosure,

for manufacturing the package 11 from the sheet of material 13 using the apparatus 101 as described above. In a first step 202 of the method 201, the sheet of material 13 is folded by the folding unit 111, thereby creating a folded sheet of material. Subsequently during second step 203 of the method 201, the sheet of material 13 is pressed by the folding unit into the receiving space 107 of receiving organ 105. In a further step 205, the respective receiving organ 105 with the folded sheet of material is moved to the locking unit 113, by rotating all of the receiving organs 105 about the rotation axis R. In a third step 207 of the method 201, the section of the sheet of material 13 is locked to the other section of the sheet of material 13 by the locking unit 113, while the folded sheet of material is located in the receiving space 107 of the respective receiving organ 105, thereby creating the package 11. The respective receiving organ 105 with the resulting package 11 is moved in a subsequent step 209, by rotating all of the receiving organs 205 about the rotation axis R, to the removal unit 131. In a last step 211 of the method 201, the package 11 is removed from the receiving space 107 of the respective receiving organ 105 by the removal unit 131.

Claims

1. An apparatus (101) for manufacturing a package (11) from a sheet of material (13), preferably a sheet of cardboard or corrugated material, wherein said sheet of material (13) comprises sheet portions defining a bottom wall (17) and a side wall (15) connected, via a folding line (19), to said bottom wall (17), wherein said apparatus (101) is provided with a module (103) comprising:

- a plurality of receiving organs (105) comprising a receiving space (107) bound by a wall (109) defining at least partly an outer shape of said package (11) and each arranged for receiving said package (11), wherein said plurality of receiving organs (105) are each attached to a rotation axis (109) for simultaneously rotating said plurality of receiving organs (105) about said rotation axis (R);
- a folding unit (111) arranged for folding said sheet of material (13), thereby creating a folded sheet of material, and pressing said folded sheet of material (13) into said receiving space (107) of one of said plurality of receiving organs (105);
- a locking unit (113) arranged for locking a section of said sheet of material (13), preferably said side wall, to another section of said sheet of material, preferably said side wall, while said folded sheet of material is located in said receiving space (107) of said one of said plurality of receiving organs (105) thereby creating said package (11).

2. The apparatus (101) according to claim 1, wherein said folding unit (111) comprises a mandrel (115) and a first movement arrangement (117) arranged for moving said mandrel (115) between a first position in which said mandrel is located outside said receiving space (107) of said one of said plurality of receiving organs (105) and a second position in which said mandrel (115) is located inside said receiving space (107) of said one of said plurality of receiving organs (105) for said folding of said sheet of material (13).
3. The apparatus (101) according to claim 1 or 2, wherein said locking unit (113) is provided with a locking element (119) and a second movement arrangement (121) arranged for moving said locking element (119) between a first position in which said locking element (119) is located outside said receiving space (107) of said one of said plurality of receiving organs (105) and a second position in which said locking element (119) is located inside said receiving space (107) of said one of said plurality of receiving organs (105) for said locking of said section of said sheet of material (13) to said other section of said sheet of material (13).
4. The apparatus (101) according to claim 3, wherein said wall of each of said plurality of receiving organs (105) is provided with a through hole (123) for allowing said locking element (119) to be located inside said receiving space (107) of said one of the plurality of receiving organs (105), via said through hole (123), for said locking of said section of said sheet of material (13) to said other section of said sheet of material (13).
5. The apparatus (101) according to claim 3 or 4, wherein said locking unit (113) comprises a further mandrel (125) provided with a recess (127) for at least partly receiving said locking element (119) when said locking element (119) is in said second position.
6. The apparatus (101) according to claim 5, wherein said locking unit (113) is provided with a third movement arrangement (129) arranged for moving said further mandrel (125) from a first position in which said further mandrel (125) is located outside said receiving space (107) of said one of said plurality of receiving organs (105) to a second position wherein said further mandrel (125) is located inside said receiving space (107) of said one of said plurality of receiving organs (105).
7. The apparatus (101) according to claim 6, wherein said third movement arrangement (129) is arranged for simultaneously moving said locking element (119) from a third position in which said locking ele-

ment (119) is located outside said receiving space (107) of said one of said plurality of receiving organs (105) to said first position thereof with said further mandrel (125).

8. The apparatus (101) according to any one of the preceding claims, wherein said module (103) further comprises a removal unit (131) arranged for removing said package (11), formed by said folding unit (111) and said locking unit (113), from said receiving space (107) of said one of said plurality of receiving organs (105). 5
9. The apparatus (101) according to claim 8, wherein said removal unit (131) comprises a griper (133) for gripping said package (11) and removing said package (11) from said receiving organ (105). 10
10. The apparatus (101) according to claim 9, wherein said removal unit (131) is provided with a pressure device (135) arranged for generating a pressure lower than an ambient pressure and wherein said griper (133) is arranged for gripping said package (11) via a suction force realised by said pressure device (135). 15
11. The apparatus (101) according to claim 8, 9 or 10, wherein said removal unit (131) is provided with a fourth movement arrangement (137) arranged for moving said griper from a first position in which said griper (133) is located outside said receiving space (107) of said one of said plurality of receiving organs (105) to a second position wherein said griper (133) is located inside said receiving space (107) of said one of said plurality of receiving organs (105) for gripping said package (11). 20
12. The apparatus (101) according to claim 11, wherein said fourth movement arrangement (137) is further arranged for moving said griper (133) from said first position to a third position for releasing said package (11). 25
13. The apparatus (101) according to any one of the preceding claims, wherein said folding unit (111) comprises a positioning unit (139) arranged for positioning said sheet of material (13) in front of a sheet support (145), preferably in front of an opening of a folding shoulder. 30
14. The apparatus (101) according to any one of the preceding claims, wherein said apparatus (101) comprises a plurality of said modules (103), wherein said rotation axes (R) of said plurality of modules (103) are concentric. 35
15. A method (201) of manufacturing a package (11) from a sheet of material (13), preferably a sheet of cardboard or corrugated material, using an appara-

tus (101) according to any one of the preceding claims, wherein said sheet of material (13) comprises sheet portions defining a bottom wall (17) and a side wall (15) connected, via a folding line (19), to said bottom wall (17), wherein said method (201) comprises the steps of:

- folding (202), by said folding unit (111), said sheet of material and thereby creating a folded sheet of material;
- pressing (203), by said folding unit (111), said folded sheet of material into said receiving space (107) of one of said plurality of receiving organs (105);
- moving (204), said one of said plurality of receiving organs (105), by rotation of said plurality of receiving organs (105) about said rotation axis (R), to said locking unit (113);
- locking (205), by said locking unit (113), said section of said sheet of material to said other section of said sheet of material while said folded sheet of material is located in said receiving space (107) of said one of said plurality of receiving organs (105) thereby creating said package (11).

16. The method (201) according to claim 15, wherein said method (201) further comprises the steps of:
 - moving (207), said one of said plurality of receiving organs (205), by rotation of said plurality of receiving organs (205) about said rotation axis (R), to said removal unit (131);
 - removing (209), by said removal unit (131), said package (11) from said receiving space (107) of said one of said plurality of receiving organs (105).
17. The method (201) according to claim 15 or 16, wherein said sheet of material (13) is made of corrugated material in which corrugations of said corrugated material are provided on the outside surfaces of said package (11).

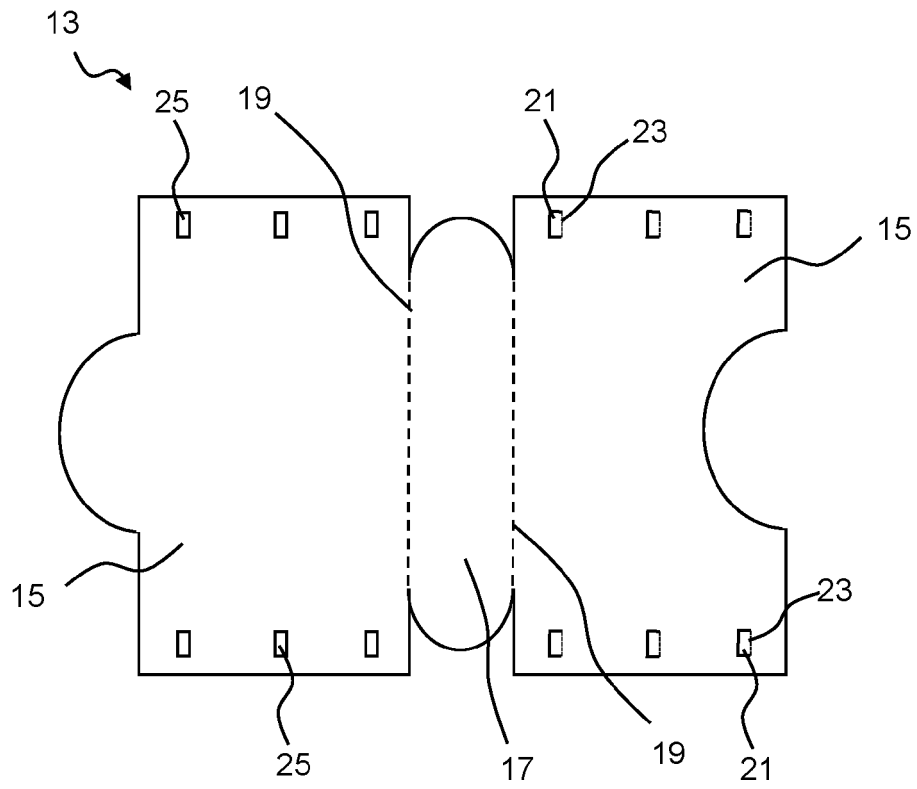


Fig. 1

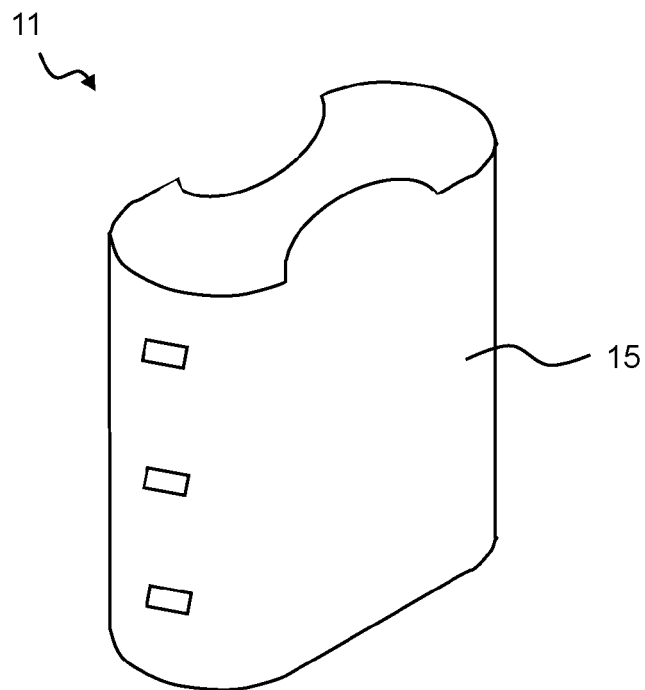


Fig. 2

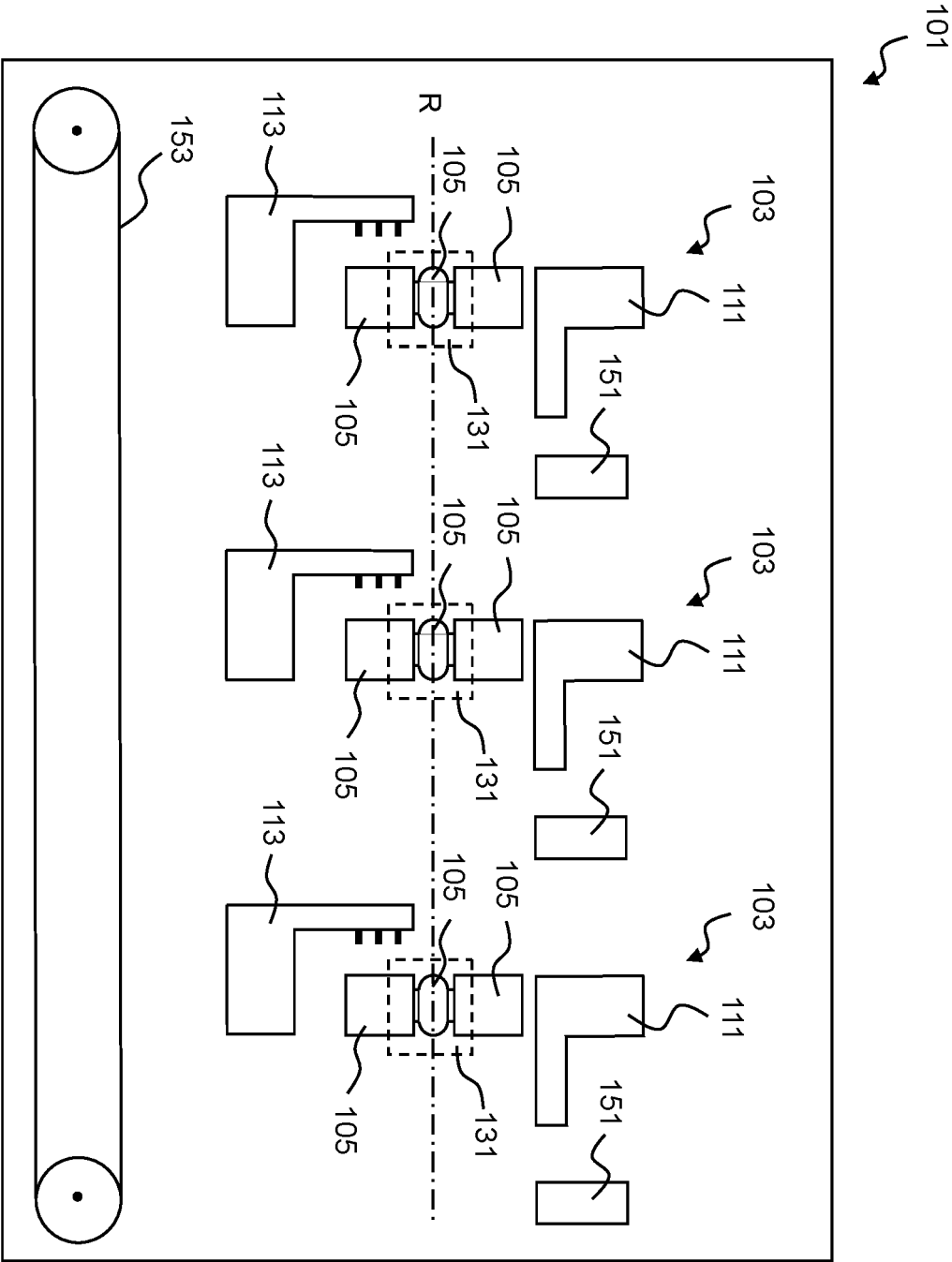


Fig. 3

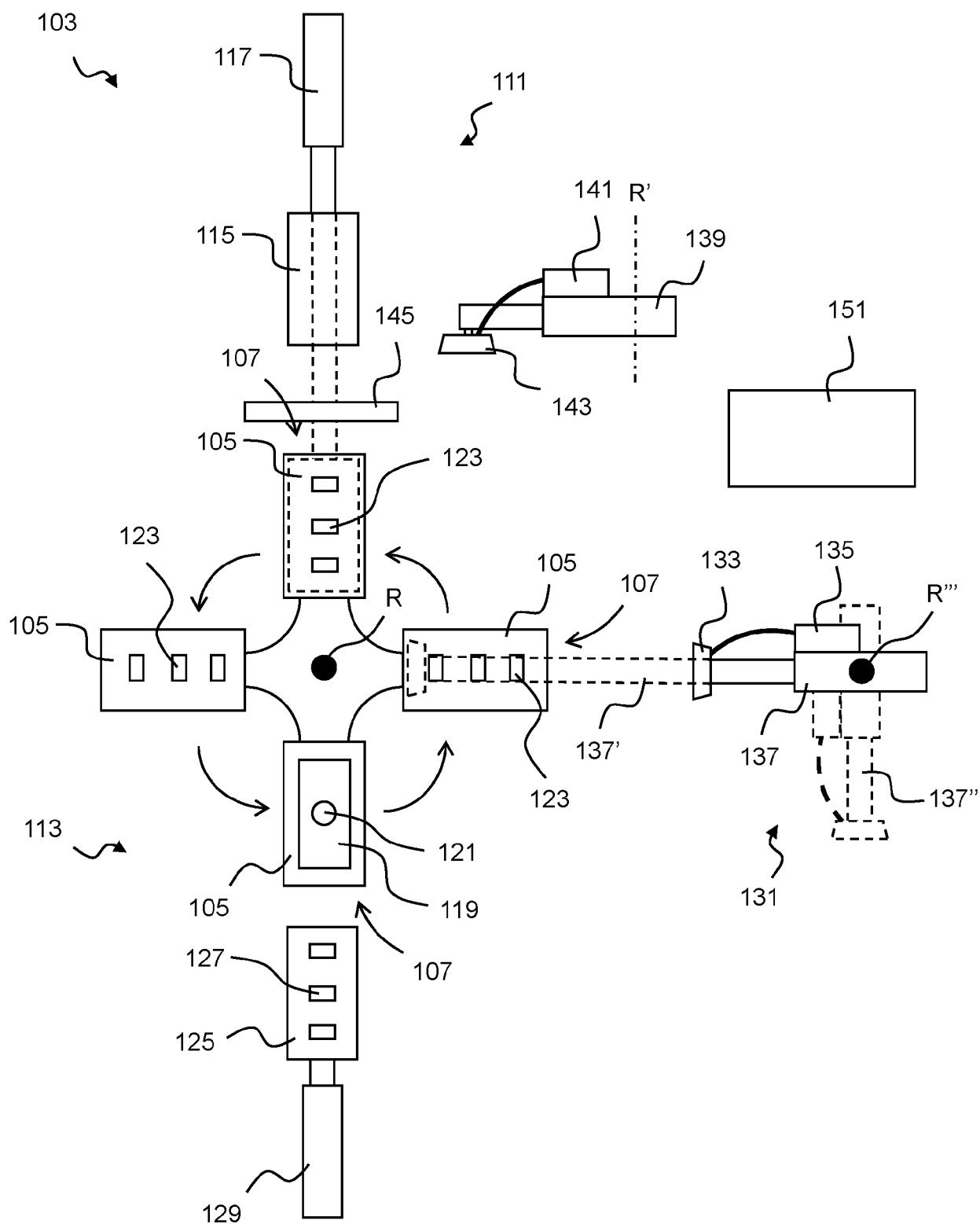


Fig. 4

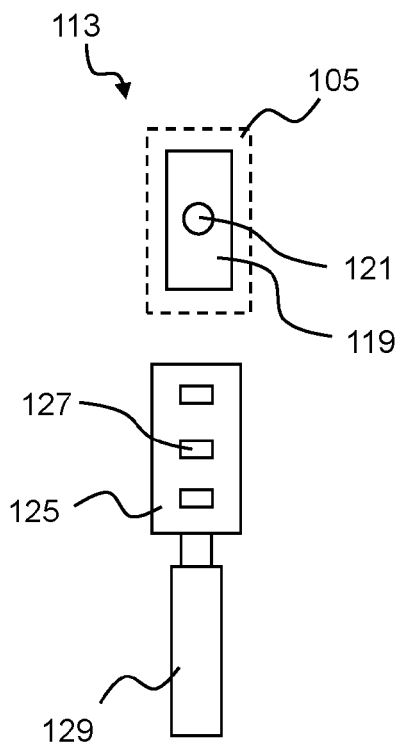


Fig. 5A

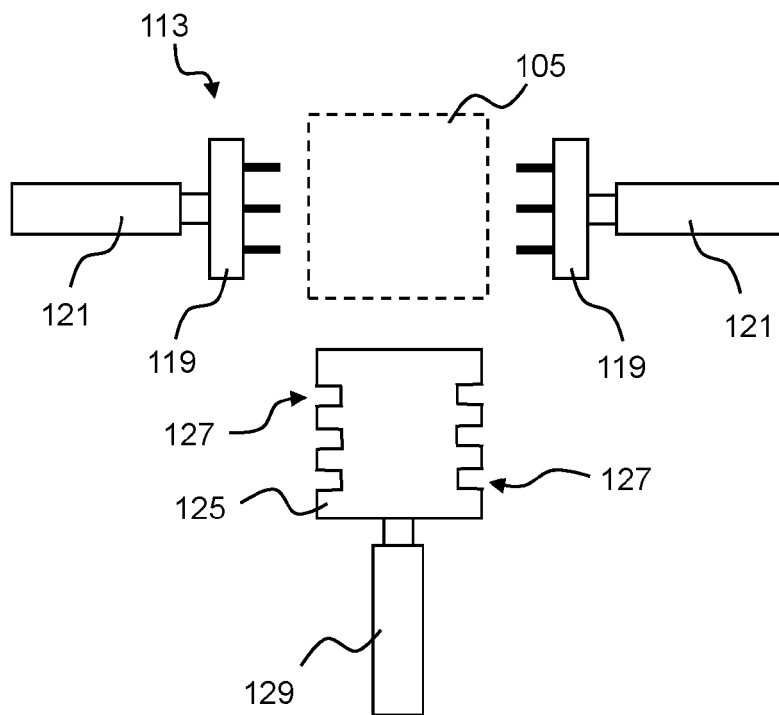


Fig. 5B

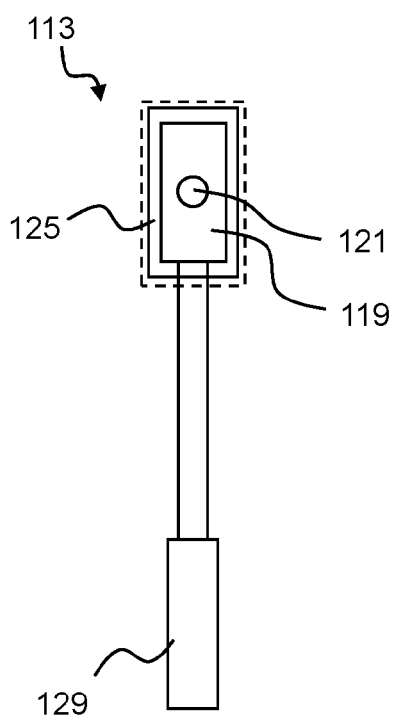


Fig. 6A

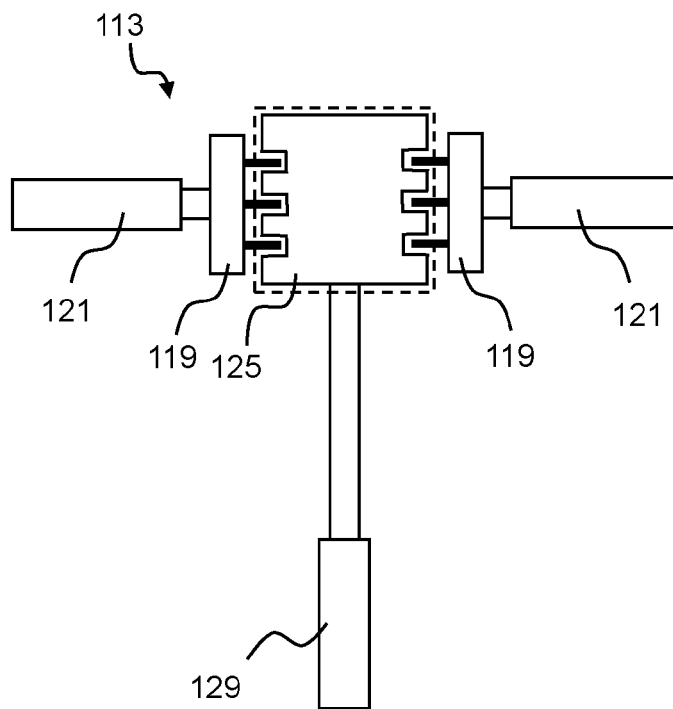


Fig. 6B

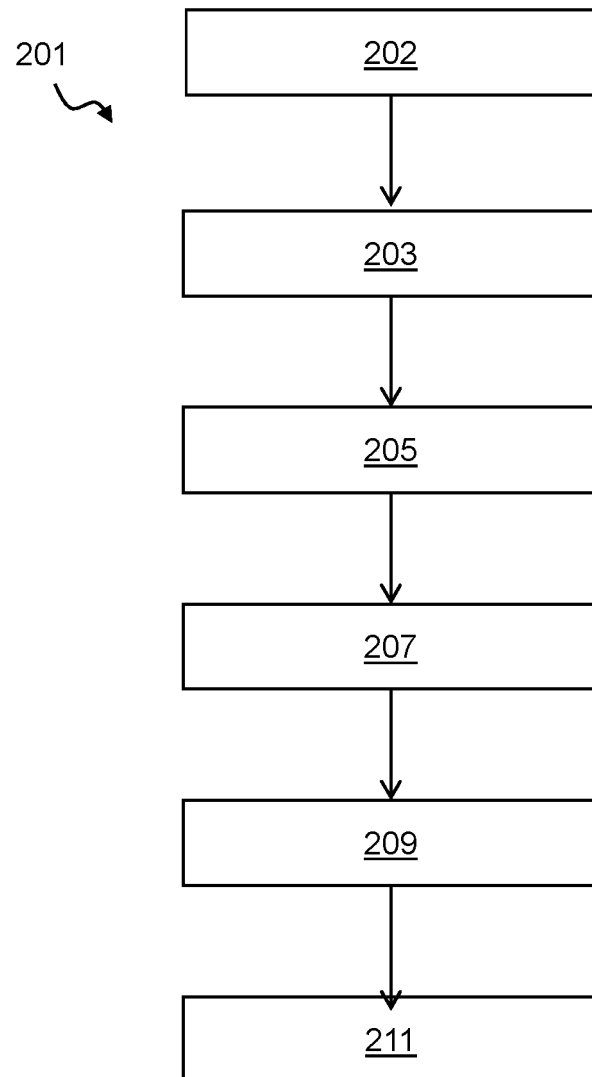


Fig. 7



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