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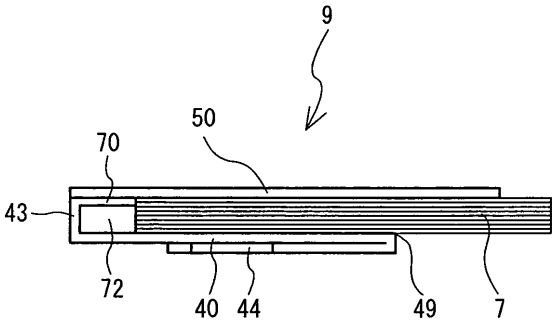
## (54) Sheet package

(57) This invention provides a sheet package (9) which prevents sheets (7) taken out from the sheet package (9) from being inserted into the sheet package (9) again and which also prevents sheets (7) from dropping out of the sheet package (9). The sheet package (9) is made up of a package material folded into a rectangular parallelepiped thin box. Ear portions which serve as a sheet intrusion blocking member are located in a space sandwiched by a bottom face and a first sheath portion and side ends of the ear portions make contact with end portions of sheets (7) in an insertion direction so that the end portions of the sheets (7) cannot reach a side wall portion. Thus, the sheets (7) cannot be restored to their original storage positions in the sheet package (9) completely and part of the sheets (7) project from the sheet package (9). Thus, dropped sheets (7) cannot be restored to the sheet package (9) through an opening portion, and sheets (7) to which either dust or dirt has adhered are thus prevented from being reused.

FIG. 22

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## Description

### BACKGROUND

**[0001]** The present invention relates to a sheet package, and more particularly to a sheet package that protects the outside of a stack of sheets with its package member and that can be set in a printer unit together with a package material.

**[0002]** Conventionally, there has been known a sheet package which accommodates a stack of sheets in its box-like package member and which, when the sheets are used for printing can be set in a printer unit by opening the lid portion of the package member and by folding it back to the opposite side, see, for example, Japanese Patent Application Publication No.2003-285939 (US2005/0230902 A1) which forms the basis for the preamble of claims 1 or 2. Because this sheet package can handle a plurality of sheets in units of a package, convenience of usage thereof is improved. And because the package member can protect sheets inside by covering, this sheet package is effective in adopting heat sensitive sheets that are susceptible to light or heat as paper sheets for the printer unit.

**[0003]** However, in the case of a conventional sheet package, when at a time of usage a part of the sheets is exposed, as a result of the opening of the lid portion, sometimes sheets stored inside the sheet package can drop out of the sheet package. In such circumstances, if printing is executed by setting a sheet package in which the dropped sheets are inserted because the dropped sheets can be brought back into the sheet package easily through an opening portion, impurities such as dust and dirt adhere to the sheet tend to damage a printing head of the printer unit.

**[0004]** Further, because the conventional sheet package has no pressing means for supporting sheets contained in the interior, when the opening portion of a sheet package is directed in a downward direction during the handling of a sheet package, sheets can drop out.

### SUMMARY OF THE INVENTION

**[0005]** The present invention has been accomplished to solve the above-described problems and a first object of the invention is to prevent sheets taken out from the sheet package temporarily from being inserted back into their original storage position within the sheet package. Further, a second object of the invention is to achieve a sheet package out of which sheets do not drop.

**[0006]** In order to achieve the above-described objects, according to an aspect of the present invention, there is provided a sheet package as claimed in claims 1 or 2.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0007]** Exemplary embodiments of the invention will be described below in detail with reference to the accompanying drawings in which:

FIG.1 is a perspective view of a printer unit;
FIG.2 is a sectional view taken along the line I-I in FIG. 1;
FIG. 3 is a view showing a condition in which a sheet package is set in a sheet storage portion;
FIG.4 is an enlarged sectional view showing the details of a sheet-separating portion and a printing mechanism portion;
FIG.5 is a perspective view of the sheet package;
FIG.6 is a perspective view of a sheet package with the lid portion folded back to the rear side;
FIG.7 is a bottom face view of the sheet package;
FIG. 8 is a view of the unfolded package according to a first embodiment showing the exterior of the package;
FIG.9 is a perspective view of an unfolded condition showing the interior of the package member;
FIG.10 is a perspective view showing a process of manufacturing the sheet package;
FIG.11 is a perspective view showing a process of manufacturing the sheet package;
FIG.12 is a perspective view showing a process of manufacturing the sheet package;
FIG.13 is a perspective view showing a process of manufacturing the sheet package;
FIG.14 is a perspective view showing a process of manufacturing the sheet package;
FIG.15 is a perspective view showing an opening action at a time that a sheet package is used;
FIG.16 is a perspective view showing an opening action at a time that a sheet package is used;
FIG.17 is a side view diagram showing a loading action of loading the sheet package to a printer unit;
FIG.18 is a sectional view taken along the line III-III in FIG.16 of the sheet package;
FIG.19 is a sectional view taken along the line III-III of the sheet package in FIG.16 when sheets are consumed so that the quantity of the accommodated sheets is decreased;
FIG.20 is a sectional view taken along the line III-III of the sheet package in FIG.16 when no sheet exists in the interior;
FIG.21 is a perspective view showing a condition in which sheets are inserted into the sheet package;
FIG.22 is a longitudinal sectional view of a sheet package when the sheets are inserted through an opening portion in the sheet package;
FIG.23 is a view of an unfolded sheet package according to a second embodiment showing the exterior of the package material;
FIG.24 is a perspective view showing a halfway condition of assembly of the sheet package according to the second embodiment;
FIG.25 is an exploded view of the sheet package according to a third embodiment as seen from the

exterior of the package material; and

FIG.26 is an exploded view of the sheet package according to a fourth embodiment showing the exterior of the package material.

FIG.27 is a view of the unfolded sheet package according to a fifth embodiment showing the interior of the package material.

FIG.28 is a partial enlarged view of the sheet package according to a sixth embodiment showing the interior of the package material.

FIG.29 is a partial enlarged view of the sheet package according to a seventh embodiment showing the interior of the package material.

FIG.30 is a pattern diagram of vertical sectional view of the fold line processing adjacent to the bottom portion, side wall portion and boundary line of the sheet package according to the fifth embodiment of the conventional package material.

FIG.31 is a pattern diagram of vertical sectional view of the fold line processing adjacent to the bottom portion, side wall portion and boundary line of the sheet package according to the fifth embodiment of the package material.

## DETAILED DESCRIPTION OF THE EMBODIMENTS

**[0008]** Hereinafter, the structure of a printer unit into which a sheet package 9 is to be loaded according to a first embodiment of the present invention will be described with reference to FIGS. 1-4.

**[0009]** As shown in FIG. 1, the printer unit 1 is formed into a flat type rectangular parallelpiped configuration approximately 2 cm in thickness, while its rectangular shape as seen in a plan view is slightly larger than A6 size. A main body case 2 which constitutes a casing of the printer unit 1 is comprised of a frame body 3, a lower cover 4, an upper cover 5, a lid body 10 and the like. The frame body 3 constitutes a frame of the printer unit 1, presenting a rectangular shape as seen in its plan view. The lower cover 4 covers the bottom face of the frame body 3, presenting a rectangular shape as seen in its plan view. The upper cover 5 covers part of the top face of the frame body 3. The lid body 10 is structured so as to be capable of being opened and closed.

**[0010]** As shown in FIGS. 2 and 3, a printing mechanism portion 14 is incorporated inside an end portion (upper side in FIGS. 2 and 3) of the printer unit 1 and the rectangular upper cover 5 as seen in its plan view is provided in such a way as to cover its top face. A sheet storage portion 6 is formed in the remaining portion of the top face of the frame body 3 that excludes the portion covered by the upper cover 5. The top of the sheet storage portion 6 is covered by the rectangular lid body 10 as seen in its plan view. The lid body 10 can be opened and closed freely as shown in FIG. 2.

**[0011]** The sheet storage portion 6 can accommodate a sheet package 9 in which a plurality of sheets 7, for example A6 or A7 sized cut-sheet type heat sensitive papers, can be stored inside a package material 8, as shown in FIG. 3. The main body case 2 is equipped with a locking mechanism (not shown), and when a sheet package 9 set in the sheet storage portion 6, the lid body 10 can be closed and locked as shown in FIG. 3.

**[0012]** A pickup roller 12, a separation block 13 and the like are disposed as a sheet-separating portion 11 at an end portion on the printing mechanism portion 14 side of the sheet storage portion 6. A thermal head 15, a platen roller 16 and a paper guide 17 are disposed as a printing mechanism portion 14 below the upper cover 5.

**[0013]** The paper separation portion 11 will next be described with reference to FIG. 4. As shown in FIG. 4, the pickup roller 12 and the separation block 13 are provided at an end portion on a side close to the printing mechanism portion 14 of the sheet storage portion 6. At such an inner face of the lid body 10 as to face the sheet storage portion 6, a pressing plate 18 is supported in condition where it can swing. A coil-like urging spring 19 is interposed between the pressing plate 18 and the lid body 10 so as to apply constantly to the pressing plate 18 an urging force in a direction of the rotation of the pressing plate 18 in a downward direction.

**[0014]** The sheet package 9 is loaded into the sheet storage portion 6 with the printing object faces of the sheets 7 being directed in a downward direction, and in a state in which a bottom face of a sheet 7 located at the bottommost position of sheets 7 stored in the sheet package 9 in a stacked condition is exposed partly from the package material 8. Then, when the lid body 10 is closed and locked, the pressing plate 18 urged by the urging spring 19 in a downward direction presses the exposed portion of the sheet 7 against the pickup roller 12 through the package material 8 so that the bottom face of the sheet 7 is brought into contact with the pickup roller 12.

**[0015]** As shown in FIG. 4, the separation block 13 which constitutes the sheet-separating portion 11 is provided such that it is located in the vicinity of and opposes the pickup roller 12. The separation block 13 has a separation guide face 13a which is inclined with respect to a direction of feeding sheets by the pickup roller 12. In a sheet-separating portion 11 having such a structure, the pickup roller 12 is driven so that a frictional transportation force is applied to the sheet 7 that is located on the bottommost layer and that is in contact with the pickup roller 12. Then, only the sheet 7 located on the bottommost layer is separated and fed by the separating action of the separation guide face 13a of the separation block 13 in tandem with the frictional transportation force.

**[0016]** Next, the printing mechanism portion 14 will be described. As shown in FIG. 4, the platen roller 16 is provided being driven rotatably by a motor (not shown) on the opposite side to the pickup roller 12 across the separation block 13, and the paper guide 17 is disposed in the vicinity of the outer peripheral face of the platen roller 16. The paper guide 17 has a concavely curved sliding contact face 17a that possesses a substantially U-shaped section as seen in a lateral direction, and the

paper guide 17 is provided so as to extend along the outer peripheral face of the cylindrical platen roller 16. A pressing coil spring 20 is provided between the paper guide 17 and the main body case 2 so as to urge the sliding contact face 17a toward the outer peripheral face of the platen roller 16.

**[0017]** In a printer unit 1 having such a structure, a sheet 7 separated by the sheet-separating portion 11 is conveyed by the pickup roller 12 and passes between the bottom end of the separation block 13 and a guide plate 21 that guides the sheet in the direction of the platen roller 16. The sheet 7 is guided by the guide plate 21 and guided from the bottom side of the platen roller 16 to a portion between the platen roller 16 and the paper guide 17. The sheet 7 is held between the outer peripheral face of the platen roller 16 and the sliding contact face 17a of the paper guide 17 and conveyed in a state in which it is inverted into a U shape as seen in a lateral direction by a rotation of the platen roller 16. The sheet accordingly reaches the top side of the platen roller 16 with its printing object face facing an upward direction.

**[0018]** As shown in FIG. 4, the thermal head 15 that is located above the platen roller 16 has a heat-generating body portion 15a. The thermal head 15 is provided rotatably around a rotation shaft 15b, and the heat generating body portion 15a is configured in such a way as to be capable of making contact with, and moving away from, the top face of the platen roller 16. The reason why the thermal head 15 is configured in such a way as to be rotatable is that in removing a jammed paper when a sheet 7 is jammed between the platen roller 16 and the paper guide 17, the thermal head 15 is in this way prevented from becoming an impediment to that removal work.

**[0019]** As shown in FIG. 4, an end of a torsion coil type spring 22 is attached to the thermal head 15 so as to always apply an urging force constantly in a direction in which the heat-generating body portion 15a of the thermal head 15 is made to approach the top face of the platen roller 16. With this configuration, the heat-generating body portion 15a of the thermal head 15 makes contact with the top face of a sheet 7 conveyed by the platen roller 16 with its printing object face directed in an upward direction and, the sheet 7 is then printed at the position where contact is made.

**[0020]** The thermal head 15 is of a line head type and can accordingly print any character or image on each individual line extending in a direction perpendicular to the conveyance direction of the sheet 7 on the conveyed heat sensitive type sheet 7. A printing width at the time that printing is performed on a single line is set so as to substantially equal to the width of the paper 7 which is a printing object. Because the thermal head 15 is used as a printing head, a heat sensitive paper is used as a printing object medium and thus, consumables such as ink and ink ribbon are reduced. Further, a mechanism for supplying ink can be abolished, thereby resulting in a compact structure of the printer unit 1. As the heat sensitive paper, heat sensitive coloring type having a coloring layer which generates color when heated by the thermal head 15, and a heat sensitive boring type in which a boring layer is overlaid on a base material layer and in which, the boring layer being bored when heated and other types are available.

**[0021]** A sheet discharge guide face 13b, which is inclined with respect to a sheet-feeding direction of the platen roller 16, is formed on the separation block 13. With this structure, a sheet 7 after printed by the heat-generating body portion 15a of the thermal head 15 is guided by the sheet discharge guide face 13b and discharged to the top of the lid body 10 through a slit defined by the upper cover 5 of the main body case 2 and the lid body 10 as shown in FIG.1.

**[0022]** Next, a sheet package 9 of the first embodiment of the present invention to be set in the printer unit 1 will be described with reference to FIGS. 5-14.

**[0023]** As shown in FIG. 5, the sheet package 9 is made up of the package material 8 which is folded into a rectangular parallelepiped thin box. The sheet package 9 contains a plurality of sheets (recording object mediums) 7 composed of, for example, A6-A7 size cut-sheet like heat sensitive papers in a stacked condition. Users purchase sheet packages 9 that are put on sale in a box type condition shown in FIG. 5. And as shown in FIGS. 6 and 7, a lid portion 44 is opened and folded back to the rear side. An insert section 44d of the lid portion 44 is inserted into a third slit 45 in a bottom portion 40, which will be described later so as to expose sheets 7 located on the inside. Then, the user sets the sheets together with the package material 8 in the sheet storage portion 6 of the printer unit 1 and uses.

**[0024]** Next, the structure of the package material 8 will be described with reference to FIGS. 8 and 9. As shown in FIGS. 8 and 9, the package material 8 is formed by punching out a flat thick paper. The rectangular bottom portion 40 as the first portion, for covering one face in a stack direction of the stacked sheets 7 is provided in the central portion of the package material 8. For convenience for explanation, the lid side in a discharge direction of the sheet 7 in the sheet package 9, that is, right side in FIG. 8 of the package material 8 is defined to be front side and the left side on opposite side is defined to be rear side. A rectangular side wall portion 41 as the third portion, which is rectangular, and is extended from one of a pair of side end portions of the bottom portion 40. A rectangular side wall portion 42 as the fourth portion, is extended from the other side end portion. A rectangular side wall portion 43 as the fifth portion, is extended from the rear end portion of the bottom portion 40. The side wall portion 43 receives the bottom end portion of the sheets 7 when the sheet package 9 is assembled. The heights of the side wall portions 41-43 (width in short side direction) are all the same and larger than the stack height of the sheets 7 stored in the sheet package 9.

**[0025]** As shown in FIGS. 8 and 9, the lid portion 44 is extended from the front end side of the bottom portion

40. The lid portion 44 is comprised of a lid base portion 44a, a lid side wall portion 44b, a lid front end portion 44c and the insert section 44d. The lid base portion 44a is formed in a rectangular shape. The lid side wall portion 44b is formed in a rectangular shape and is extended from the lid base portion 44a, having the same height (width in a short side direction) as the heights of the side wall portions 41 to 43. The lid front end portion 44c is extended from the lid side wall portion 44b and a width thereof is smaller than that of the lid side wall portion 44b. The insertion portion 44d is extended from the lid front end portion 44c and a width thereof is smaller than the lid front end portion 44c. A pair of inclined sides is provided at the front end of the insertion portion 44d. A shape that is formed by a combination of the bottom portion 40 and the lid base portion 44a is substantially the same shape as a sheet 7.

**[0026]** As shown in FIGS. 8 and 9, a rectangular first sheath portion 50 as the second portion, for covering the sheets 7 in such a way that it opposes the bottom portion 40 after assembly is extended from the side wall portion 41 of the bottom portion 40. The first sheath portion 50 has a first slit 51 in which the insert section 44d of the lid portion 44 is inserted and a second slit 52 in which an insert section 61 of a second sheath portion 60 is inserted. A square cutout portion 53 for detecting the presence/absence of a sheet 7 is provided in a side end portion on the lid base portion 44a side of the first sheath portion 50. The printer unit 1 detects the presence/absence of a sheet 7 with the use of the cutout portion 53. In other words, the sheet package 9 is loaded in the sheet storage portion 6 of the printer unit 1 in the state shown in FIG. 6, and the printer unit 1 is provided with a reflection type optical sensor 80 (see FIGS. 3 and 4) at a position opposite to the cutout portion 53. Thus, when any sheets 7 are present in the sheet package 9, the reflection type optical sensor 80 detects reflection of light from the sheets 7 and if no sheet 7 is present, the reflection type optical sensor detects reflection light from a synthetic resin which constitutes the rear face of the lid body 10. Therefore, if as the color of the synthetic resin which constitutes the sheet storage portion 6, a color having a low reflectance ratio is set, the presence/absence of a sheet can be easily detected.

**[0027]** As shown in FIG. 8, three sensor marks 46 which indicate the type and size of sheets 7 stored in the sheet package 9 are printed on an end portion on the first sheath portion 50 side of the bottom portion 40 on the front side (outer side) of the package material 8. These sensor marks 46 are read by a reflection type optical sensor (a sensor (not shown) that is different from the reflection type optical sensor 80), and that is provided on the printer unit 1. For example, if a sensor mark 46 is printed, it is regarded as "1", and the sensor mark 46 is not printed, it is regarded as "0", then the absence of a sheet and seven different types of sheets 7 can be identified with the combination of presence or absence of the three sensor marks 46. The bottom portion 40 is provided with a third slit 45 in which the insert section 44d of a folded back lid portion 44 is to be inserted. Further, a cut-in portion 54 which is cut to a predetermined length from the cutout portion 53 side is provided between the side wall portion 41 and the first sheath portion 50. The cut-in portion 54 facilitates deflection of the first sheath portion 50 when the first sheath portion 50 is pressed if the sheet package 9 is loaded on the sheet storage portion 6.

**[0028]** As shown in FIGS. 8 and 9, a second sheath portion 60 for fixing the first sheath portion 50 for covering the sheets 7 in such a way that it opposes the bottom portion 40 after assembly is provided so as to extend as far as side wall portion 42 of the bottom portion 40. The width of the second sheath portion 60 is smaller than that of the first sheath portion 50 and an insert section 61 is formed on a side end portion of the second sheath portion 60. When the sheet package 9 is assembled, the insert section 61 is inserted into the second slit 52 in the first sheath portion 50 so as to fix the first sheath portion 50 opposing to the bottom portion 40.

**[0029]** As shown in FIGS. 8 and 9, a tongue portion 70 as the sixth portion, which is rectangular, is extended from the side wall portion 43 of the bottom portion 40. Rectangular ear portions 71 and 72 are provided on both end portions in the longitudinal direction of the tongue portion 70. When the ear portions 71 and 72 are fold, they perform as sheet intrusion blocking members. A portion indicated with two-dot and chain line in both FIGS. 8 and 9 is a portion that is subjected to fold line processing and the fold line facilitates folding of a thick paper for convenience of assembly.

**[0030]** Next, a manufacturing process of the sheet package 9 will be described with reference to FIGS. 10 to 14. As shown in FIG. 10, the ear portions 71 and 72 on both end portions in the longitudinal direction of the tongue portion 70 are folded back and the stacked sheets 7 are loaded on the bottom portion 40. Next, as shown in FIG. 11, the tongue portion 70 of the package material 8 is fold over. Next, as shown in FIG. 12, the first sheath portion 50 is folded in such a way that it overlaps with the top of the tongue portion 70 and as shown in FIG. 13, the second sheath portion 60 is folded over the first sheath portion 50. Next, the insert section 61 of the second sheath portion 60 is inserted into the second slit 52 in the first sheath portion 50.

**[0031]** Finally, as shown in FIG. 14, the lid portion 44 is folded over the first sheath portion 50, the insert section 44d of the lid portion 44 is inserted into the first slit 51 in the first sheath portion 50, and the sheet package is thus completed. Sheet packages 9 are sold in this condition. Because this condition allows the ear portions 71 and 72 to seek to be elastically restored within the sheet package 9, they press against the surface of the stacked sheets 7.

**[0032]** Next, a method of using the sheet package 9 will be described with reference to FIGS. 3, 5, 6, 7, 15, 16 and 17. When a sheet package 9 is used, the lid portion 44 of the sheet package 9 in the state shown in FIG. 5 is erected as shown in FIG. 15 and folded back to the

rear side along the line II-II in FIG. 16. Then, as shown in FIG. 7, the insert section 44d of the lid front end portion 44c of the lid portion 44 is inserted into the third slit 45 of the bottom portion 40 and the lid portion 44 is fixed to the bottom portion 40. Consequently, as shown in FIG. 6, the sheet package 9 reverts to a state in which the front end portion of the sheets 7 is exposed. The sheet package 9 in this state is stored in the sheet storage portion 6 of the printer unit 1 as shown in FIG. 3. When the lid body 10 is closed, the first sheath portion 50 of the sheet package 9 is pressed by the pressing plate 18 and the sheet that is located on the bottommost layer of the stacked sheets 7 is pressed against the pickup roller 12.

**[0033]** At this time, the reflection type optical sensor 80 that is provided on the printer unit 1 opposes the cutout portion 53 provided in the first sheath portion 50 of the sheet package 9 (see FIGS. 3, 4). Therefore, when any sheets 7 are present in the sheet package 9, the reflection type optical sensor 80 detects reflection light from a sheet 7 and when no sheet 7 is present, it detects reflection light from a synthetic resin which constitutes the rear face of the lid body 10.

**[0034]** Next, an action of a sheet intrusion blocking member (ear portions 71 and 72) of the present invention will be described with reference to FIGS. 6, 16 to 22.

**[0035]** When the lid portion 44 of the sheet package 9 is folded back as shown in FIGS. 6 and 16, in the sheet package 9, the ear portions 71 and 72 that are folded back from both end portions of the tongue portion 70 press against the surface of the sheet 7 stored in the sheet package 9 as shown in FIG. 18 (see also FIG. 11). The pressing force of the ear portions 71 and 72 is generated when the ear portions 71 and 72 seek to become elastically restored by means of elasticity of the package material 8. When the quantity of sheets stored in the sheet package 9 is small, the ear portions 71 and 72 are elastically restored so as to press against the surface of a sheet 7 as shown in FIG. 19. Therefore, when the lid portion 44 of the sheet package 9 is folded back, sheets 7 can be prevented from dropping out of the sheet package 9.

**[0036]** In circumstances such as when all sheets 7 have been pulled out from the sheet package 9 by a user, or when a user swings the sheet package 9 with an opening portion 49 (see FIG. 21) facing downwards with folding back the lid portion 44, all the sheets 7 might drop out from the sheet package 9. In such circumstances, the ear portions 71 and 72 are elastically restored by means of the elasticity of the package 8 along the fold line as shown in FIG. 20, so that the front ends of the ear portions 71 and 72 make contact with the bottom portion 40. In this state, if sheets 7 are inserted into the sheet package 9 through the opening portion 49 as shown in FIG. 21, the ear portions 71 and 72 are located in space sandwiched by the bottom portion 40 (the first portion) and the first sheath portion 50 (the second portion) as shown in FIG. 22 and the side ends of the ear portions 71 and 72 make contact with the end portions of the sheets 7 in an insertion direction, and the end portions of the sheets 7 are consequently unable to contact with the side wall portion 43. Therefore, the sheets 7 cannot be restored to their original positions in the sheet package 9 as shown in FIG. 22 and consequently, part of the sheets 7 project from the sheet package 9. Thus, the dropped sheets 7 cannot be restored to their normal storage positions in the sheet package 9 through the opening portion 49, thereby preventing sheets 7 to which dust or dirt has adhered from being used again.

**[0037]** Next, a second embodiment of the sheet package 9 will be described with reference to FIGS. 23 and 24.

**[0038]** Because substantially every configuration of the package material 8 of the sheet package 9 of the second embodiment is identical to the package material of the first embodiment as shown in FIG. 23, only different portions will be described. As shown in FIG. 23, the package material 8 of the sheet package 9 of the second embodiment is provided with a tongue portion 70 which is rectangular. The ear portions 73 and 74 which are rectangular, are provided in a central portion in a longitudinal direction of the tongue portion 70 with a cut line (straight) and a fold line (two-dot and chain line) . When the ear portions 73 and 74 are folded back, they perform identical functions to those of the ear portions 71 and 72 of the first embodiment. According to the second embodiment, if the tongue portion 70 is raised and folded and the ear portions 73 and 74 are folded as shown in FIG. 24, the ear portions 73 and 74 press against the sheets 7, thereby producing identical operations and effects to those in the first embodiment.

**[0039]** A third embodiment of the sheet package 9 will now be described with reference to FIG. 25.

**[0040]** Because substantially every configuration of the package material 8 of the sheet package 9 of the third embodiment is identical to the package material of the first embodiment as shown in FIG. 25, only different portions will be described. Although as shown in FIG. 25, the package material 8 of the sheet package 9 of the third embodiment is provided with a tongue portion 70 which is rectangular, ear portions are not provided on the tongue portion 70. According to the third embodiment, the ear portions 47 and 48 which is rectangular are provided on the bottom portion 40 with a cut line (straight) and a fold line (two-dot and chain line). Therefore, before the sheets 7 are loaded on the bottom portion 40 as the first portion, the ear portions 47 and 48 of the bottom portion 40 are raised and folded back and then sheets 7 are loaded thereon. Consequently, the ear portions 47 and 48 press the sheets 7, thereby producing identical operations and effects to those of the first embodiment.

**[0041]** Next, a fourth embodiment of the sheet package 9 will be described with reference to FIG. 26.

**[0042]** Because substantially every configuration of the package material 8 of the sheet package 9 of the fourth embodiment is identical to the package material of the third embodiment as shown in FIG. 26, only differ-

ent portions will be explained. Although the package material 8 of the sheet package 9 of the fourth embodiment is provided with the tongue portion 70 which is rectangular as shown in FIG. 26, the ear portion is not provided on the tongue portion 70. According to the fourth embodiment, the ear portions 57 and 58 which are rectangular, are provided on the first sheath portion 50 as the first portion with a cut line (straight) and a fold line (two-dot and chain line) provided. Therefore, sheets 7 are loaded on the bottom portion 40, and before the first sheath portion 50 is folded back, the ear portions 57 and 58 are raised and folded back. When the first sheath portion 50 is folded, the ear portions 57 and 58 press against the sheets 7, thereby producing identical operations and effects to those in the first embodiment.

**[0043]** Next, a fifth embodiment of the sheet package 9 will be described with reference to FIG. 27. Substantially every configuration of the package material 8 of the sheet package 9 of the fifth embodiment is identical to the package material 8 of the first embodiment as shown in FIG. 8. The different point is that a boundary line 401 between the bottom portion 40 and the side wall portion 41, a boundary line 402 between the bottom portion 40 and the side wall portion 42, and a boundary line 403 between the bottom portion 40 and the side wall portion 43 are perforated.

**[0044]** Ordinarily, the fold line processing with half-round shape embossing is processed on the boundary line in the package material 8. The fold line processing with half-round shape embossing is performed from the outer side to the inner side in assembling the package material 8. The boundary line is facilitated to fold by the fold line processing. When the boundary line processed with the fold line processing by embossing is fold, an embossment portion 410 is formed on the inner side of the fold line along the fold line (See FIG.30). The boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43 are processed with the ordinary fold line processing with half-round shape embossing. When each of the boundary lines 401, 402 and 403 is folded, the embossment portion 410 is formed on the inner side of the fold line along the fold line (See FIG.30). That is because the inner part of the fold line is compressed when the boundary line is folded, and the inner part need the releasing portion of the compression to bulge. Some fiber of the package material 8 is unraveled within the embossment portion, and the fiber density is slightly less than other portions. The bottom portion 40 is situated next to the embossment portion 410 formed on the boundary line 401. A space 411 is formed between the bottom portion 40 and the embossment portion 410. The sheet 7 can be wedged in the space 411. The same goes for the space formed between the bottom portion 40 and the boundary line 402, and the space between the bottom portion 40 and the boundary line 403. Once the sheet is wedged in the space, the wedged sheet may not be ejected by operating the printer unit 1. The sheet that may be wedged is only the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40. As described before, a face provided in the package material 8 to wedge the sheet 7 and the embossment portion adjacent to the face are needed for wedging the sheet 7. The sheet 7 is wedged easily if the sheet 7 contacts the face in parallel. The sheet 7 can be wedged easily if the edge of the sheet 7 contacts parallel with the linear embossment portion 410. In that respect, the size of the sheet storage portion 6 in present embodiment as seen in a plan view is almost the same as that of the sheet 7 stored in it. Because the each edge of the sheet 7 is regulated by the inner wall of the sheet storage portion 6 or by the side wall of the package material 8, the edge of the sheet 7 contacts the linear embossment portion 410 easily in parallel with the linear embossment portion 410. Since the sheet 7 located on the bottommost layer is pressed to the bottom portion 40 by the effect of gravitation, by the effect of urging the sheet 7 in a downward direction by the ear portions 71 and 72 at the upstream of conveyance direction of the sheet, and by the effect of urging the sheet 7 in a downward direction by the urging spring 19 at the downstream of conveyance direction of the sheet, the sheet 7 is wedged easily. Even in the bottommost sheet 7, the part urged in a downward direction is more inclined to be wedged than the part not urged in a downward direction.

**[0045]** However, the sheet package 9 provides the lid base portion 44a which is folded back to the rear side when the sheet package 9 is loaded to the sheet storage portion 6. The length of the lid base portion 44a in conveyance direction is approximately one-third of the length of the sheet package 9 in conveyance direction. Sine the bottom portion 40 is formed shortly for the lid base portion 44a, and the side walls are formed in some part of the bottom portion 40, there is no fold line parallel to the conveyance direction of the sheet and is no the embossment portion in the one-third length portion from the end of the downstream to the upstream side in conveyance direction on the bottom face in the sheet package 9. The urging spring 19 is structured so as to urge the sheet 7 strongly in a downward direction at the end of the downstream of conveyance direction in the sheet package 9 and urge the sheet 7 weakly as toward to the upstream. Therefore, the potential of being wedged the sheet 7 due to urging the sheet 7 in a downward direction by the urging spring 19 at the downstream of conveyance direction of the sheet is smaller than the potential of being wedged the sheet 7 due to urging the sheet 7 in a downward direction by the ear portions 71 and 72 at the upstream of conveyance direction of the sheet.

**[0046]** Compared with the package material 8 processed with the ordinary fold line processing, the package material 8 in the present embodiment provides the perforated lines on the boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary

line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43, as described before. For example, as shown in FIG.31, a perforated line 412 facilitates folding of the side wall 41 to the bottom portion 40, and the embossment portion is not formed on the inner side of the fold line folded at the boundary line processed with the perforated line. The perforated line 412 facilitates folding of the side walls 42 and 43 to the bottom portion 40, and the embossment portion is not formed on the inner side of the fold line folded at the boundary line processed with the perforated line, as the same as above. As a result, unlike the sheet package 9 with the ordinary fold line processing, the sheet package 9 in the present embodiment can prevent the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40 from being wedged in the boundary line between the bottom portion 40 and the side wall portion 41, the boundary line between the bottom portion 40 and the side wall portion 42, or the boundary line between the bottom portion 40 and the side wall portion 43.

In the package material 8 in the fifth embodiment (see FIG. 27), a boundary line 404 between the first sheath portion 50 and the side wall portion 41, a boundary line 405 between the second sheath portion 60 and the side wall portion 42, and a boundary line 406 between the tongue portion 70 and the side wall portion 43 are processed with the ordinary fold line processing with half-round shape embossing.

**[0047]** In the sheet package 9 of the present embodiment, the perforated lines are provided on the boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43. The perforated lines may be provided on only the boundary line 403 that is the border with the bottom portion 40 opposing the ear portions 71 and 72 through the sheet 7 and where the sheet 7 is urged strongly by the ear portions 71 and 72 in a downward direction. On that occasion, in addition, the perforated lines may be provided on only the portion where the border with the bottom portion 40 opposing the ear portions 71 and 72 through the sheet 7 and that is adjacent to the ear portions 71 and 72 in the boundary line 403. The perforated lines may be provided on the portion that is the end of the upstream of conveyance direction of the sheet 7 in the boundary line 402 with the bottom portion 40 opposing the ear portion 71 through the sheet 7 and that is adjacent to the ear portion 71 in the boundary line 402, the portion that is the end of the upstream of conveyance direction of the sheet 7 in the boundary line 401 and that is adjacent to the ear portion 72 in the boundary line 401 with the bottom portion 40 opposing the ear portion 72 through the sheet 7, and the boundary line 403.

**[0048]** Next, a sixth embodiment of the sheet package 9 will be described with reference to FIG. 28. The object of the sheet package 9 in the present embodiment is to prevent the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40 from being wedged in the boundary line between the bottom portion 40 and the side wall portion 41, the boundary line between the bottom portion 40 and the side wall portion 42, and the boundary line between the bottom portion 40 and the side wall portion 43, as the same as the sheet package 9 in the fifth embodiment. Substantially every configuration of the package material 8 of the sheet package 9 of the sixth embodiment is identical to the package material 8 of the first embodiment as shown in FIG. 8. As shown in FIG.28, the different point is that the boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43 are processed with half-cut processing on each inner side of the boundary line 401, 402 and 403 so that the side wall portions 41, 42 and 43 can be folded easily. The half-cut processing is processing to make incisions with the depth of half-thickness of the package material 8. With the half-cut processing, the side wall portions 41, 42 and 43 can be folded to the bottom portion 40 easily and the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40 is prevented from being wedged in the boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43 because the boundary lines between the side wall portions 41, 42 and 43 and the bottom portion 40 are folded closely to the bottom portion 40. In the package material 8 of the sixth embodiment, the boundary line 404 between the first sheath portion 50 and the side wall portion 41, the boundary line 405 between the second sheath portion 60 and the side wall portion 42, and the boundary line 406 between the tongue portion 70 and the side wall portion 43 are processed with the ordinary fold line processing with half-round shape embossing.

**[0049]** Next, a seventh embodiment of the sheet package 9 will be described with reference to FIG. 29. The object of the sheet package 9 in the present embodiment is to prevent the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40 from being wedged in the boundary line between the bottom portion 40 and the side wall portion 41, the boundary line between the bottom portion 40 and the side wall portion 42, and the boundary line between the bottom portion 40 and the side wall portion 43, as the same as the sheet package 9 in the fifth embodiment. Substantially every configuration of the package material 8 of the sheet package 9 of the seventh embodiment is identical to the package material 8 of the first embodiment as shown in FIG. 8. The different point is that pit-like indentations with predetermined depth are provided in line on the boundary line 401 between the bottom portion 40 and the side wall

portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43, as shown in FIG.29. By the fold line processing with pits, the side wall portions 41, 42 and 43 can be folded to the bottom portion 40 easily and the sheet 7 located on the bottommost layer of the stacked sheets opposing to the bottom portion 40 is prevented from being wedged in the boundary line 401 between the bottom portion 40 and the side wall portion 41, the boundary line 402 between the bottom portion 40 and the side wall portion 42, and the boundary line 403 between the bottom portion 40 and the side wall portion 43. In the package material 8 of the seventh embodiment, the boundary line 404 between the first sheath portion 50 and the side wall portion 41, the boundary line 405 between the second sheath portion 60 and the side wall portion 42, and the boundary line 406 between the tongue portion 70 and the side wall portion 43 are processed with the ordinary fold line processing with half-round shape embossing. The above described terms "perforated line", "half-cut processing" and "pit-like indentation" correspond to the indentation portion.

**[0050]** The present invention is not limited to the above-described embodiments but may be modified in various ways. For example, a single ear portion is permitted instead of a pair of ear portions on the right and left sides. The shape of the ear portion is not limited to a rectangular one but may be of any shape such as trapezoid. Although, according to the embodiments, the side wall portion 42 is extended from the bottom portion 40, the side wall portion 42 may also be extended from the first sheath portion 50, while the second sheath portion 60 may be extended from the side wall portion 42. Although according to the embodiments, the side wall portion 43 is extended from the bottom portion 40, the side wall portion 43 may also be extended from the first sheath portion 50, while the tongue portion 70 may be extended from the side wall portion 43. The term "perforated line", "half-cut processing" and "pit-like indentation" are not necessary to be provided on whole of the boundary line 401 between the 40 and the 41, the boundary line 402 between the 40 and the 42, and the boundary line 403 between the 40 and the 43. For example, they may be provided on only the portion where the sheet 7 is wedged easily and other portions may be processed with the ordinary fold processing with half-round shape embossing. As portions where the sheet 7 is wedged easily are the boundary line between the bottom portion 40 and the side wall portion 41, the boundary between line the bottom portion 40 and the side wall portion 42 which opposes to front side of the first sheath portion 50 pressed by the pressing plate 18 of the printer unit 1, and the boundary line between some side wall portion and the bottom portion 40 where is adjacent to the portion urged the sheet 7 by ear portion, for example.

**[0051]** The printer unit 1 described in the above embodiment discharges the sheet 7 through the slit between the upper cover 5 of the main body case 2 and the lid body 10. The printer unit 1 is available, even if the side of the printer unit 1 is set down or the upper cover 5 of the printer unit 1 is set down, unless the slit is blocked. Needless to say, the sheet package 9 loaded in the printer unit 1 also stands or is reversed corresponding to each occasion.

## Claims

**1.** A sheet package (9) comprising:

a package material (8) for covering the outer sides of stacked sheets (7) and having:

a first portion (40) that is rectangular for covering a surface on one side in a stacking direction of the stacked sheets (7);
a second portion (50) for covering a surface on another side in a stacking direction of the stacked sheets (7) opposite to the first portion (40);
a third portion (41) that is connected to both the first portion (40) and to the second portion (50) for covering a side face of the stacked sheets (7) in parallel to a conveyance direction of the sheets (7);
a fourth portion (42) for covering the side face of the stacked sheets (7) in parallel to the conveyance direction of the sheets (7) and that is opposite to the third portion (41);
a fifth portion (43) that is connected to the first portion (40) or the second portion (50) for covering the side face of the stacked sheets (7) on an upstream side in the conveyance direction of the sheets (7); and
an opening portion (49) for exposing part of the sheets (7) from the package material (8);

**characterized by**:

sheet intrusion blocking members (71,72) for preventing sheets (7) discharged through the opening portion (49) from being inserted again through the opening portion (49) and pressed against their original storage positions, the sheet intrusion blocking members (71, 72) being provided in the interior after assembly of the sheet package (9),

wherein the sheet package (9) being structured so as to be capable of being set in a printer unit (1) together with the package material (8) with part of sheets (7) exposed.

**2.** A sheet package (9) comprising:

sheets (7) that are accommodated in the sheet package (9), as printing object mediums for a printer unit (1) and
a package material (8) for covering the outer sides of stacked sheets (7) and having:

a first portion (40) that is rectangular and covers a surface on one side in a stacking direction of the stacked sheets (7);
a second portion (50) that covers a surface on another side in a stacking direction of the stacked sheets (7) opposite to the first portion (40);
a third portion (41) that is connected to both the first portion (40) and to the second portion (50) for covering a side face of the stacked sheets (7) in parallel to a conveyance direction of the sheets (7);
a fourth portion (42) that covers the side face of the stacked sheets (7) in parallel to the conveyance direction of the sheets (7) and that is opposite to the third portion (41) across the stacked sheets (7);
a fifth portion (43) that is connected to the first portion (40) or the second portion (50) and that covers the side face of the stacked sheets (7) on an upstream side in the conveyance direction of the sheets (7); and
an opening portion (49) that exposes part of the sheets (7) from the package material (8);

**characterized by**:

sheet intrusion blocking members (71,72) that prevent the sheets (7) discharged through the opening portion (49) from being inserted again through the opening portion (49) and pressed against their original storage positions, the sheet intrusion blocking members (71, 72) being provided in the interior after assembly of the sheet package (9),

wherein the sheet package (9) being structured so as to be capable of being set in the printer unit (1) together with the package material (8) with part of the sheets (7) exposed.

**3.** The sheet package according to claim 1 or 2, further comprising
a sixth portion (70) that is connected to the fifth portion (43) and
that overlaps with the second portion (50) when the fifth portion (43) is connected to the first portion (40) or
that overlaps with the first portion (40) when the fifth portion (43) is connected to the second portion (50), wherein
the sheet intrusion blocking members (73, 74) are provided on the sixth portion (70) and block the sheets (7) discharged through the opening portion (49) from making contact again with the fifth portion (43) through the opening portion (49).

**4.** The sheet package according to claim 3, wherein
the sheet intrusion blocking members are ear portions (73, 74), which are provided in the sixth portion (70) and which are extended in a direction perpendicular to the conveyance direction of the sheets (7) each along a fold line and
the ear portions (73,74) are elastically restored along the fold line due to elasticity of the package material (8) so that the front ends of the ear portions (73, 74) are located away from the sixth portion (70)
in a space sandwiched by the first portion (40) and the second portion (50),
in a space between the second portion (50) and the stacked sheets (7) when the fifth portion (43) is connected to the first portion (40), or
in a space between the first portion (40) and the stacked sheets (7) when the fifth portion (43) is connected to the second portion (50),
whereby, side ends of the ear portion (73, 74) butting against the sheets (7) inserted to make contact with the fifth portion (43) through the opening portion (49) so as to prevent the sheets (7) from making contact with the fifth portion (43).

**5.** The sheet package according to claim 4, wherein
an indentation portion is provided on
an inner side of a fold line between the first portion (40) and fifth portion (43) when the fifth portion (43) is connected to the first portion (40) or,
an inner side of a fold line between the second portion (50) and fifth portion (43) when the fifth portion (43) is connected to the second portion (50).

**6.** The sheet package according to claim 1 or 2, wherein
the sheet intrusion blocking members (47, 48) are provided in the first portion (40) in such a way that the sheets (7) discharged through the opening portion (49) are prevented from making contact again with the fifth portion (43) through the opening portion (49).

**7.** The sheet package according to claim 1 or 6, wherein
the sheet intrusion blocking members are ear portions (47,48), which are provided on the first portion (40) and which are extended in a direction perpendicular to the conveyance direction of the sheet (7) along a fold line; and
the ear portions (47,48) are elastically restored along the fold line due to elasticity of the package material (8) so that the front ends of the ear portions (47, 48) are located away from the first portion (40)
in a space sandwiched by the first portion (40) and

the second portion (50) or
in a space between the first portion (40) and the stacked sheets (7)
whereby, side ends of the ear portion (47, 48) butting against the sheets (7) inserted to make contact with the fifth portion (43) through the opening portion (49) so as to prevent the sheets (7) from making contact with the fifth portion (43).

**8.** The sheet package according to claim 7, wherein
an indentation portion is provided respectively on
an inner side of a fold line between the second portion (50) and third portion (41),
an inner side of a fold line between the second portion (50) and fourth portion (42) when the fourth portion (42) is connected to the second portion (50), and
an inner side of a fold line between the second portion (50) and fifth portion (43) when the fifth portion (43) is connected to the second portion (50).

**9.** The sheet package according to claim 5 or 8, wherein the indentation portion is formed with any of perforation, half-cut or pit-like indentation.

FIG. 1

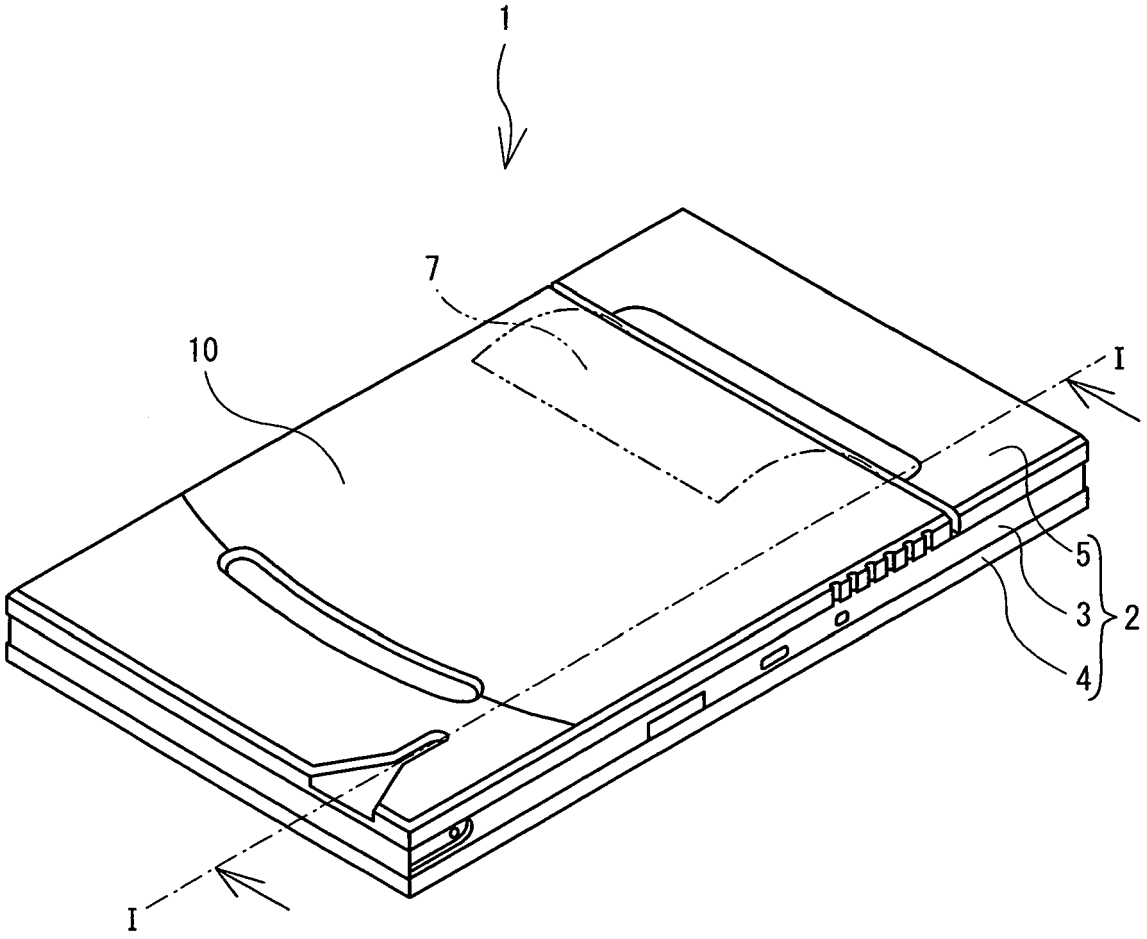


FIG. 2

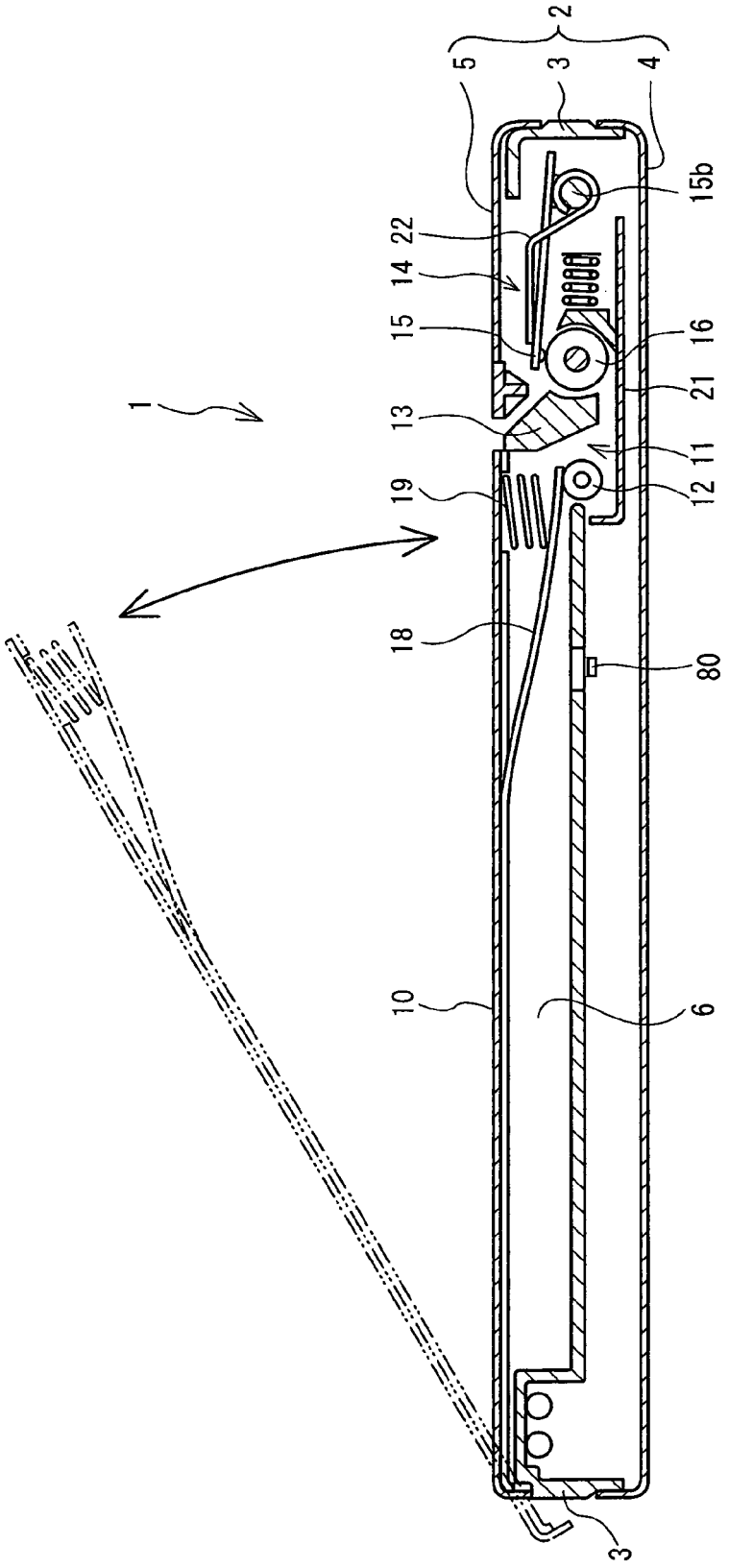


FIG. 3

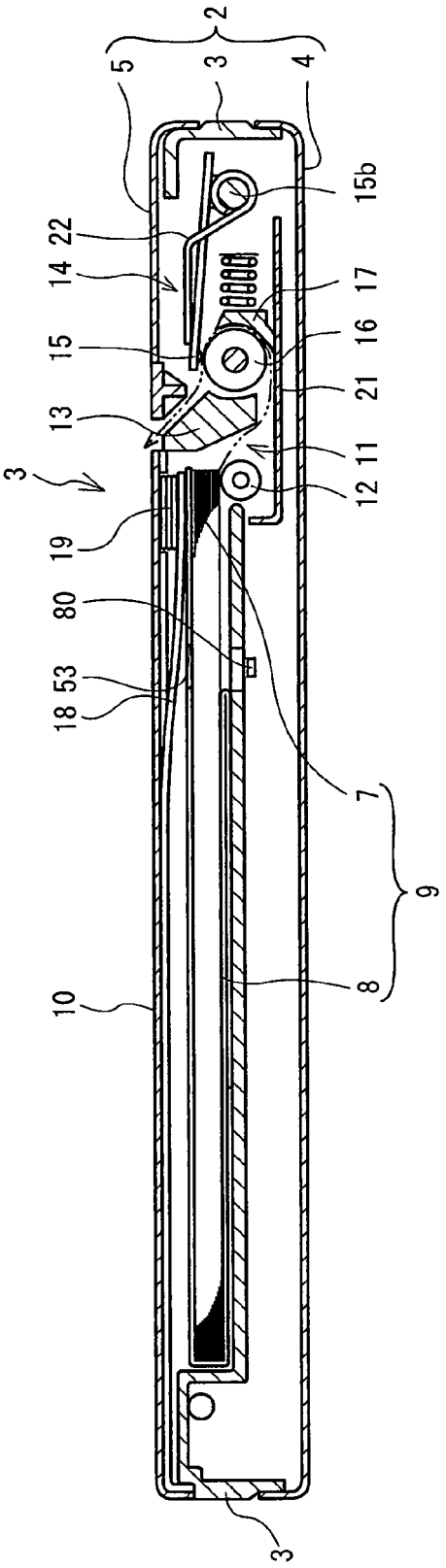
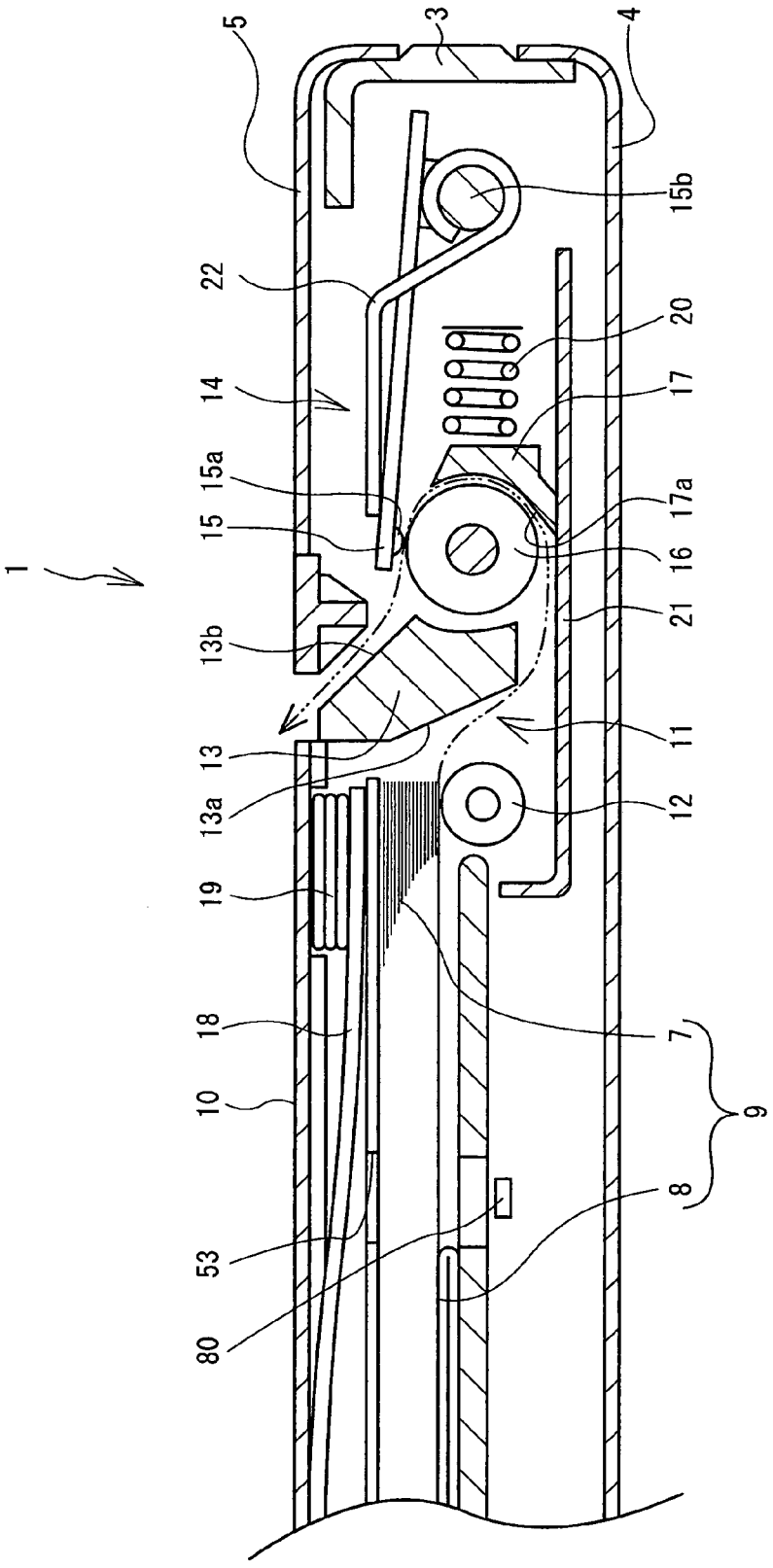


FIG. 4


1
5
3
4
15b
22
20
14
17
15a
17a
15
16
21
13b
11
13
12
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19
18
7
9
10
8
53
80

FIG. 5

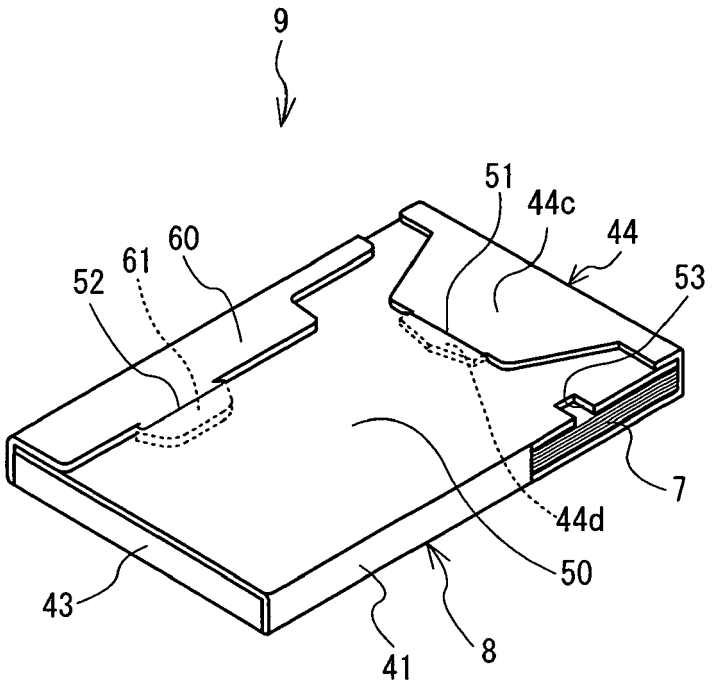

FIG. 6

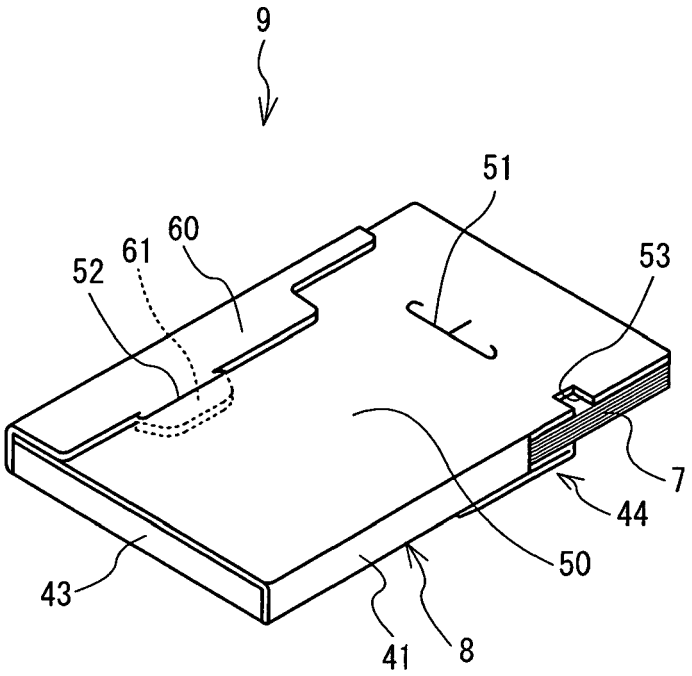

FIG. 7

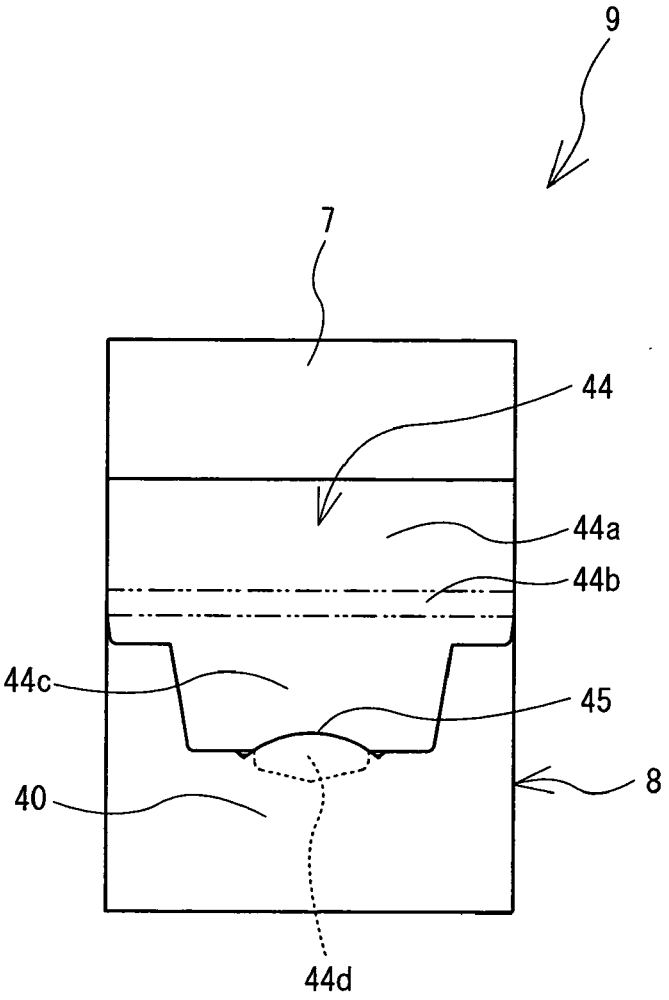

FIG. 8

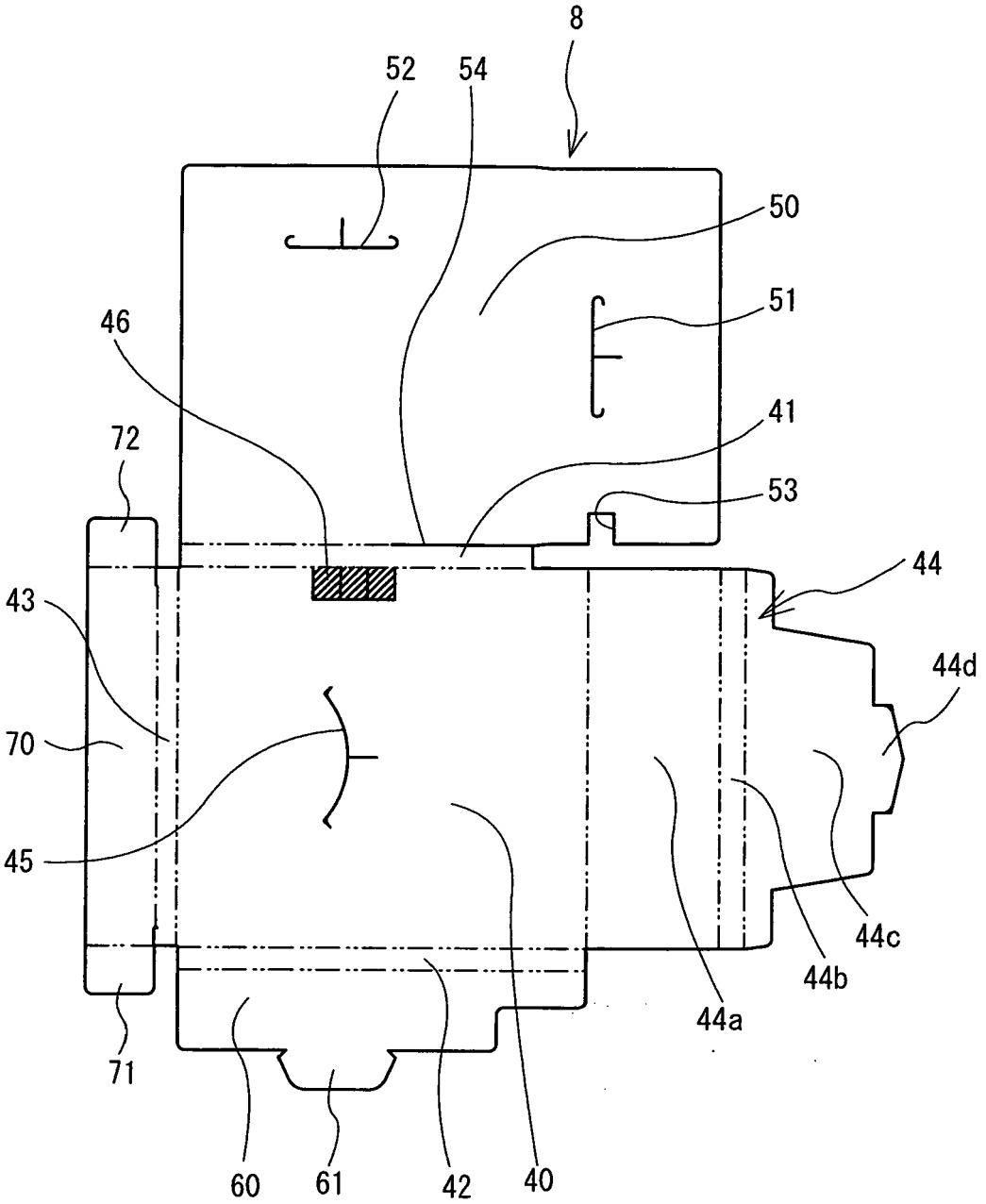

FIG. 9

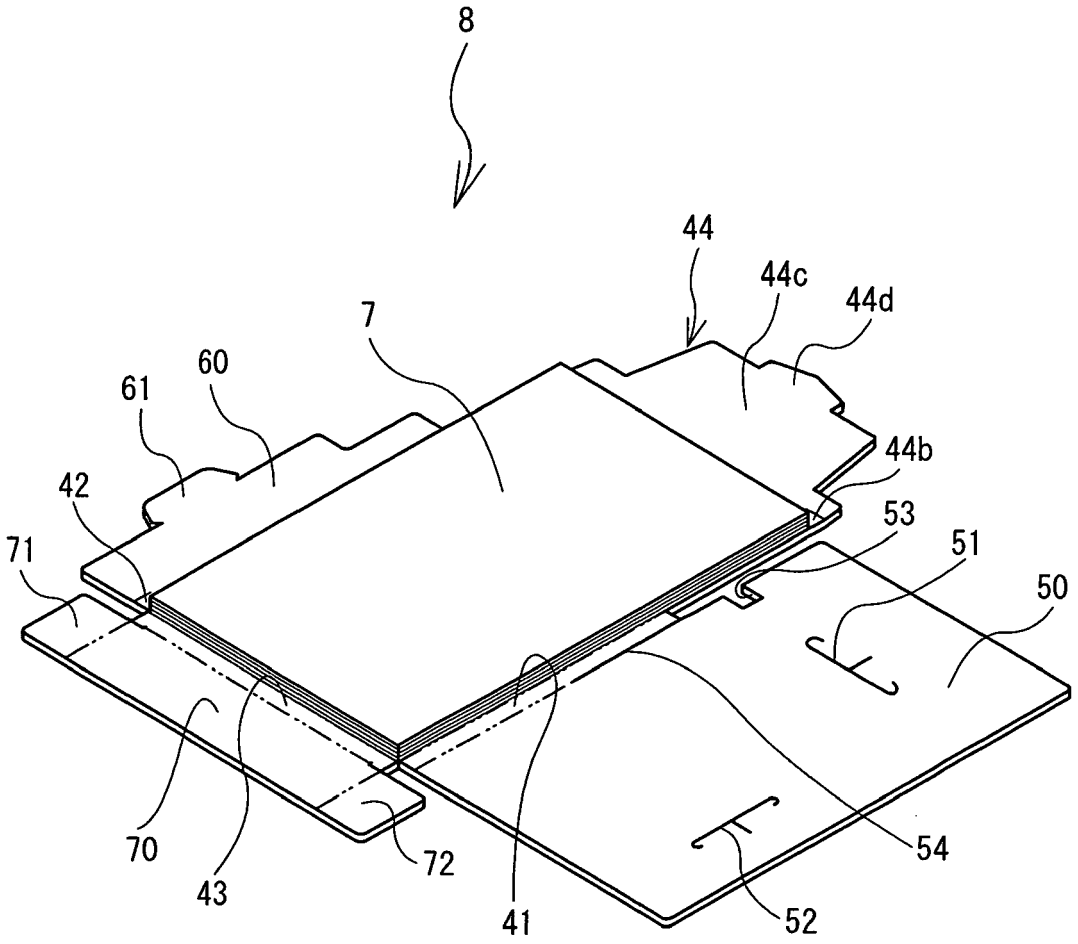

FIG. 10

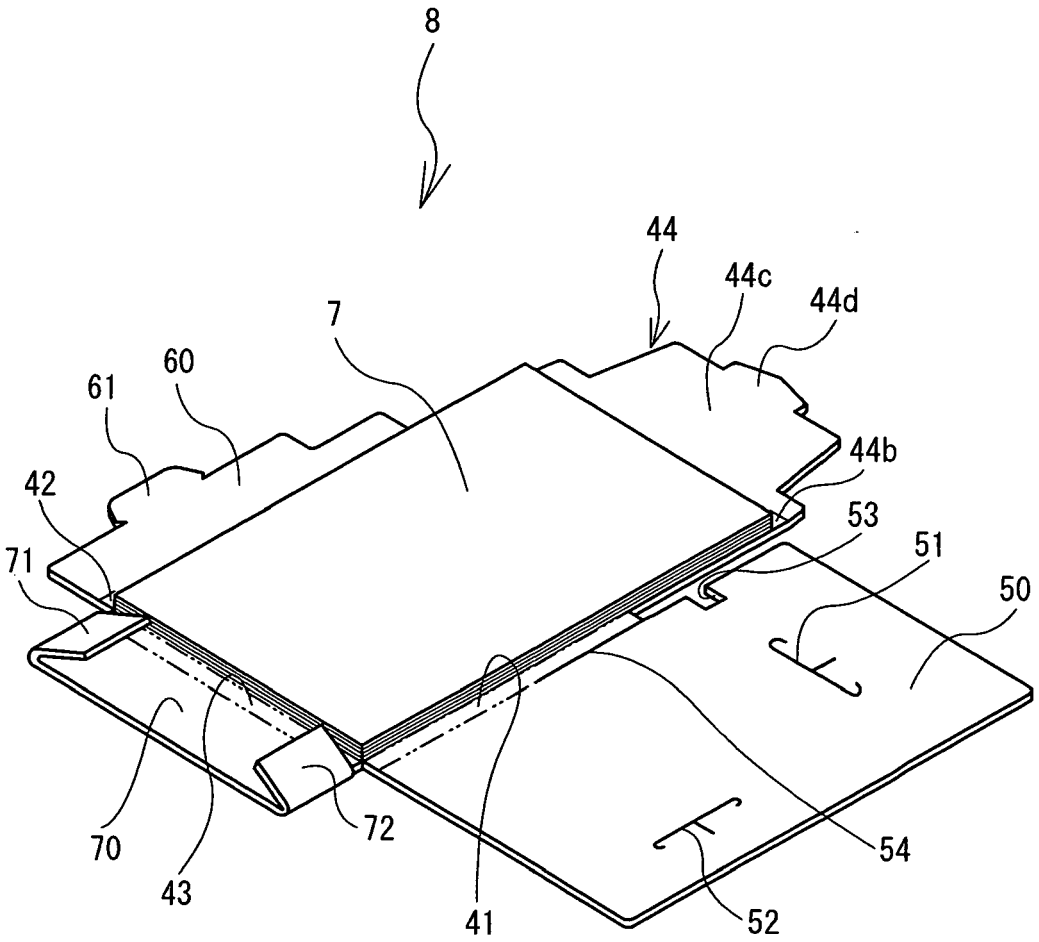

FIG. 11

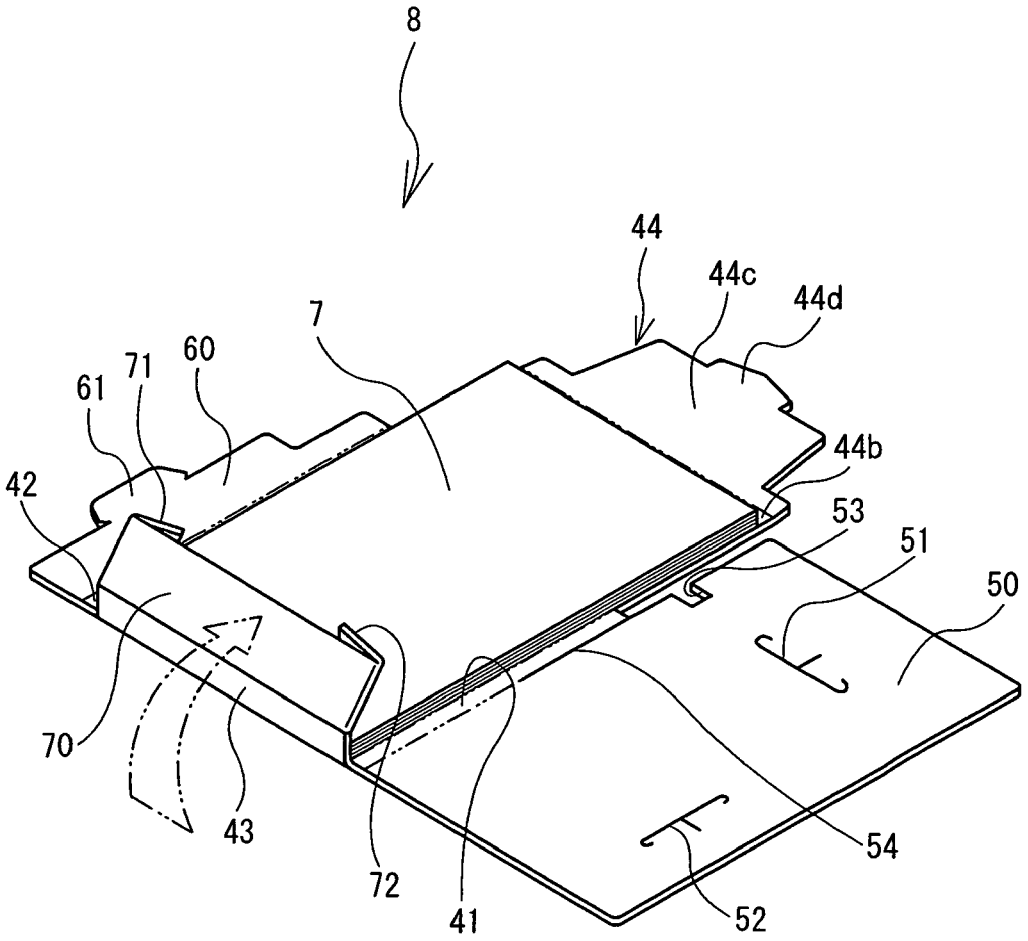

FIG. 12

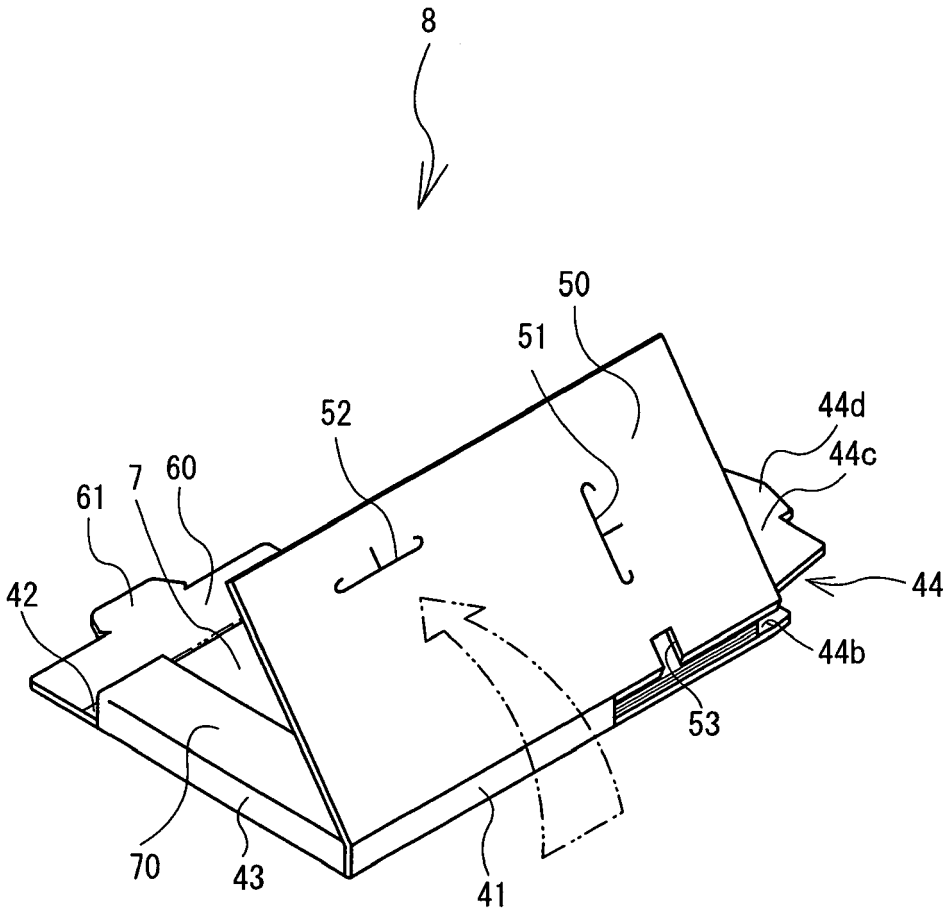

FIG. 13

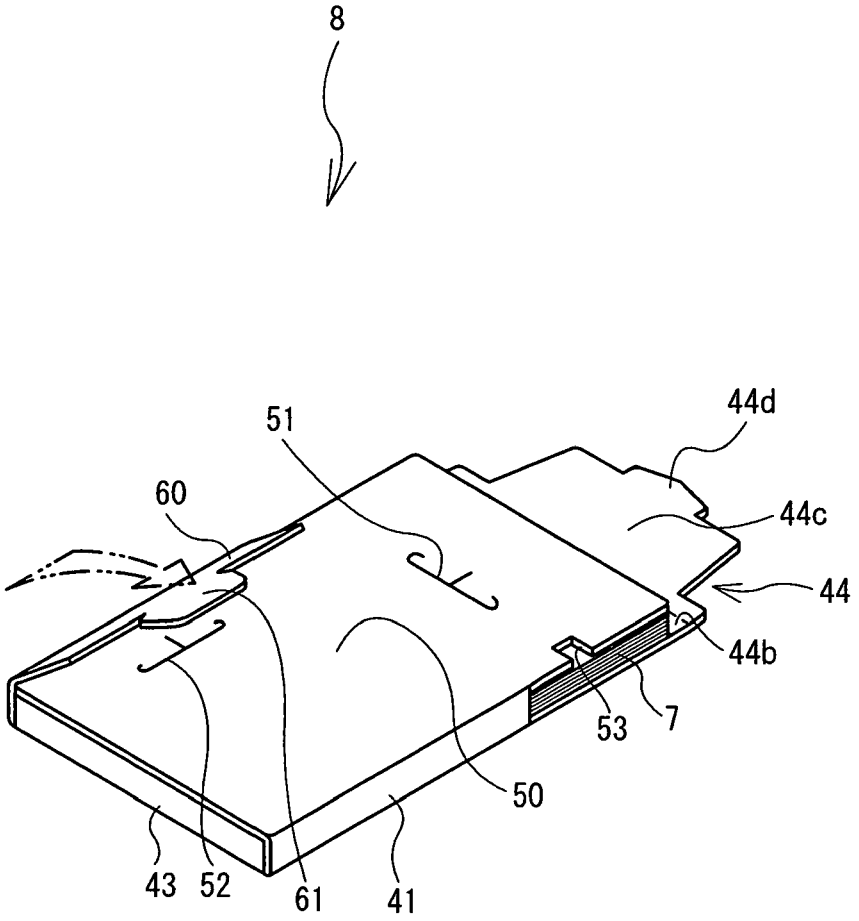

FIG. 14

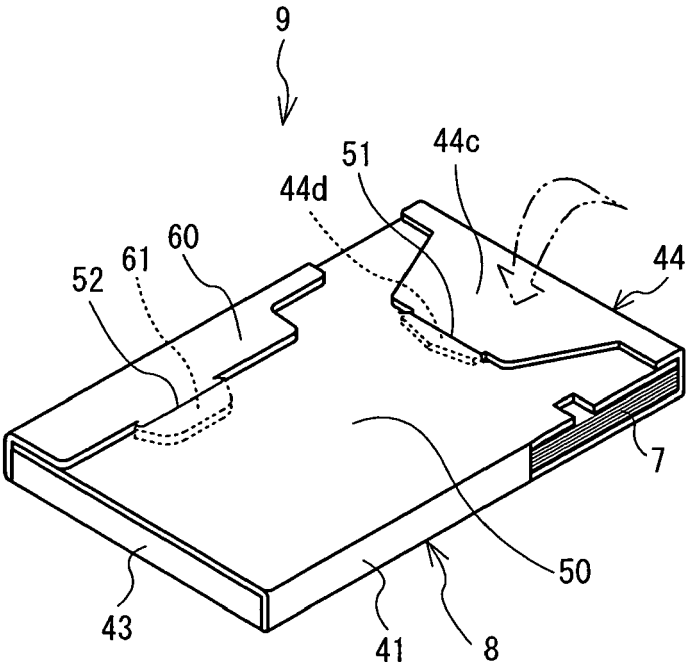

FIG. 15

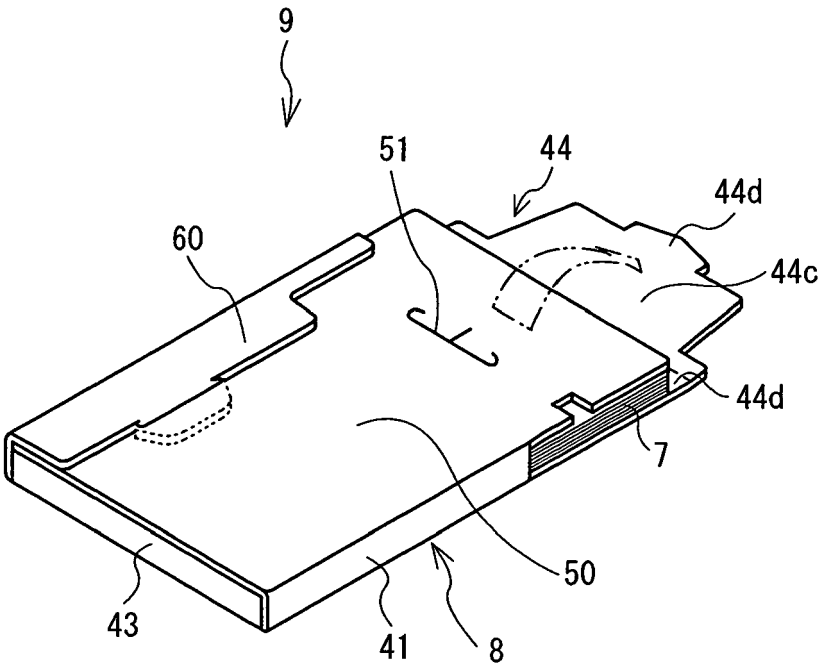

FIG. 16

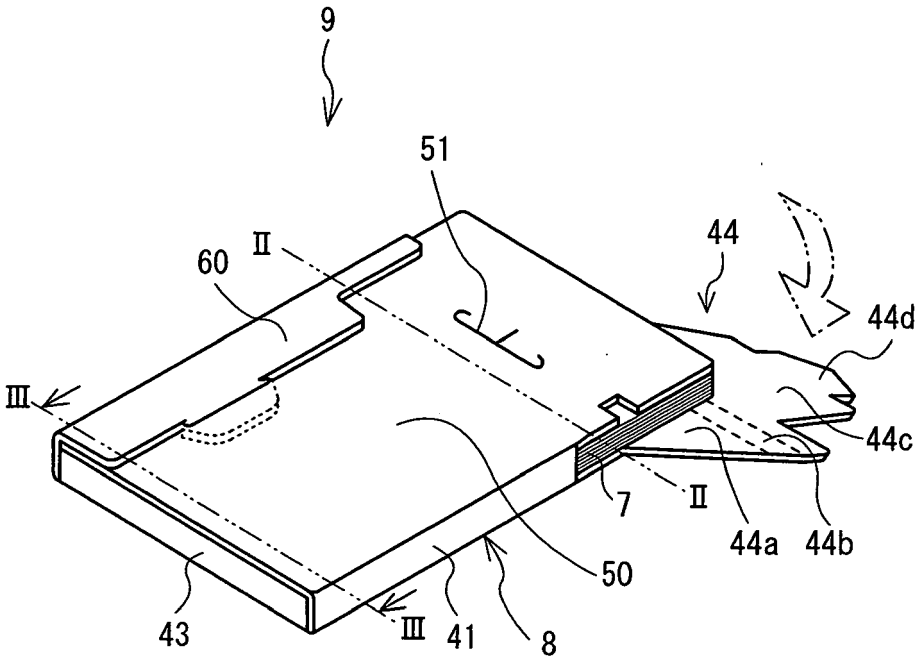

FIG. 17

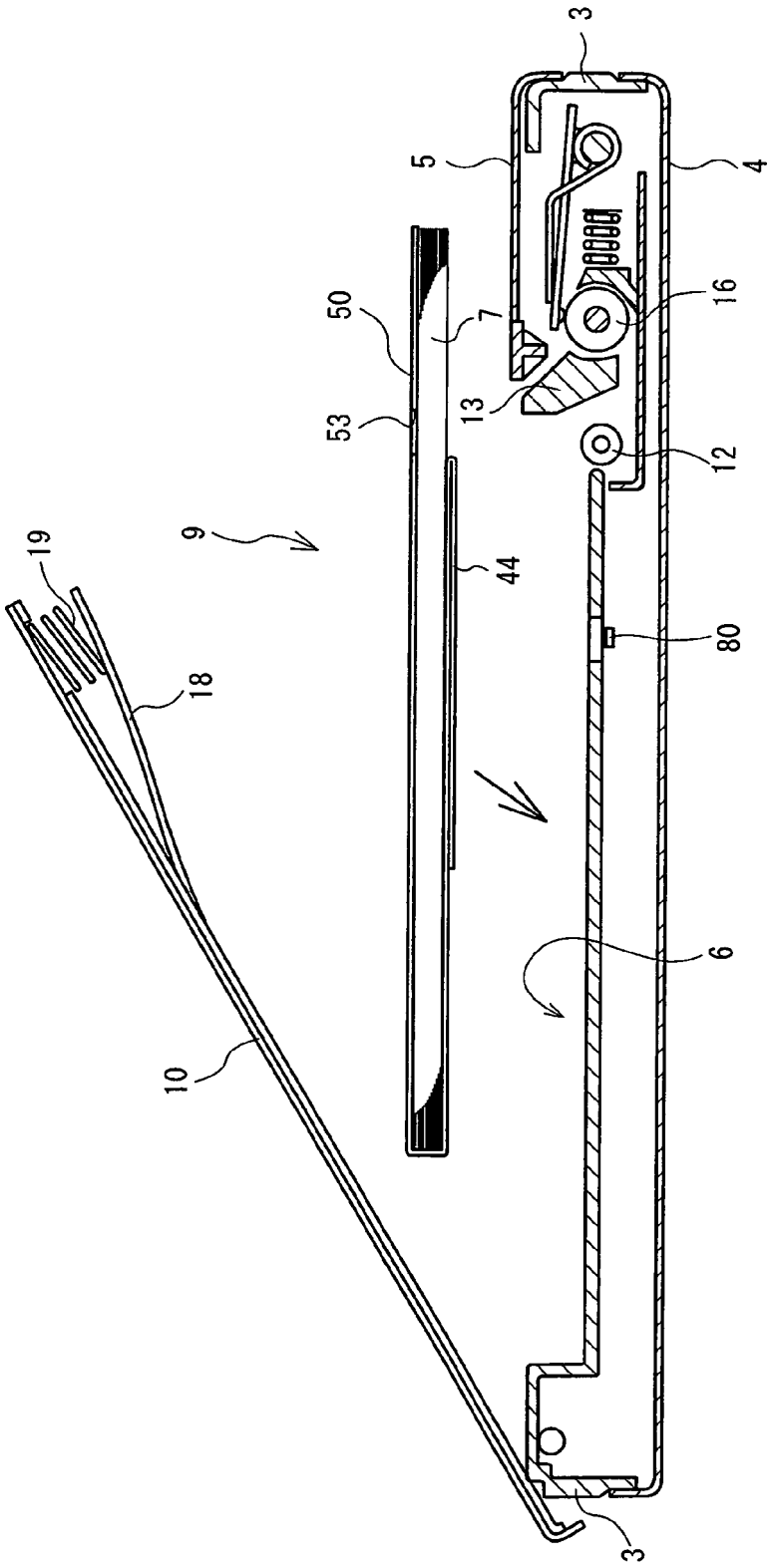

FIG. 18

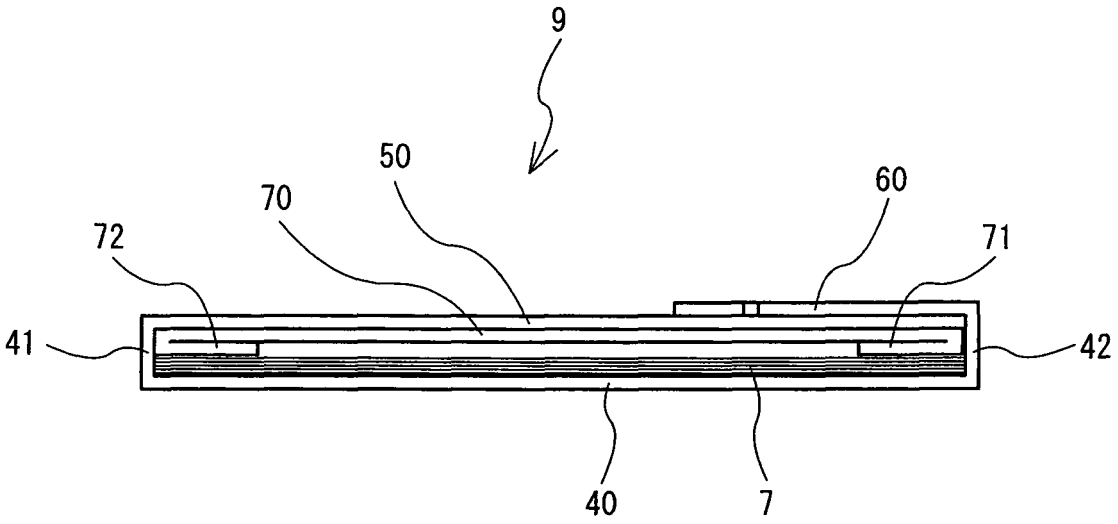

FIG. 19

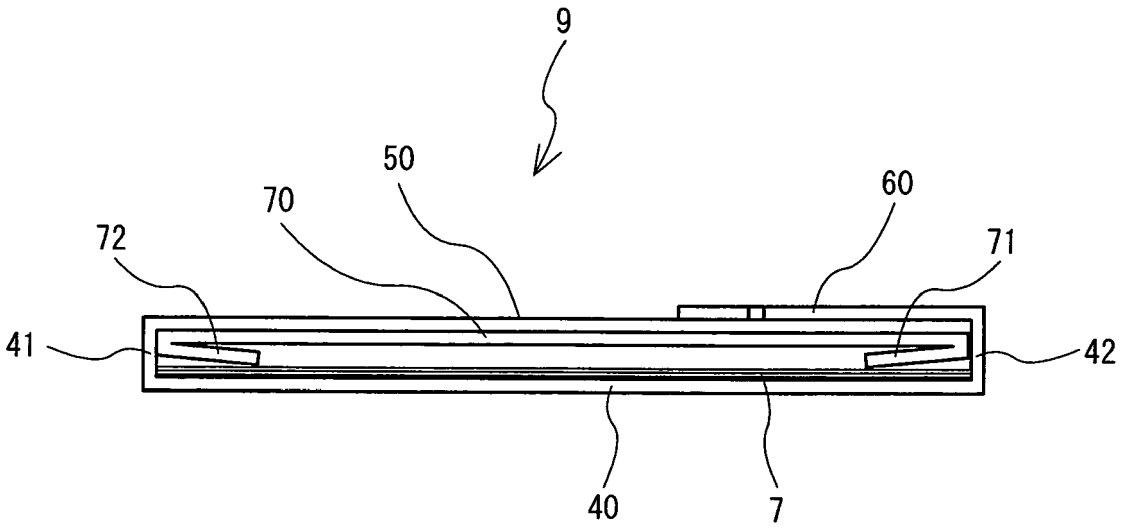

FIG. 20

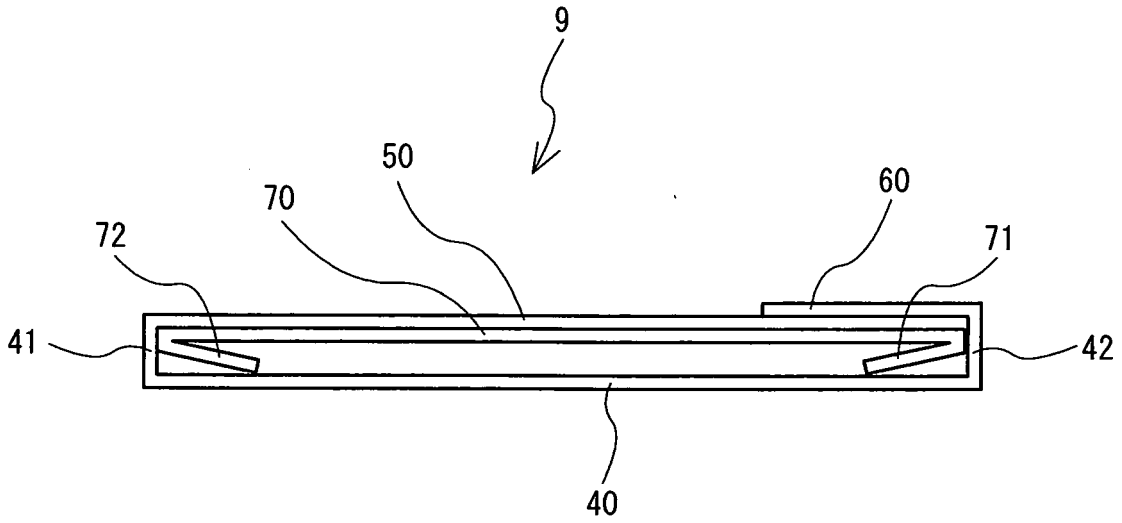

FIG. 21

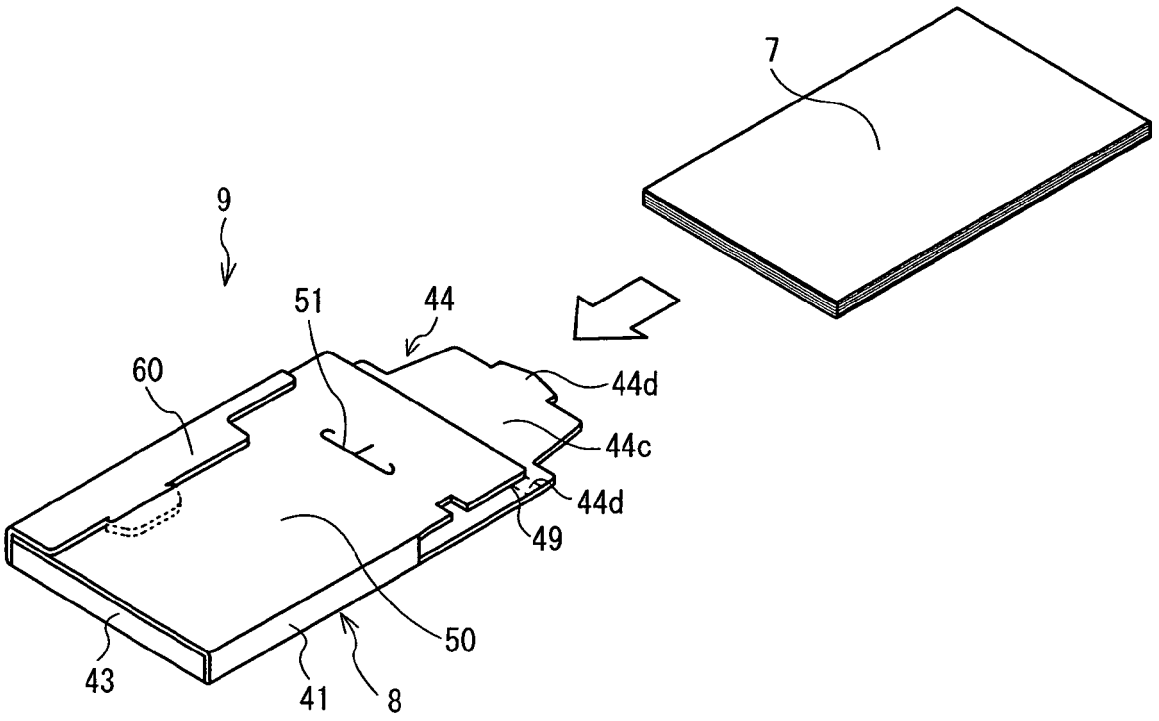

FIG. 22

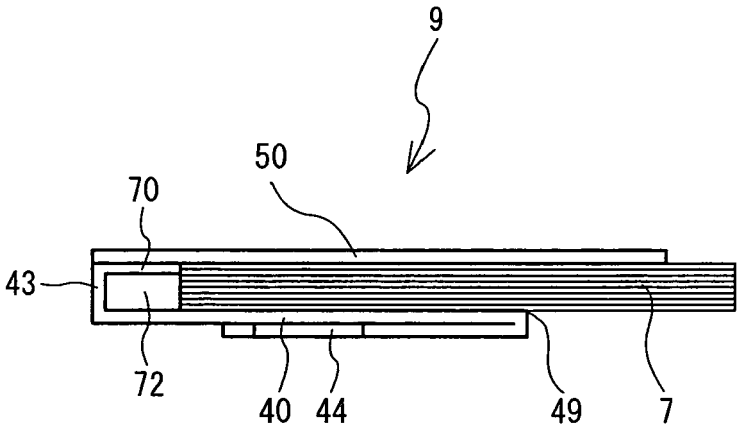

FIG. 23

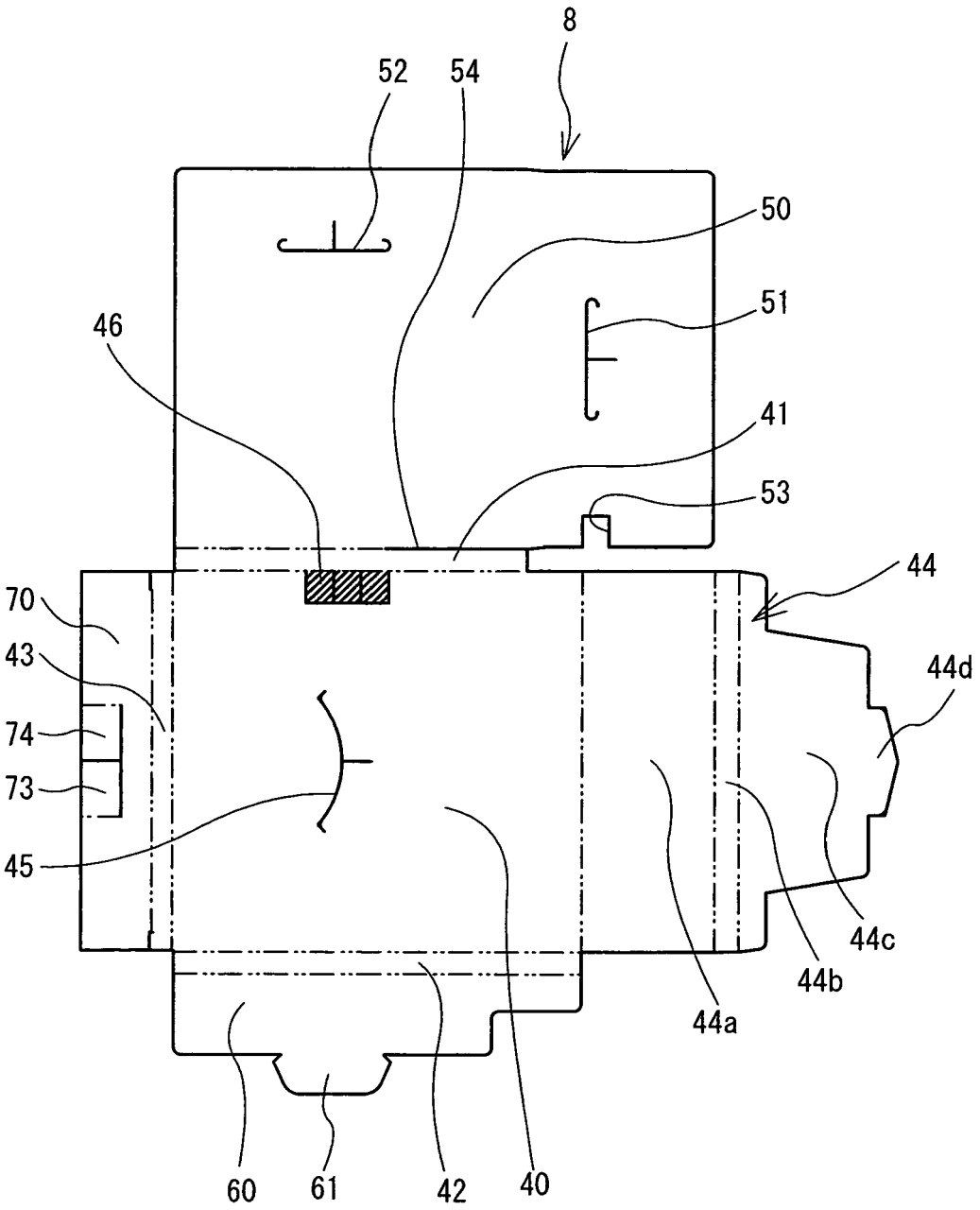

FIG. 24

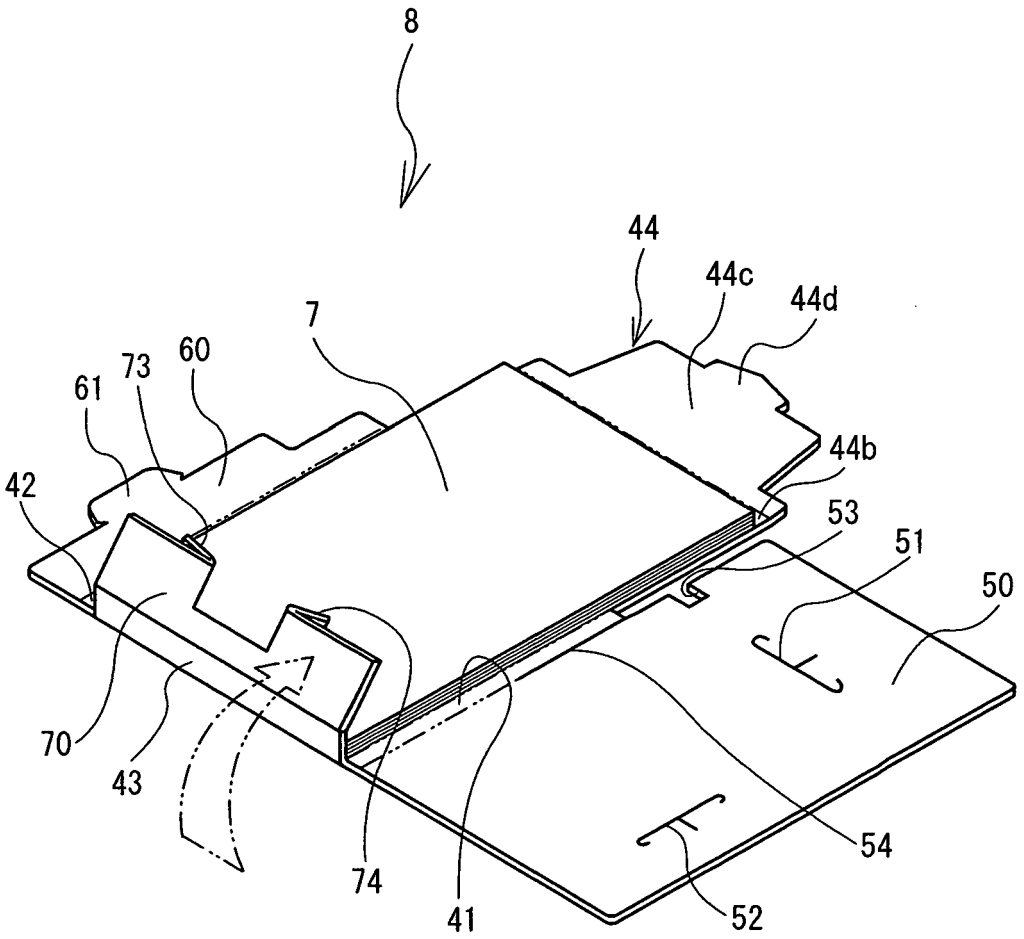

FIG. 25

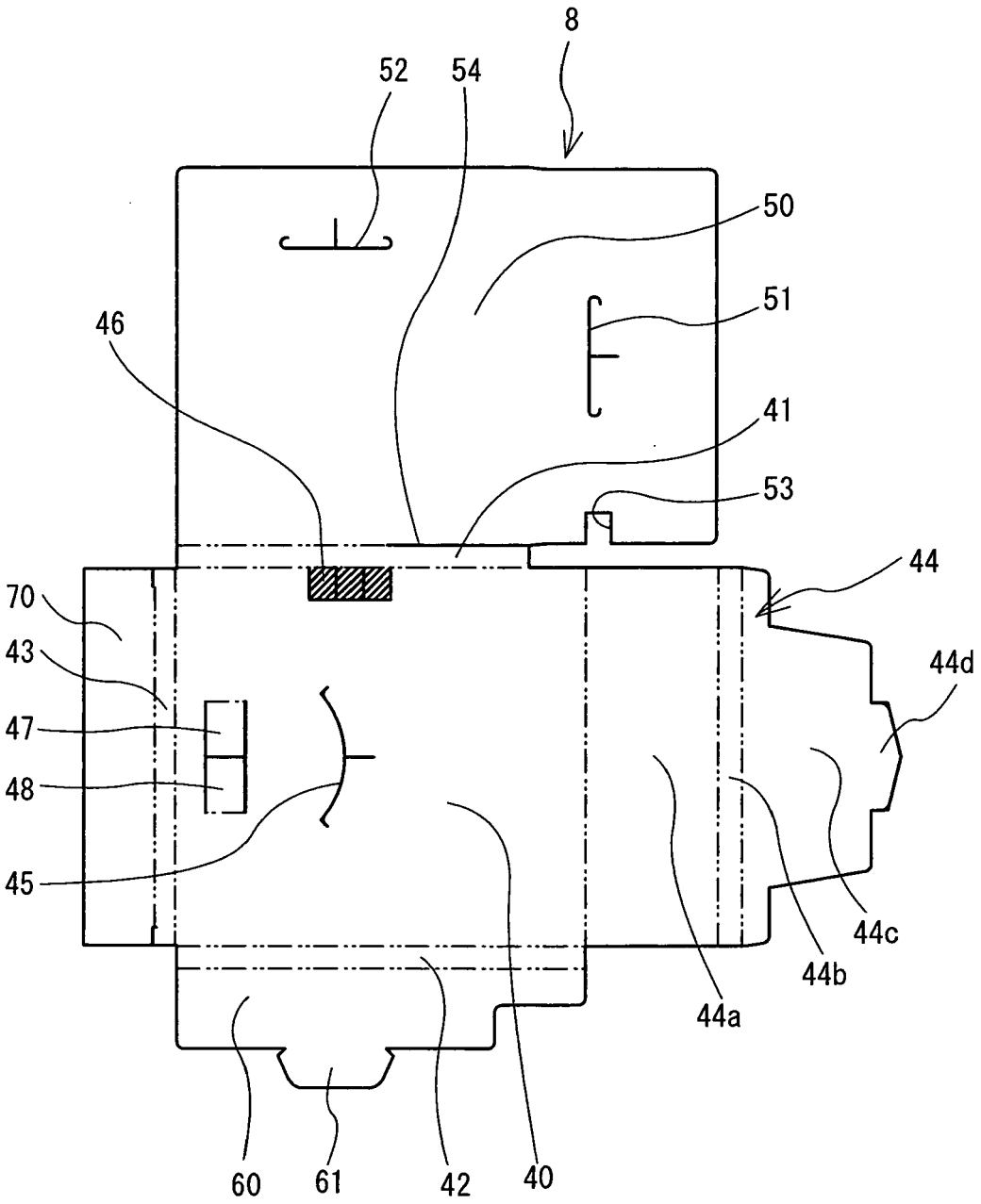

FIG. 26

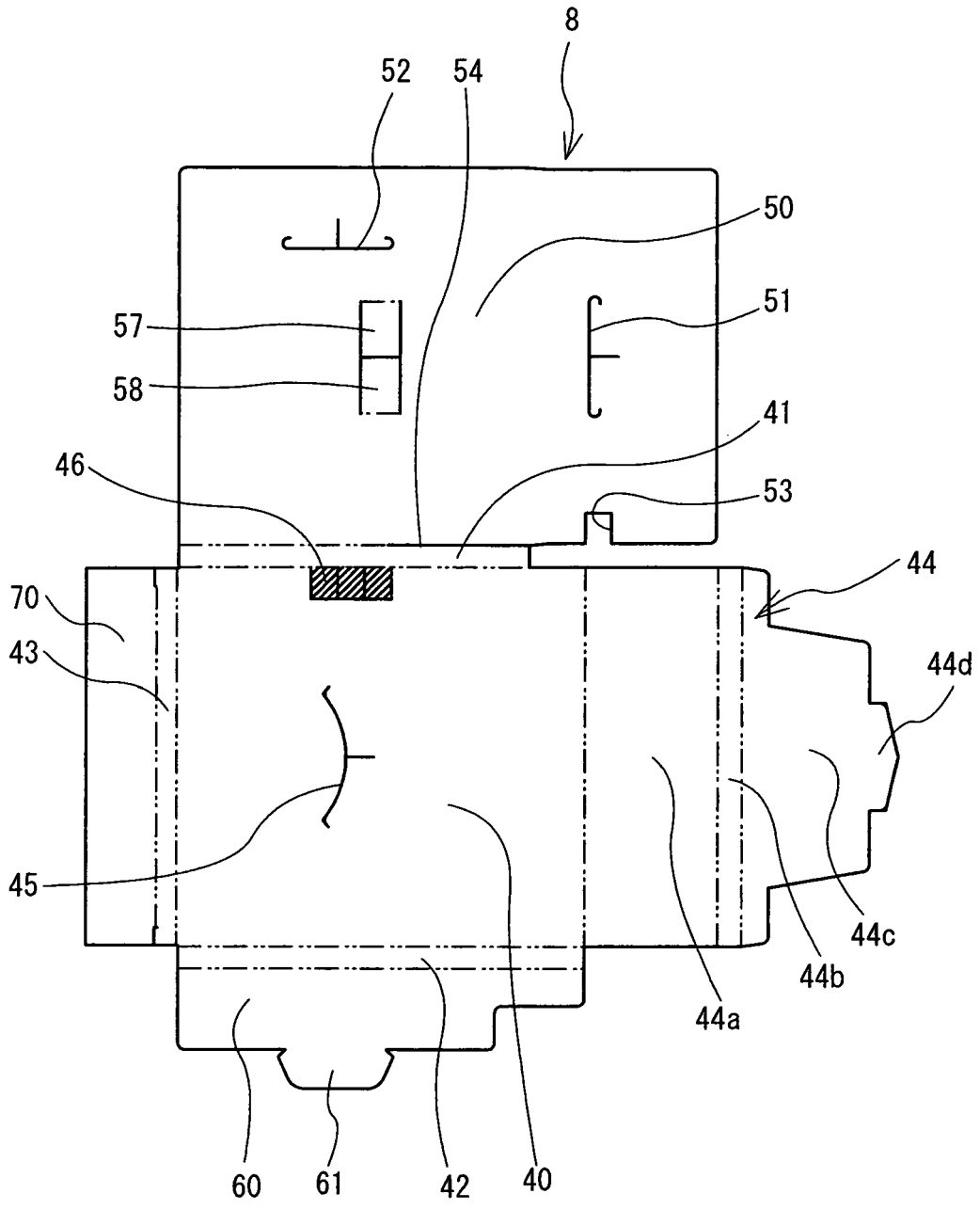

FIG. 27

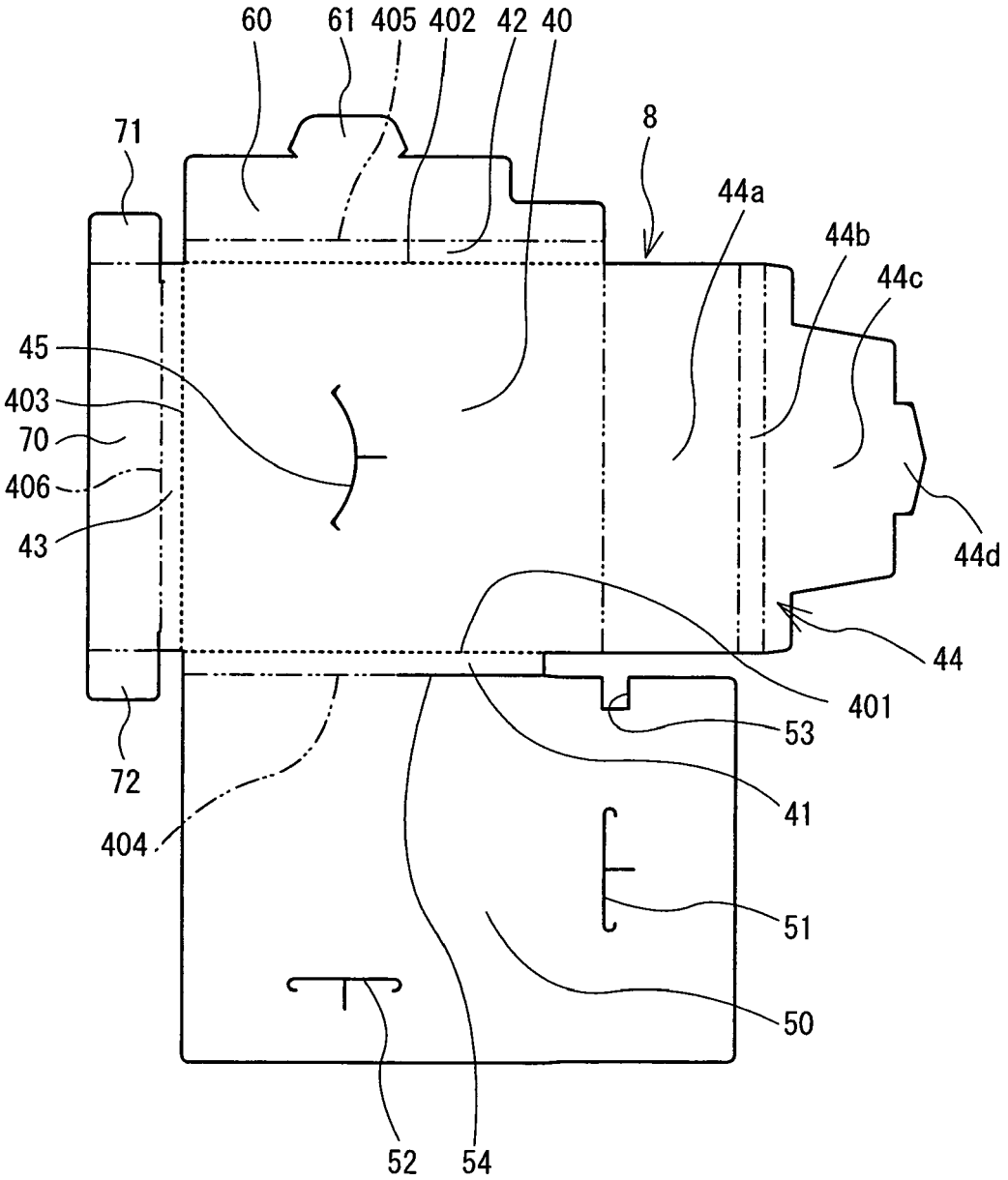
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FIG. 28

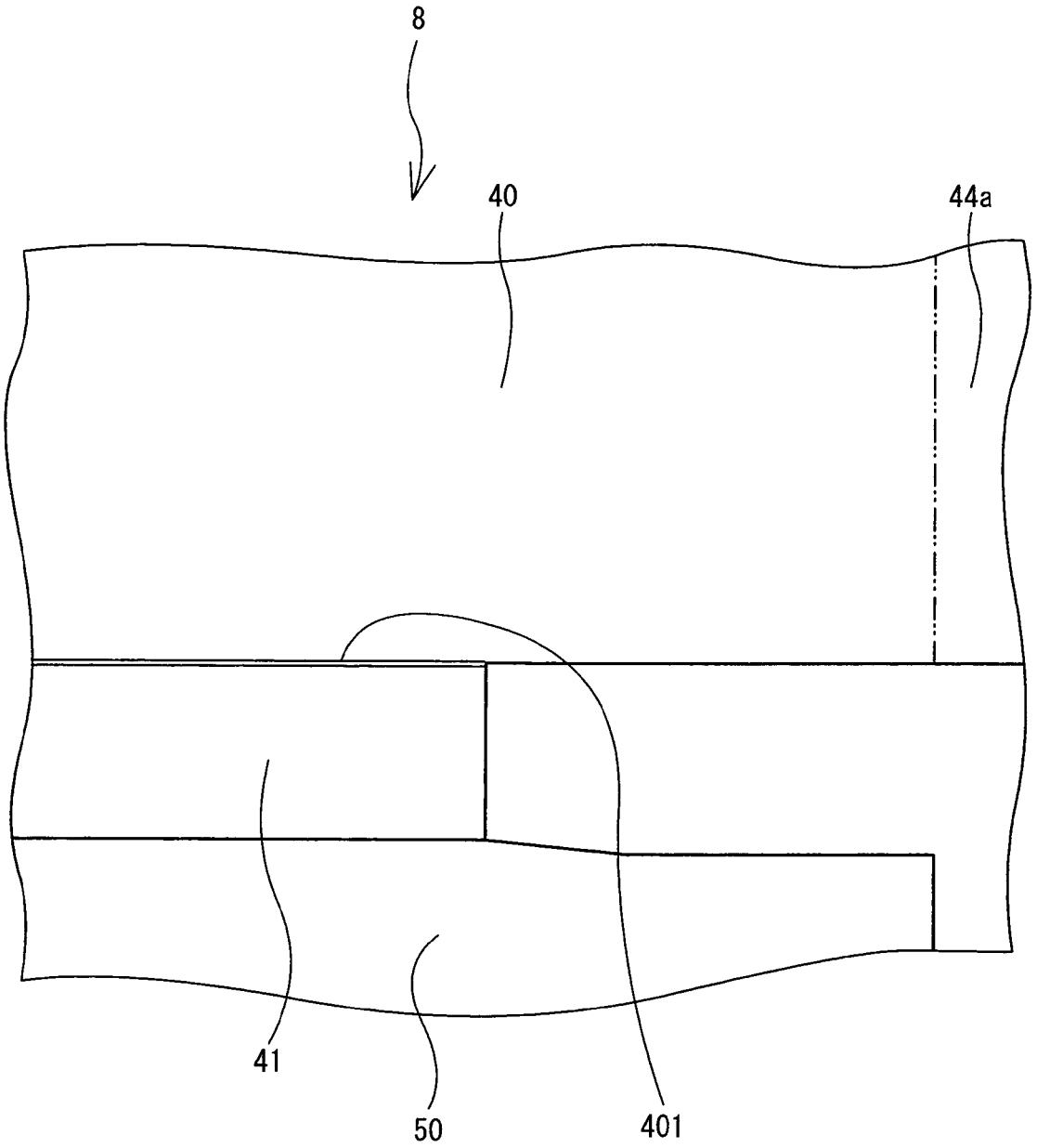


FIG. 29

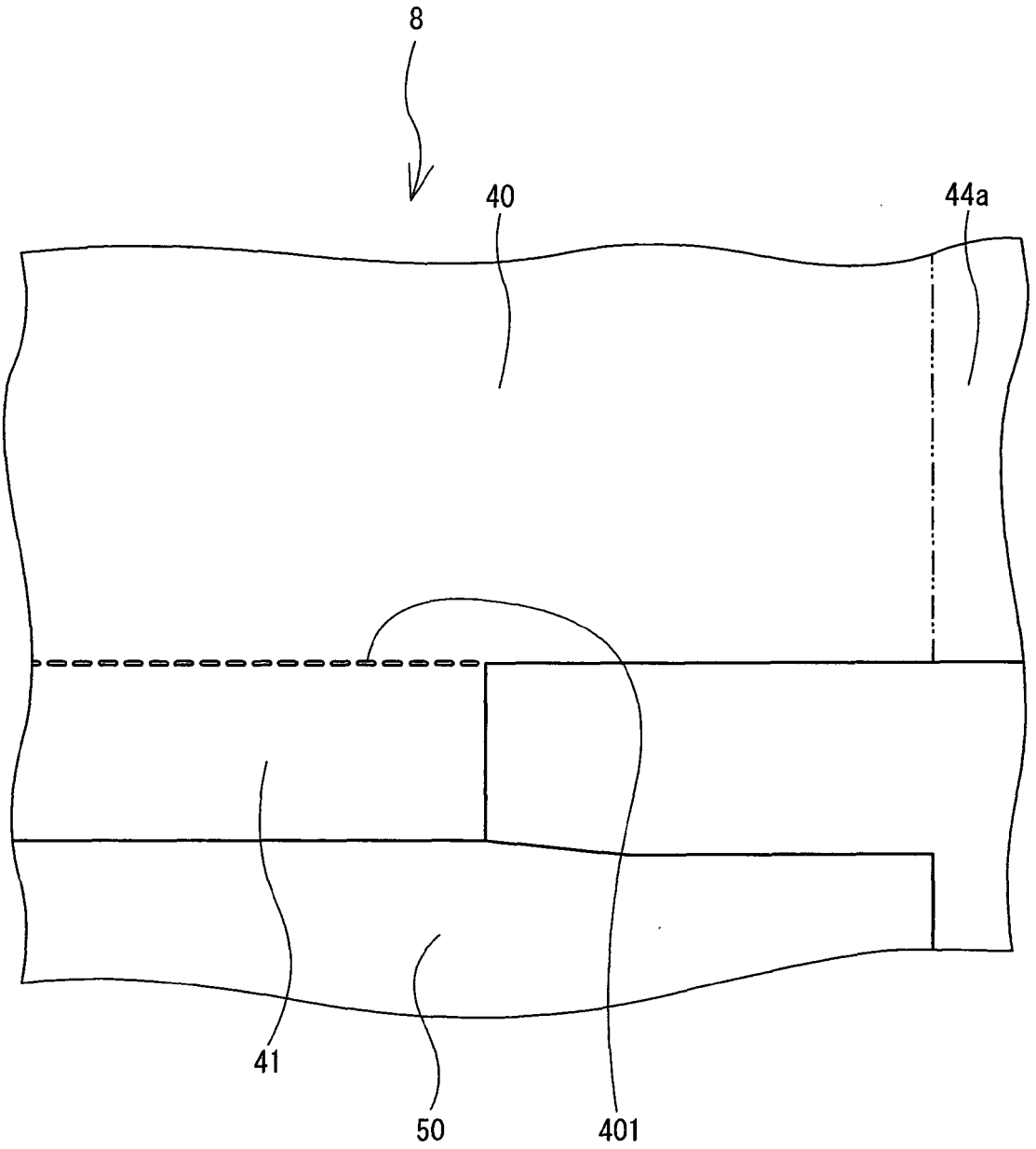


FIG. 30

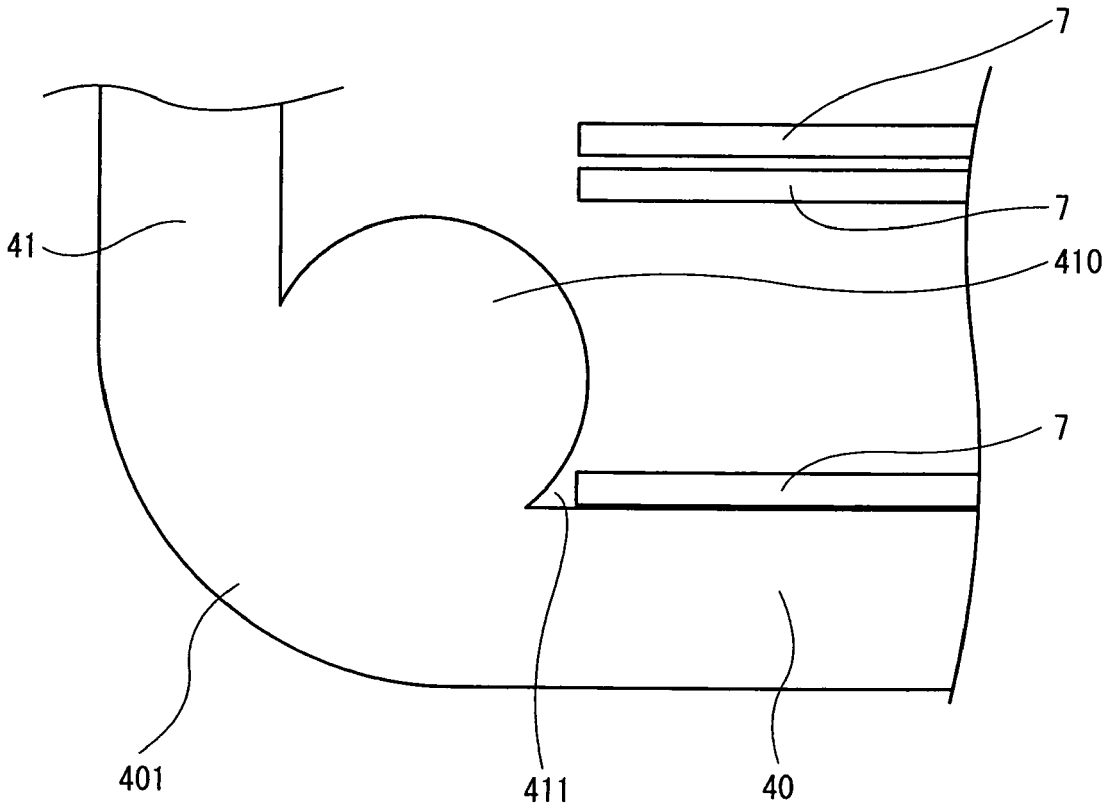
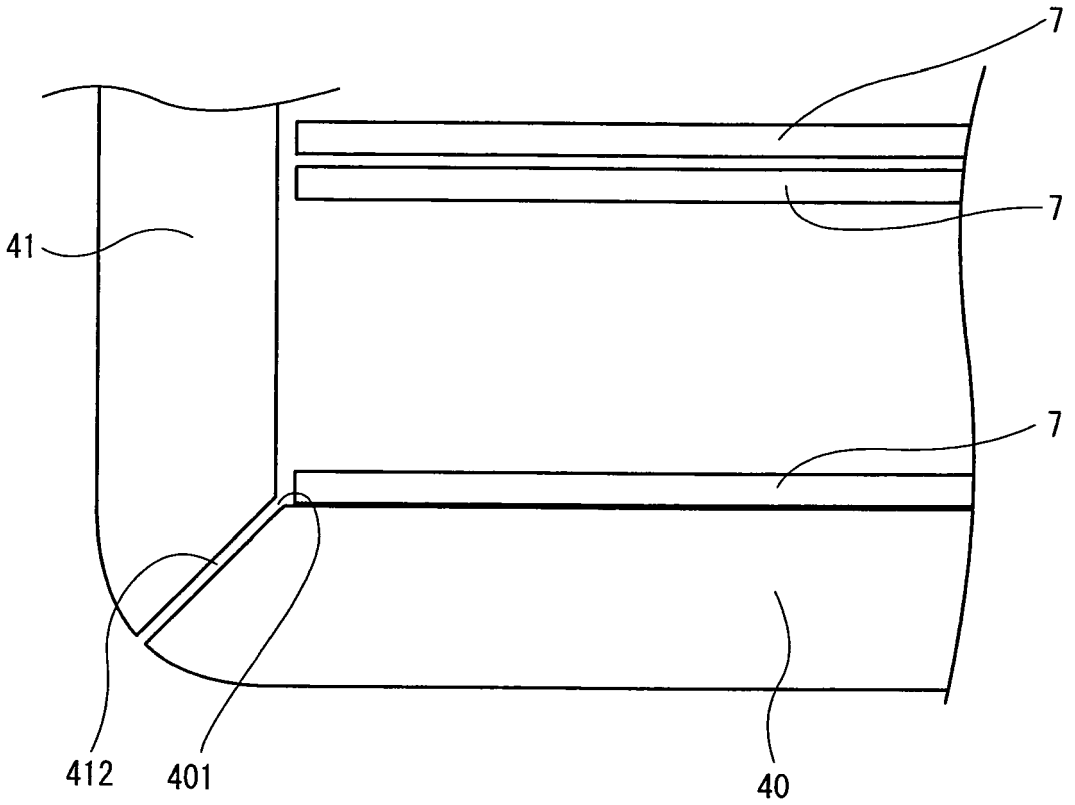


FIG. 31



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Application Number
EP 07 02 4349

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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 6 March 2008 | Callan, Feargel |

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