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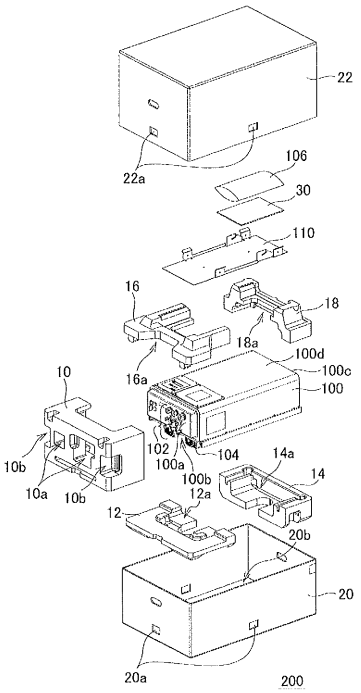
(54) PACKING MATERIAL AND METHOD FOR ATTACHING ARTICLE TO BE PACKED

(57) One aspect of the invention provides a packing material that can reduce time and effort of the work to attach an article including a protruding portion, which protrudes downward from a lower surface of the article, to a wall with the lower surface oriented downward, and a method for attaching the article. The article is packed in the packing material. The article includes the protruding portion that protrudes downward from the lower surface, and the article is attached to the wall with the protruding portion oriented downward. The packing material includes: a first shock absorber configured to include a recess in which the protruding portion is accommodated, the lower surface of the article being fitted in the first shock absorber; and a box that accommodates the article, which is fitted in the first shock absorber, therein. The first shock absorber can hold the article while the lower surface of the article is oriented downward, when the article is taken out from the box while fitted in the first shock absorber.

Fig. 1



EP 2 716 569 A1

Description

TECHNICAL FIELD

[0001] The invention relates to a packing material in which an article is packed and a method for attaching the article, which is packed in the packing material.

BACKGROUND ART

[0002] For example, the packing material disclosed in Patent Document 1 constitutes a shock absorber for at least one of an electronic instrument body and a stand, and includes a shock absorbing jig member, which constitutes a jig in assembling the electronic instrument body and the stand.

Patent Document 1: Japanese Unexamined Patent Publication No. 2008-44668

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0003] In articles to be packed that are packed in packing material, there is an article, which includes a protruding portion protruding downward from a lower surface and is attached to a wall with the lower surface oriented downward. In the case that the article is attached to the wall with the lower surface oriented downward, sometimes a worker tentatively places the article on a floor while the lower surface of the article is oriented downward, the worker lifts the article with the lower surface oriented downward, and attaches the article to the wall. However, sometimes the article including the protruding portion cannot independently be placed on the floor with the lower surface oriented downward because the protruding portion becomes an obstacle.

[0004] The invention provides a packing material that can reduce time and effort of the work to attach the article including the protruding portion, which protrudes downward from the lower surface, to the wall with the lower surface oriented downward, and a method for attaching the article.

MEANS FOR SOLVING THE PROBLEM

[0005] A packing material according to a first aspect of the invention is a packing material in which an article is packed, the article including a protruding portion protruding downward from a lower surface, the article being attached to a wall with the protruding portion oriented downward, the packing material includes: a first shock absorber configured to include a recess in which the protruding portion is accommodated, the lower surface of the article being fitted in the first shock absorber; and a box configured to accommodate the article, which is fitted in the first shock absorber, therein. In the packing material, the first shock absorber can hold the article while the lower surface of the article is oriented downward, when the article is taken out from the box while fitted in the first shock absorber.

[0006] The article may include a projecting portion configured to project from a rear surface, the rear surface being a surface on a side on which the article is attached to the wall, the first shock absorber may include a support configured to support the rear surface of the article, and a height from the rear surface in the support may be less than or equal to a height from the rear surface in the projecting portion.

[0007] The packing material may further include a second shock absorber that is provided so as to be able to be separated from the first shock absorber, the second shock absorber including a recess in which the projecting portion is accommodated, the second shock absorber may be accommodated in the box together with the article and the first shock absorber, and the second shock absorber may be separated from the first shock absorber before the article is attached to the wall.

[0008] The first shock absorber may include handle portions that are used to lift the article while the lower surface of the article is oriented downward.

[0009] In accordance with a second aspect of the invention, a method of attaching the article is a method for taking out the article, which is packed in the packing material, from the packing material and attaching the article to the wall, the method for attaching the article includes: a step of taking out the article from the box while fitted in the first shock absorber, and causing the first shock absorber to support the article to stand up while the lower surface of the article is oriented downward; and a step of attaching the article to the wall with the lower surface oriented downward.

[0010] The box may accommodate the article therein while a rear surface or a front surface of the article is oriented toward a bottom surface of the box, the rear surface being a surface on a side on which the article is attached to the wall, the front surface being a surface on an opposite side to the rear surface, and the standing-up step may include: a step of opening a sidewall of the box, in which the article is accommodated, on the lower surface side of the article; and a step of causing the article to stand up with an edge portion of the lower surface of the article on the bottom surface side of the box as a support point.

[0011] The article may include a projecting portion configured to project from a rear surface, the rear surface being a surface on a side on which the article is attached to the wall, the first shock absorber may include a support configured to support the rear surface of the article, a height from the rear surface in the support may be less than or equal to a height from the rear surface in the projecting portion, and the attaching step may include: a step of attaching the article to the wall with the lower surface oriented downward while fitted in the first shock absorber; and a step of removing the first shock absorber

from the article attached to the wall.

[0012] The packing material may further include a second shock absorber that is provided so as to be able to be separated from the first shock absorber, the second shock absorber including a recess in which the projecting portion is accommodated, the second shock absorber may be accommodated in the box together with the article and the first shock absorber, and the standing-up step may further include a step of separating the second shock absorber from the first shock absorber.

[0013] The first shock absorber may include handle portions that are used to lift the article while the lower surface of the article is oriented downward, and the attaching step may include: a step of attaching the article, which is fitted in the first shock absorber, to the wall with the lower surface oriented downward; and a step of removing the first shock absorber from the article attached to the wall.

[0014] All the features necessary for the invention are not described in the summary of the invention. A subcombination of a feature group is also included in the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is an exploded perspective view of a packing material in which a power conditioner is packed.

Fig. 2 is a sectional view of a first shock absorber fitted in the power conditioner.

Fig. 3 is a view explaining a procedure to attach the power conditioner to a wall.

Fig. 4 is a view explaining the procedure to attach the power conditioner to the wall.

Fig. 5 is a view explaining the procedure to attach the power conditioner to the wall.

Fig. 6 is a view explaining the procedure to attach the power conditioner to the wall.

Fig. 7 is a view explaining the procedure to attach the power conditioner to the wall.

MODE FOR CARRYING OUT THE INVENTION

[0016] Hereinafter, an embodiment of the invention will be described. However, the invention is not limited to the embodiment. All combinations of features described in the embodiment are not necessary for the means for solving the problem.

[0017] Fig. 1 is an exploded perspective view of a packing material 200 according to an embodiment. A power conditioner 100 is packed in the packing material 200. The power conditioner 100 includes a protruding portion 102 that protrudes from a lower surface 100a. The power conditioner 100 is an example of the article, which is attached to a wall while a protruding portion 102 is oriented toward a floor direction (a ground direction), namely, downward. The power conditioner 100 is an electric instrument that boosts a DC voltage output from a DC power supply, such as a photovoltaic cell and a fuel cell, converts the boosted DC voltage into an AC voltage, and outputs the AC voltage to a load or a system power supply. The power conditioner 100 includes an input terminal to which a DC power is input, an output terminal from which an AC power is output, and an operation knob as the protruding portion 102. The power conditioner 100 includes a heat sink 104 that cools an internal circuit of the power conditioner 100 and the like. The heat sink 104 is an example of the projecting portion projecting from a rear surface 100b that is of a surface on a side attached to the wall. The article, which is packed in the packing material 200, is not limited to the power conditioner 100, but the article may be other articles to be packed, such as a water heater and a heat source, which includes the protruding portion protruding downward from the lower surface and is attached to the wall with the protruding portion oriented downward. Instead of protruding downward from the lower surface 100a, the protruding portion 102 may protrude downward from the lower surface 100a while extending from a side surface.

[0018] The power conditioner 100 is attached to the wall with the protruding portion 102 oriented downward. Before attaching the power conditioner 100 to the wall, sometimes a worker tentatively vertically places the power conditioner 100 on a floor with the protruding portion 102 oriented downward. However, because the protruding portion 102 protrudes downward from the lower surface, the power conditioner 100 cannot vertically be placed by itself with the protruding portion 102 oriented downward. Accordingly, it is necessary for the worker to hold the power conditioner 100 taken out from the packing material 200 while lifting the power conditioner 100 with the protruding portion 102 oriented downward. In order to avoid such a situation, it is conceivable that a protective wall, in which a height from the lower surface of the power conditioner 100 is higher than that of the protruding portion 102, is provided in the lower surface of the power conditioner 100 so as to surround at least a part of the protruding portion 102. Therefore, the protective wall constitutes a self-standing base, and the power conditioner 100 can be tentatively vertically placed with the protruding portion 102 oriented downward. However, when the worker connects a cable to the input terminal or output terminal adjacent to the protective wall, the protective wall becomes an obstacle to hardly perform the cable connection work. As the protective wall is provided, the instrument becomes heavier and bigger. Additionally, cost of the whole instrument also increases.

[0019] Therefore, the embodiment provides a shock absorber that can vertically place the power conditioner 100 on the floor by itself without providing the protective wall, which protects the protruding portion 102 such as the input terminal, in the lower surface of the power conditioner 100.

[0020] The packing material 200 includes a first shock absorber 10, a second shock absorber 12, a third shock

absorber 14, a fourth shock absorber 16, a fifth shock absorber 18, a box 20, and a cover member 22. The first shock absorber 10 includes a recess 10a in which the protruding portion 102 is accommodated, and the lower surface 100a of the power conditioner 100 is fitted in the first shock absorber 10. The first shock absorber 10 may have a space in which the protruding portion 102 can be accommodated as the recess 10a, and the recess 10a may pierce the first shock absorber 10a or not pierce the first shock absorber 10. The same holds true for the recesses included in other shock absorbers. The first shock absorber 10 also includes a handle portions 10b that are used to lift the power conditioner 100 with the lower surface 100a oriented downward. The first shock absorber 10 can independently hold the power conditioner 100 with the lower surface 100a of the power conditioner 100 oriented downward, when the power conditioner 100 is taken out from the box 20 while fitted in the first shock absorber 10.

[0021] The second shock absorber 12 is provided so as to be able to be separated from the first shock absorber 10, and includes a recess 12a in which the heat sink 104 on the side of the lower surface 100a is partially accommodated. The second shock absorber 12 is separated from the first shock absorber 10 before the power conditioner 100 is attached to the wall. The third shock absorber 14 includes a recess 14a in which the rear surface 100b on the side of an upper surface 100c of the power conditioner 100 and the heat sink 104 are partially accommodated, and the rear surface 100b on the side of the upper surface 100c of the power conditioner 100 is fitted in the recess 14a. The fourth shock absorber 16 includes a recess 16a in which a front surface 100d on the side of the lower surface 100a of the power conditioner 100 is partially accommodated, and the front surface 100d on the side of the lower surface 100a of the power conditioner 100 is fitted in the recess 16a. The fifth shock absorber 18 includes a recess 18a in which the front surface 100d on the side of the upper surface 100c of the power conditioner 100 is partially accommodated, and the front surface 100d on the side of the upper surface 100c of the power conditioner 100 is fitted in the recess 18a.

[0022] The power conditioner 100 is accommodated in the box 20 while fitted in the first shock absorber 10, the second shock absorber 12, the third shock absorber 14, the fourth shock absorber 16, and the fifth shock absorber 18. An attaching plate 110 that is used to attach the power conditioner 100 to the wall, an instruction manual 30, and an attached component 106 are also accommodated in the box 20. The power conditioner 100 is accommodated in the box 20 while the rear surface 100b, which is of the surface on the side on which the power conditioner 100 is attached to the wall, is oriented toward a bottom surface 20b of the box 20. Alternatively, the power conditioner 100 may be accommodated in the box 20 while the front surface 100d, which is of the surface on an opposite side to the rear surface, is oriented toward the bottom surface 20b of the box 20. The box 20 includes openings 20a for four sidewalls. The cover member 22 includes openings 22a, each of which is opposed to the opening 20a in the sidewall, while cover member 22 is fitted in the box 20. Packings are fitted in the openings 22a and the openings 20a while the cover member 22 is fitted in the box 20, thereby fixing the cover member 22 and the box 20 to each other.

[0023] Fig. 2 is a sectional view illustrating the first shock absorber 10 in which the power conditioner 100 is fitted. The first shock absorber 10 includes a support 10c that supports the rear surface 100b of the power conditioner 100. At this point, a height a from the rear surface 100b in the support 10c is less than or equal to a height b from the rear surface 100b in the heat sink 104. That is, the height from the rear surface 100b in the side surface of the first shock absorber 10 that supports the side of the rear surface 100b of the power conditioner 100 is less than or equal to the height from the rear surface 100b in the heat sink 104. When the height a from the rear surface 100b in the support 10c is greater than the height b from the rear surface 100b in the heat sink 104, the side surface on the wall side of the first shock absorber 10 becomes the obstacle in attaching the power conditioner 100 fitted in the first shock absorber 10 to the wall, and the power conditioner 100 is hardly attached to the wall while fitted in the first shock absorber 10. On the other hand, when the height a from the rear surface 100b in the support 10c is less than or equal to the height b from the rear surface 100b in the heat sink 104, the side surface of the first shock absorber 10 that supports the side of the rear surface 100b does not become the obstacle. Therefore, the power conditioner 100 can be attached to the wall while fitted in the first shock absorber 10. The first shock absorber 10 includes the handle portions 10b that are used to lift the power conditioner 100 with the lower surface 100a oriented downward. Accordingly, the worker can lift the power conditioner 100, which is fitted in the first shock absorber 10, with the protruding portion 102 oriented downward while gripping the handle portions 10b, and the worker can directly attach the power conditioner 100 fitted in the first shock absorber 10 to the wall.

[0024] Figs. 3 to 7 are views explaining a procedure to attach the power conditioner 100 to the wall. At first, packings 24 are taken out from the packing material 200 (see Fig. 3). Then the cover member 22 in which the box 20 is fitted is taken out. A sidewall 20c of the box 20 on the side of the lower surface 100a of the power conditioner 100 is brought down outward, thereby opening the sidewall 20c (see Fig. 4). Alternatively, the sidewall 20c may be opened by cutting off the sidewall 20c. Then, the power conditioner 100 is taken out from the box 20 while fitted in the first shock absorber 10, and the power conditioner 100 is independently supported by the first shock absorber 10 while the lower surface 100a of the power conditioner 100 is oriented downward, whereby the power conditioner 100 stands up. At this point, the power condition-

er 100 may stand up by a principle of leverage with an edge portion of the lower surface 100a of the power conditioner 100 on the side of the bottom surface 20b of the box 20 as a support point (see Fig. 5). The power conditioner 100 may stand up at the same time as the opening of the sidewall 20c. That is, notches are previously provided at both edges of the sidewall 20c, and the sidewall 20c may be brought down outward using the bottom surface of the first shock absorber 10 when the power conditioner 100 stands up by the principle of leverage. After the power conditioner 100 stands up, the second shock absorber 12 in which the rear surface 100b of the power conditioner 100 is separated from the first shock absorber 10. The second shock absorber 12 may be separated from the first shock absorber 10 when the power conditioner 100 is taken out from the box 20. Then, the power conditioner 100 fitted in the first shock absorber 10 is supported while the handle portions 10b are gripped, and the power conditioner 100 is attached to the wall with the attaching plate 110 interposed therebetween while the lower surface 100a is oriented downward (see Fig. 6). After the power conditioner 100 is attached to the wall, the first shock absorber 10 is removed from the power conditioner 100 (see Fig. 7).

[0025] As described above, when the power conditioner 100 is taken out from the box 20 while fitted in the first shock absorber 10, the power conditioner 100 can independently be held while the lower surface 100a of the power conditioner 100 is oriented downward. Accordingly, when the power conditioner 100 is taken out from the packing material 200 and attached to the wall, the first shock absorber 10 supports the power conditioner 100 while the lower surface 100a of the power conditioner 100 is oriented downward, which allows the power conditioner 100 to stand up. Therefore, it is not necessary for the worker to hold the power conditioner 100 taken out from the packing material 200 for a long time while lifting the power conditioner 100 with the protruding portion 102 oriented downward.

[0026] Because the first shock absorber 10 includes the handle portions 10b, the worker supports the power conditioner 100 while gripping the handle portions 10b, and the worker can easily attach the power conditioner 100 to the wall with the lower surface 100a oriented downward. According to the embodiment, the time and effort of the work to attach the article including the protruding portion, which protrudes downward from the lower surface, to the wall with the lower surface oriented downward can be reduced.

[0027] Additionally, according to the embodiment, the power conditioner 100 is carried with the lower surface 100a oriented downward while the lower surface 100a is fitted in the first shock absorber 10. Even if the worker mistakenly drops the power conditioner 100 on the floor, the first shock absorber 10 acts as a cushion to reduce an impact on the protruding portion 102 of the power conditioner 100. Therefore, an adverse effect of the drop on the power conditioner 100 can be reduced compared with the case that the power conditioner 100 is not fitted in the first shock absorber 10. Even if the power conditioner 100 drops on the floor or a worker's foot, the first shock absorber 10 acts as the cushion to reduce the impact on a drop position, such as the floor and the worker's foot. Therefore, the adverse effect on the drop position can be reduced compared with the case that the power conditioner 100 is not fitted in the first shock absorber 10.

[0028] Although the embodiment of the invention is described above, the technical scope of the invention is not limited to the scope of the embodiment.

[0029] It is clear for those skilled in the art that various changes and modifications can be made in the invention. It is clear from the claims that the changes and modifications are also included in the technical scope of the invention.

[0030] In the performance sequence of pieces of processing such as the operations, the procedures, the steps, and the stages in the device, the system, the program, and the method in the claims, the description, and the drawings, "before" or "prior to" is not described unless otherwise noted, and it is noted that the pieces of processing are performed in any performance sequence as long as the output of the preceding processing is used in the subsequent processing. In the operation flow of the claims, the description, and the drawings, for the sake of convenience, it is not always necessary that the pieces of processing be performed in this order even if "at first" or "then" is used.

DESCRIPTION OF SYMBOLS

[0031]

10	first shock absorber 10
10a	recess
10b	handle portion
10c	support
12	second shock absorber
12a	recess
20	box
20b	bottom surface
20c	sidewall
22	cover member
100	power conditioner
100a	lower surface

100b rear surface

100c upper surface

100d front surface

102 protruding portion

104 heat sink

200 packing material

Claims

1. A packing material for packing an article, the article comprising a protruding portion protruding downward from a lower surface of the article, the article configured to be attached to a wall with the protruding portion oriented downward, the packing material comprising:

   a first shock absorber configured to comprise a recess, the recess configured to accommodated the protruding portion, the lower surface of the article, the lower surface of the article configured to be fitted in the first shock absorber; and
   a box configured to accommodate the article fitted in the first shock absorber,
   wherein the first shock absorber is configured to hold the article while the lower surface of the article is oriented downward, when the article is taken out from the box while fitted in the first shock absorber.

2. The packing material according to claim 1, wherein the article comprises a projecting portion configured to project from a rear surface, the rear surface being a surface on a side on which the article is attached to the wall,
   the first shock absorber comprises a support configured to support the rear surface of the article, and
   a height from the rear surface in the support is less than or equal to a height from the rear surface in the projecting portion.

3. The packing material according to claim 2, further comprising a second shock absorber that is provided so as to be able to be separated from the first shock absorber, the second shock absorber comprising a recess in which the projecting portion is accommodated,
   wherein the second shock absorber is accommodated in the box together with the article and the first shock absorber, and
   the second shock absorber is separated from the first shock absorber before the article is attached to the wall.

4. The packing material according to any one of claims 1 to 3, wherein the first shock absorber comprises handle portions that are used to lift the article while the lower surface of the article is oriented downward.

5. A method for taking out the article, which is packed in the packing material according to claim 1, from the packing material and attaching the article to the wall, the method for attaching the article comprising:

   a step of taking out the article from the box while fitted in the first shock absorber, and causing the first shock absorber to support the article to stand up while the lower surface of the article is oriented downward; and
   a step of attaching the article to the wall with the lower surface of the article oriented downward.

6. The method for attaching the article according to claim 5, wherein the box accommodates the article therein while a rear surface or a front surface of the article is oriented toward a bottom surface of the box, the rear surface being a surface on a side on which the article is attached to the wall, the front surface being a surface on an opposite side to the rear surface, and
   the standing-up step comprises:

   a step of opening a sidewall of the box, in which the article is accommodated, on the lower surface side of the article; and
   a step of causing the article to stand up with an edge portion of the lower surface of the article on the bottom surface side of the box as a support point.

7. The method for attaching the article according to claim 5 or 6, wherein the article comprises a projecting portion configured to project from a rear surface, the rear surface being a surface on a side on which the article is attached to the wall,
   the first shock absorber comprises a support configured to support the rear surface of the article,
   a height from the rear surface in the support is less than or equal to a height from the rear surface in the projecting portion, and
   the attaching step comprises:

   a step of attaching the article to the wall with the lower surface oriented downward while fitted in the first shock absorber; and
   a step of removing the first shock absorber from the article attached to the wall.

8. The method for attaching the article according to claim 7, wherein the packing material further comprises a second shock absorber that is provided so as to be able to be separated from the first shock

absorber, the second shock absorber comprising a recess in which the projecting portion is accommodated,
the second shock absorber is accommodated in the box together with the article and the first shock absorber, and
the standing-up step further comprises a step of separating the second shock absorber from the first shock absorber.

9. The method for attaching the article according to claim 5 or 6, wherein the first shock absorber comprises handle portions that are used to lift the article while the lower surface of the article is oriented downward, and
the attaching step comprises:

a step of attaching the article, which is fitted in the first shock absorber, to the wall with the lower surface oriented downward; and
a step of removing the first shock absorber from the article attached to the wall.

Fig. 1

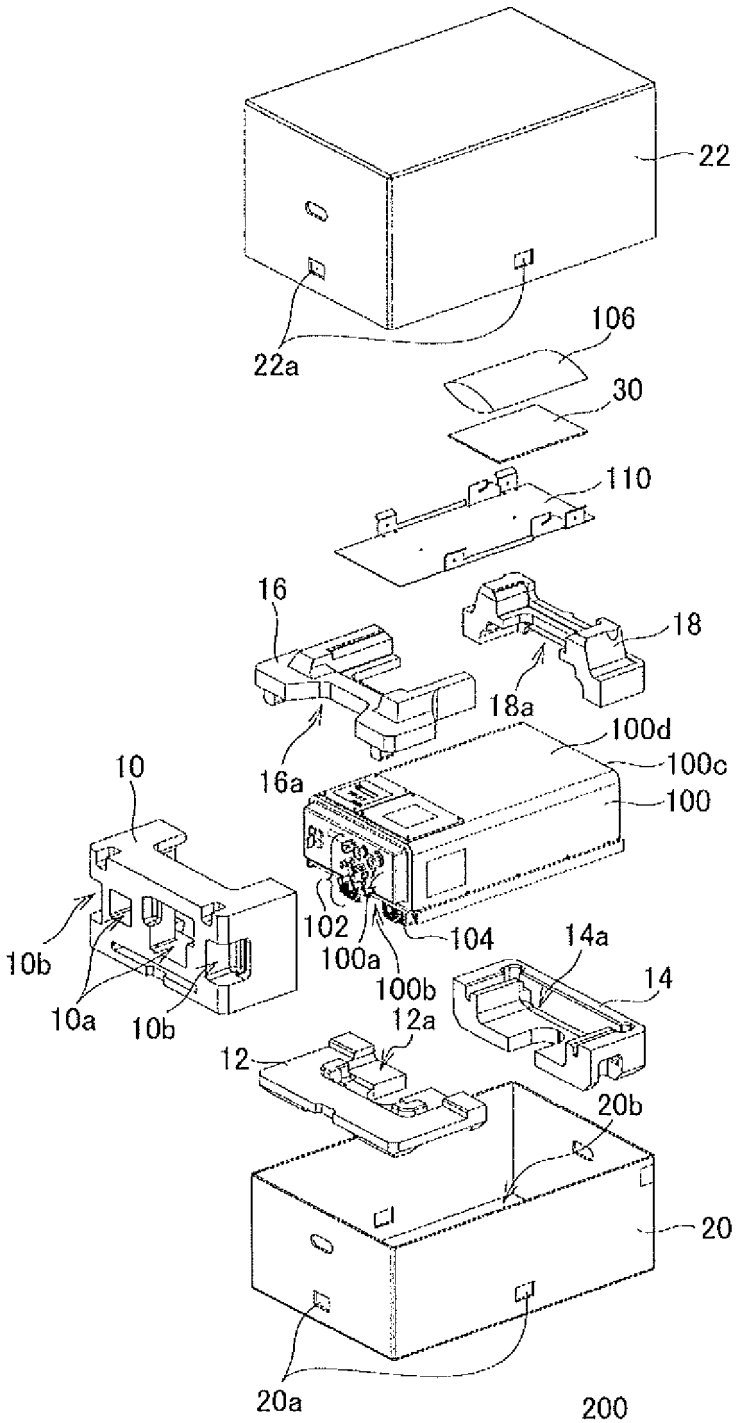

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Fig. 2

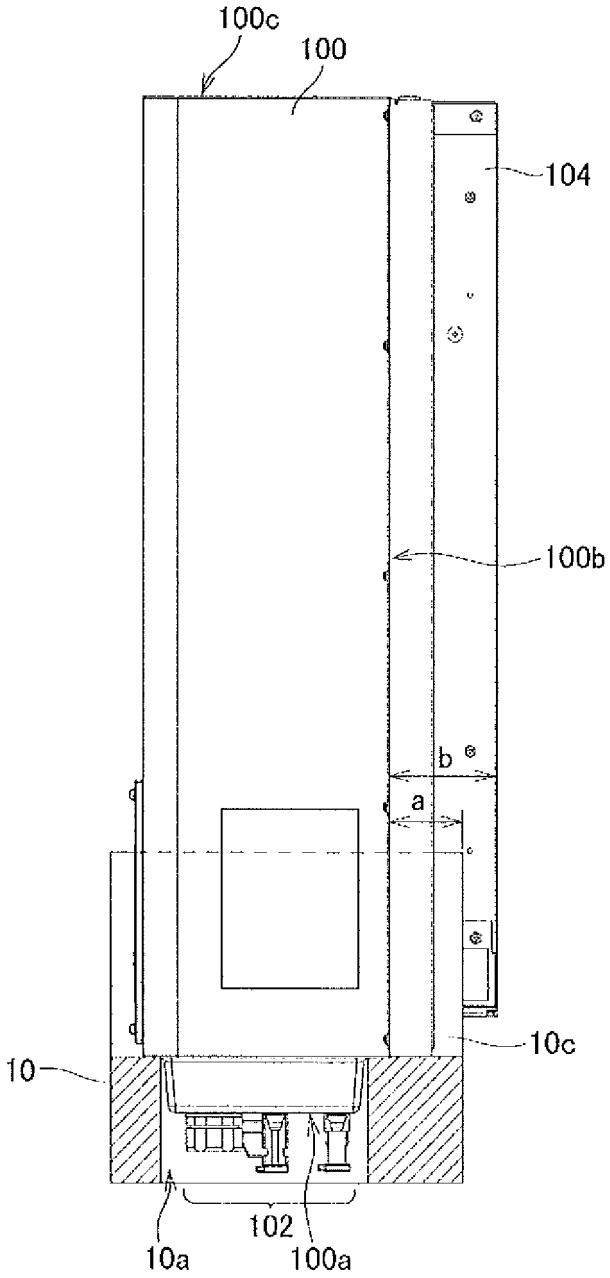


Fig. 3

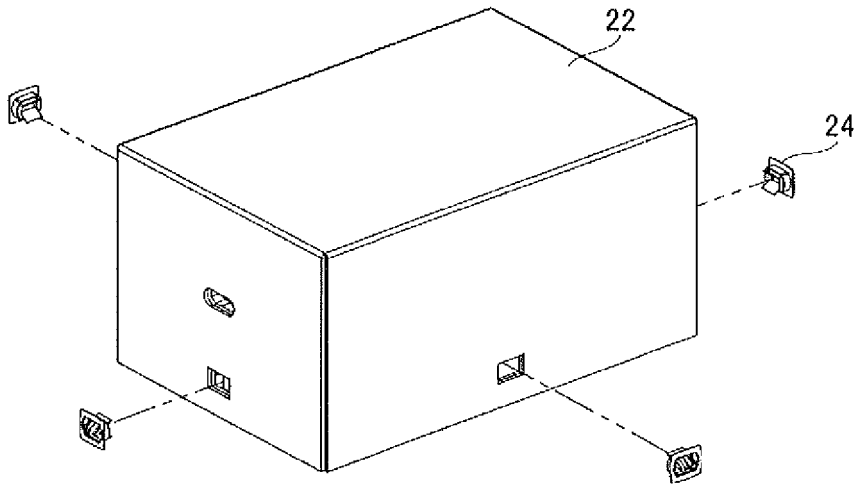


Fig. 4

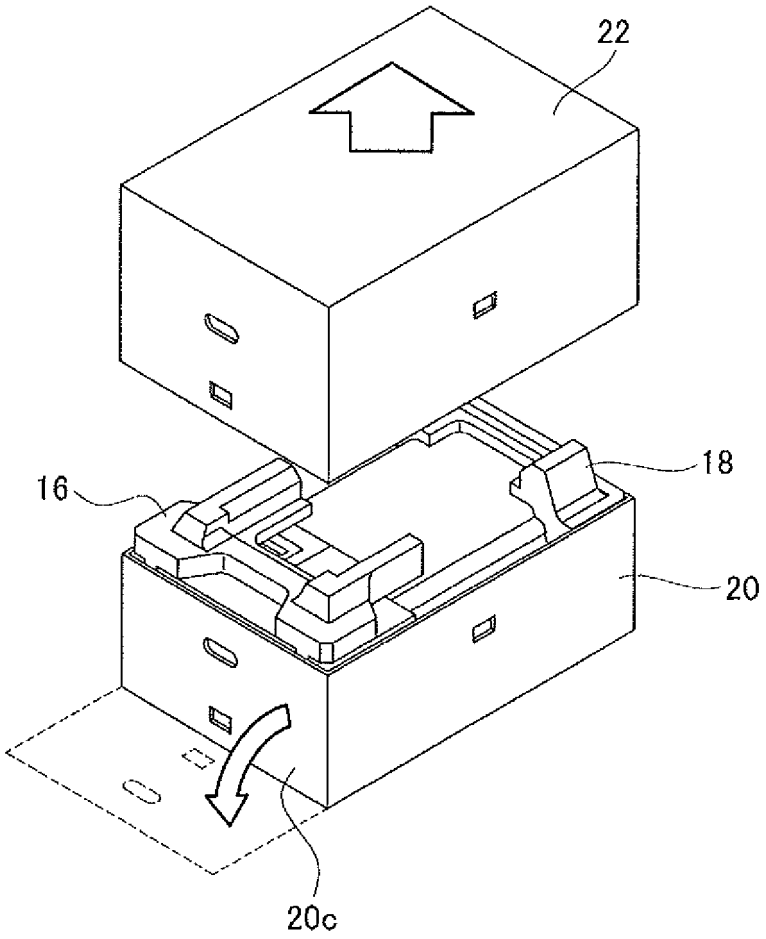


Fig. 5

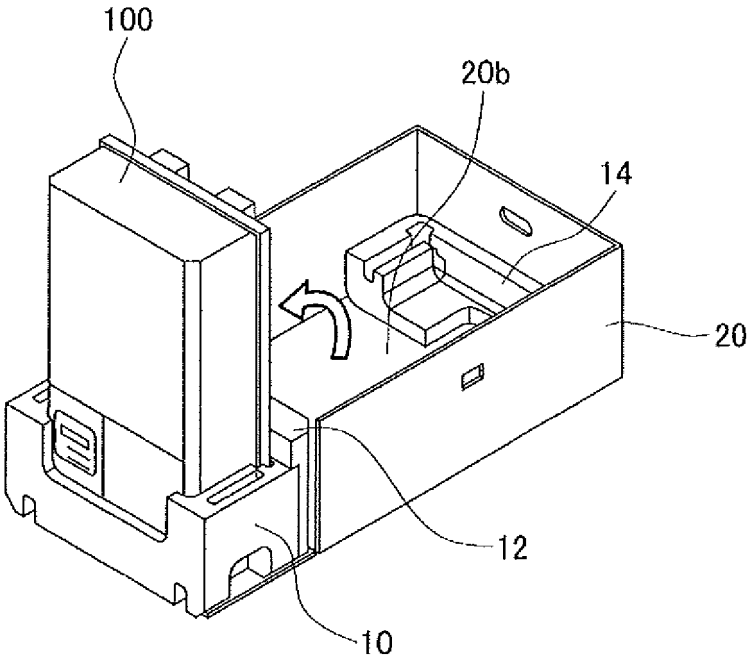


Fig. 6

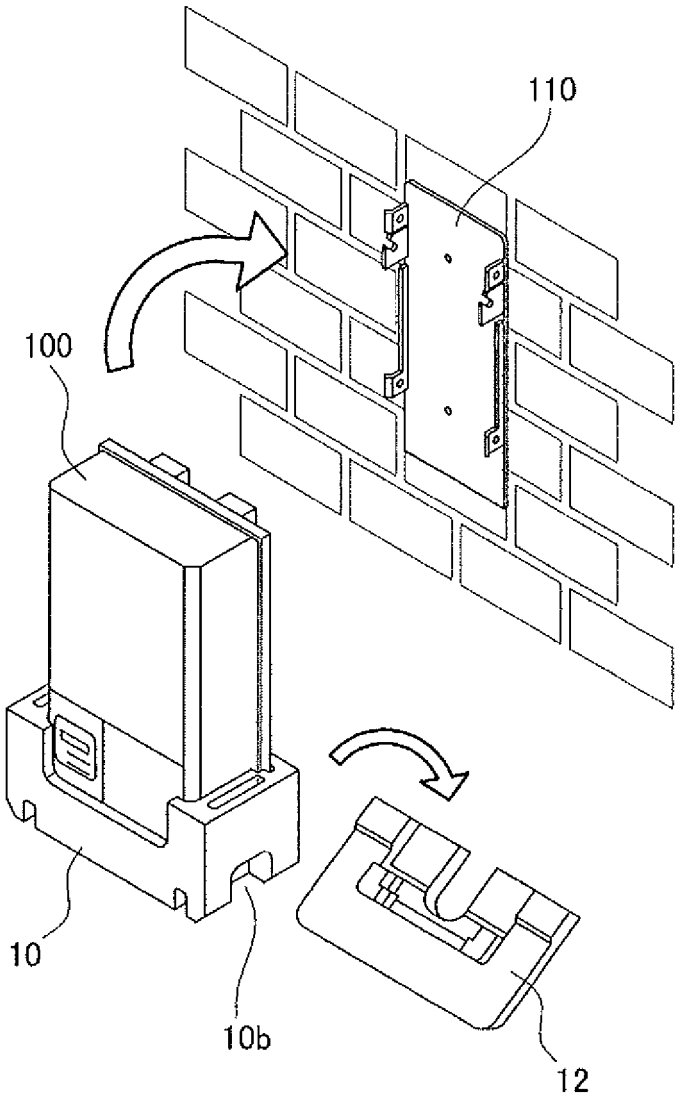
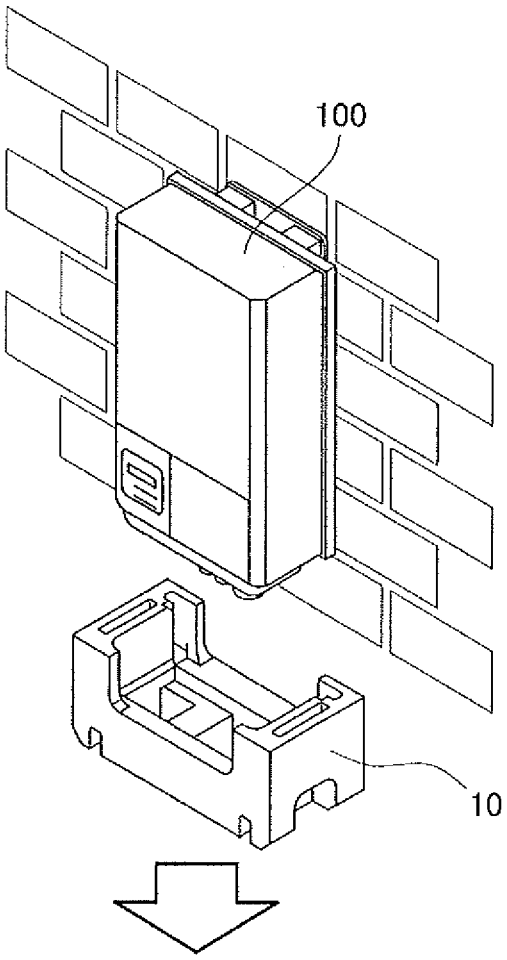


Fig. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/002813

A. CLASSIFICATION OF SUBJECT MATTER
B65D81/113(2006.01)i, *B65D5/12*(2006.01)i, *B65D5/50*(2006.01)i, *B65D85/68*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D81/113, B65D5/12, B65D5/50, B65D85/68, B65D77/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 9-58669 A (Kabushiki Kaisha Maruichi), 04 March 1997 (04.03.1997), claim 1; paragraphs [0013], [0019] to [0023]; fig. 1, 6 (Family: none)	1,2,5 4 3,6-9
Y	JP 2001-151266 A (Noritz Corp.), 05 June 2001 (05.06.2001), paragraph [0044]; fig. 6, 7 (Family: none)	4

☐ Further documents are listed in the continuation of Box C.

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Patent documents cited in the description

- JP 2008044668 A **[0002]**