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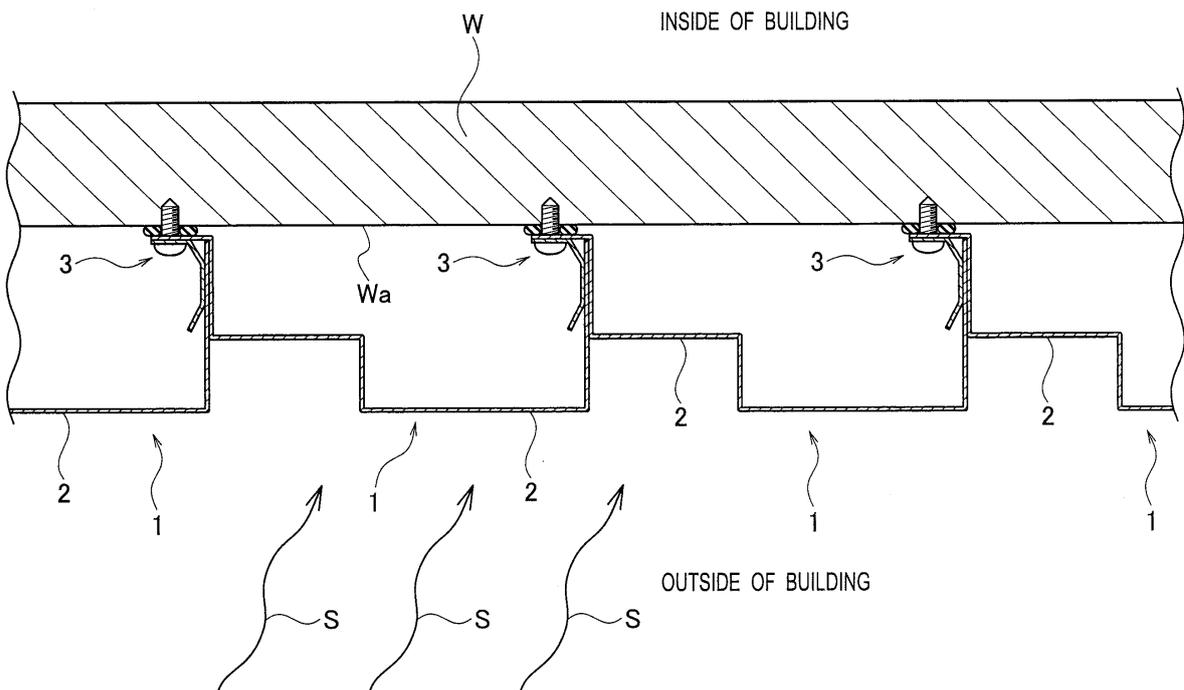
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(54) **EXTERIOR HEAT INSULATION COVER PANEL**

(57) An exterior heat insulation cover panel (1) includes a plate member (2) installed on an outer wall surface (Wa) of an exterior wall (W) of a building to form a heat insulation air layer (A) between the plate member

(2) and the outer wall surface (Wa), and a supporter (3) configured to support the plate member (2) on the outer wall surface (Wa) in a point contact manner.

FIG. 2



Description

Technical Field

[0001] The present invention relates to an exterior heat insulation cover panel attached to an exterior wall of a building for heat shielding and exterior heat insulation.

Background Art

[0002] During summer, the temperature of the surface of an exterior wall of a building rises extremely and sometimes reaches as high as 70°C. Such heat passes through the wall to a room and significantly deteriorates air conditioning's cooling performance. On the other hand, during winter, an exterior wall of a building is exposed to cold wind, snow, and cold rain and thereby cooled. Such a cooled wall absorbs the heat inside a room and dissipates the heat to the outside, thereby significantly deteriorating air conditioning's heating performance. Thus, changes in sunlight, wind, and rain outside a building have a large impact on the room temperature and significantly reduce air conditioning's heating and cooling performance. Consequently, a large amount of thermal energy is required, and wasteful use of petroleum oil and electricity is inevitable.

[0003] There have been some ideas to solve this problem such as spraying a heat insulation material onto an exterior wall and attaching a foamed heat insulation plate to an interior wall so as to alleviate the impact by changes in external environments. These methods, however, can produce only small effects because the impact received by the exterior wall from summer solar heat and winter wind, rain, and snow directly reaches the room space.

[0004] Moreover, there is also a method in which exterior work is done on a thick heat insulation material attached to an exterior wall. This method, however, requires a very high construction cost and is not frequently employed in general.

[0005] In the case of spraying a heat insulation material, careful surface preparation on the surface, or the coating surface, of the exterior wall needs to be done with the help of a skilled artisan. There is also a fear that the bonding surface may be deteriorated. Further, a large amount of work of a skilled artisan such as a plasterer is needed, and therefore the work cost tends to be high.

Citation List

Patent Literatures

[0006]

PTL 1: Japanese Unexamined Patent Application Publication No. 2005-232855

PTL 2: Japanese Unexamined Patent Application Publication No. 2010-53619

Summary of Invention

[0007] PTLs 1 and 2 propose solutions to the above problems. PTL 1 describes an example of using a two-layered cover panel with furring pieces. However, not only is the panel itself very expensive, but each furring piece is large and heat is easily dissipated from the wall through it.

[0008] PTL 2 involves forming a metal cover panel along which air can easily flow. However, the panel is partly in contact with an exterior wall of a building over the entire length, and therefore the area of contact with the exterior wall is large. This structure directly transfers the temperature of the surface of the cover panel to the exterior wall of the building, which greatly lowers the heat insulation effect.

[0009] An object of the present invention is to provide an exterior heat insulation cover panel capable of greatly improving the exterior heat insulation performance of a building and capable of being installed easily at a low cost within a short work period.

[0010] An exterior heat insulation cover panel in accordance with an embodiment of the present invention includes a plate member installed on an outer wall surface of an exterior wall of a building to form a heat insulation air layer between the plate member and the outer wall surface, and a supporter configured to support the plate member on the outer wall surface in a point contact manner.

[0011] According to the embodiment of the present invention, the exterior heat insulation cover panel is supported on the outer wall surface of the building in a point support manner. In this way, it is possible to prevent mid-summer solar heat, midwinter wind, rain, and snow, etc. from having a direct impact on the exterior wall of the building. Accordingly, the heat shielding and exterior heat insulation performance of the building can be improved greatly. Moreover, the installing surface to which to attach the exterior heat insulation cover panel according to the embodiment of the present invention does not have to be an accurately finished surface. Thus, attaching the exterior heat insulation cover panel does not require surface preparation such as plastering involved in general exterior finishing work. Accordingly, the exterior heat insulation cover panel can be easily attached, the cost of the attachment work is inexpensive, and the work period can be shortened as well. Further, the exterior heat insulation cover panel according to the embodiment of the present invention can be attached directly to a wall surface on which conventional finishing work such for example as tiling has been done, and can therefore be applied to buildings already constructed. Thus, the exterior heat insulation cover panel has a wide range of application.

Brief Description of Drawings

[0012]

Fig. 1 is a perspective view of a set of exterior heat insulation cover panels according to a first embodiment of the present invention attached to a building exterior wall.

Fig. 2 is a cross-sectional view of the exterior heat insulation cover panels according to the first embodiment of the present invention attached to the building exterior wall.

Fig. 3 is an explanatory view for describing a method of attaching the exterior heat insulation cover panels according to the first embodiment of the present invention to the building exterior wall.

Fig. 4 is a cross-sectional view of a set of exterior heat insulation cover panels according to a second embodiment of the present invention attached to the building exterior wall.

Fig. 5 is a cross-sectional view of a set of exterior heat insulation cover panels according to a third embodiment of the present invention attached to the building exterior wall.

Fig. 6 is a cross-sectional view of a set of exterior heat insulation cover panels according to a fourth embodiment of the present invention attached to the building exterior wall.

Description of Embodiments

[0013] Hereinbelow, embodiments of the present invention will be described in detail with reference to the drawings.

First Embodiment

[0014] An exterior heat insulation cover panel 1 according to a first embodiment of the present invention will be described with reference to Figs. 1 to 3. Fig. 1 is a perspective view of a set of exterior heat insulation cover panels 1 attached to an outer wall surface Wa of a building exterior wall W made of concrete or wood. Fig. 2 is a cross-sectional view of the exterior heat insulation cover panels 1 attached to the outer wall surface Wa of the building exterior wall W. Fig. 3 is an explanatory view for describing a method of attaching the exterior heat insulation cover panels 1 to the building exterior wall Wa. Note that the up-down direction in Fig. 1 is the vertical direction, and Figs. 2 and 3 are horizontal cross sections.

[0015] As shown in Figs. 1 to 3, each exterior heat insulation cover panel 1 includes a plate member 2 and a supporter 3. The plate member 2 is a metal plate and has a substantially square U-shape. As shown in Fig. 3, the plate member 2 has: an outer surface portion 2a facing the outside of the building when the exterior heat insulation cover panel 1 is installed; side surface portions 2b, 2b bent and continues from opposite sides of the outer surface portion 2a; an attachment surface portion 2c further bent and continues from one of the side surface portions 2b; and a back surface portion 2d being the inner surface of the substantially square U-shape.

[0016] The attachment surface portion 2c is formed in such a way as to face the outer wall surface Wa substantially in parallel therewith when the exterior heat insulation cover panel 1 is installed. A through-hole through which to insert a below-described screw 3a is formed in the attachment surface portion 2c, and the supporter 3 is provided thereon. The plate member 2 receives heat S (including heat that lowers the temperature) of mid-summer sunlight, midwinter wind, rain, and snow, etc., mainly on the outer surface portion 2a and the side surface portions 2b.

[0017] The supporter 3 includes the screw 3a, a heat insulation member 3b such as a resin ring or a metal washer (a rubber packing in this embodiment), and a connecting fitting 3c. The heat insulation member 3b is arranged sandwiched between the attachment surface portion 2c and the outer wall surface Wa and suppresses heat transfer between the plate member 2 and the outer wall surface Wa. The screw 3a is fixed at one end in the outer wall surface Wa while inserted in the through-hole in the attachment surface portion 2c and an opening in the heat insulation member 3b. Note that the screw 3a may be a nail or a bolt. The connecting fitting 3c has a hole. The screw 3a is inserted in this hole, and the connecting fitting 3c is fixed with the screw 3a to the surface of the attachment surface portion 2c on the opposite side from the heat insulation member 3b. The supporter 3 is provided only at one spot on one plate member 2 in a plan view. The number of supporters 3 along the up-down (vertical) direction is figured out and set to any suitable number based on strength and the like necessary for the installation.

[0018] As shown in Fig. 3, to attach a second exterior heat insulation cover panel 1 next to an already installed first exterior heat insulation cover panel 1 side by side, the second exterior heat insulation cover panel 1 is moved in the direction of an arrow in the drawing to insert one of the side surface portions 2b of the second exterior heat insulation cover panel 1 between one of the side surface portions 2b and the connecting fitting 3c of the first exterior heat insulation cover panel

[0019] 1. As a result, the side surface portion 2b of the second exterior heat insulation cover panel 1 becomes biased by the elasticity of the connecting fitting 3c against the side surface portion 2b of the first exterior heat insulation cover panel 1. Thereby, the second exterior heat insulation cover panel 1 is connected to the first exterior heat insulation cover panel 1.

[0020] By the above-described configuration, the supporter 3 works such that one of the side surface portions 2b is fixed to the side surface portion 2b of the adjacent exterior heat insulation cover panel 1 and that the attachment surface portion 2c formed continuously from the other side surface portion 2b is fixed to the exterior wall W with the heat insulation member 3b therebetween. Thus, the plate member 2 is supported on the exterior wall W in a point contact manner. The contact mentioned here is point contact in a logical sense because although

the heat insulation member 3b is actually in surface contact, the area of the contact with the outer wall surface Wa is significantly smaller than the area of the plate member 2. Therefore, the exterior heat insulation cover panel 1 can be said to be attached to the exterior wall W in a point contact manner.

[0021] Multiple exterior heat insulation cover panels 1 each having the above-described configuration are installed side by side (in a vertical arrangement in this embodiment; a horizontal or oblique arrangement is possible as well) on the outer wall surface Wa of the building exterior wall W. In this case, the plate member 2 of each exterior heat insulation cover panel 1 is supported on the outer wall surface Wa of the building exterior wall W in the point contact manner by the supporter 3 while separated from the outer wall surface Wa of the building exterior wall W by a separation distance D (see Fig. 3). A heat insulation air layer A is formed between the plate member 2 and the outer wall surface Wa so that convecting air F (see Fig. 1) can flow therethrough. In this way, it is possible to prevent heat S of midsummer sunlight, midwinter wind, rain, and snow, etc. from having a direct impact on the building exterior wall W.

[0022] Although the outer surface portion 2a of the plate member 2 is in a stepped shape in this embodiment, the present invention is not limited to this configuration. The outer surface portion 2a of the plate member 2 may be in a flat shape with no step. Moreover, although this embodiment has shown the example where the attachment surface portion 2c of the plate member 2 protrudes outward from its side surface portion 2b, the present invention is not limited to this example. The attachment surface portion 2c of the plate member 2 may be formed to protrude inward from its side surface portion 2b. In this case, the connecting fitting 3c should be arranged on the surface of the attachment surface portion 2c on the same side as the heat insulation member 3b, and sandwiched and fixed between the attachment surface portion 2c and the heat insulation member 3b. Moreover, although the supporter 3 is provided only at one spot on one plate member 2 in a plan view in this embodiment, the present invention is not limited to this configuration. The supporter 3 may be provided on both side surface portions 2b of the plate member 2. Furthermore, configurations other than the plate member 2 are not limited to this embodiment, and the configurations are only required to be capable of realizing point contact.

[0023] According to this embodiment, the exterior heat insulation cover panel 1 is point supported (point contact) on the building outer wall surface Wa, thus making it possible to prevent midsummer sunlight, midwinter wind, rain, and snow, etc. from having a direct impact on the building exterior wall W. Accordingly, the heat shielding and exterior heat insulation performance of the building can be improved greatly. For example, room cooling and heating effect can be improved.

[0024] According to this embodiment, the installing surface (outer wall surface Wa) to which to attach the

exterior heat insulation cover panel 1 does not have to be an accurately finished surface. Thus, attaching the exterior heat insulation cover panel 1 does not require surface preparation such as plastering involved in general exterior finishing work. Accordingly, the exterior heat insulation cover panel 1 can be easily attached to its installing surface, the cost of the attachment work is inexpensive, and the work period can be shortened as well.

[0025] According to this embodiment, the exterior heat insulation cover panel 1 can be attached directly to an outer wall surface Wa on which conventional finishing work such for example as tiling has been done, and can therefore be applied to buildings already constructed. Thus, the exterior heat insulation cover panel 1 has a very wide range of application.

Second Embodiment

[0026] An exterior heat insulation cover panel 1A according to a second embodiment of the present invention will be described with reference to Fig. 4. Configurations similar to those in the first embodiment will be denoted by the same reference numerals, and description thereof will be omitted. Fig. 4 is a cross-sectional view of a set of exterior heat insulation cover panels 1A according to the second embodiment attached to the outer wall surface Wa of the building exterior wall W. The exterior heat insulation cover panel 1A differs from the exterior heat insulation cover panel 1 of the first embodiment only in that the exterior heat insulation cover panel 1A includes a heat insulation material 10. Besides this, they are the same.

[0027] As shown in Fig. 4, the exterior heat insulation cover panel 1A includes the heat insulation material 10 which is brought into contact with and attached to the outer wall surface Wa before the plate member 2 is attached to the exterior wall W. As shown in Fig. 4, the heat insulation material 10 is provided in such a way as to cover the entire outer wall surface Wa to which the plate member 2 and the supporter 3 are not attached. The heat insulation material 10 is produced into a given shape in a factory, for example.

[0028] According to this embodiment, advantageous effects similar to those by the first embodiment can be achieved. At the same time, since including the heat insulation material 10 to be attached to the outer wall surface Wa, the exterior heat insulation cover panel 1A can more greatly improve the heat shielding and exterior heat insulation performance of the building.

Third Embodiment

[0029] An exterior heat insulation cover panel 1B according to a third embodiment of the present invention will be described with reference to Fig. 5. Configurations similar to those in the first embodiment will be denoted by the same reference numerals, and description thereof will be omitted. Fig. 5 is a cross-sectional view of a set

of exterior heat insulation cover panels 1B according to the third embodiment attached to the outer wall surface Wa of the building exterior wall W. The exterior heat insulation cover panel 1B differs from the exterior heat insulation cover panel 1 of the first embodiment only in that the exterior heat insulation cover panel 1B includes a heat insulation material 11. Besides this, they are the same.

[0030] As shown in Fig. 5, the exterior heat insulation cover panel 1B includes the heat insulation material 11 which is brought into contact with and attached to the back surface portion 2d of the plate member 2 before the plate member 2 is attached to the exterior wall W. As shown in Fig. 5, the heat insulation material 11 is provided in such a way as to cover almost the entire surface of the back surface portion 2d of the plate member 2. The heat insulation material 11 is produced into a given shape in a factory, for example. The heat insulation material 11 may be attached to the plate member 2 in advance at the factory or in situ.

[0031] According to this embodiment, advantageous effects similar to those by the first embodiment can be achieved. At the same time, since including the heat insulation material 11 to be attached to the back surface portion 2d of the plate member 2, the exterior heat insulation cover panel 1B can more greatly improve the heat shielding and exterior heat insulation performance of the building.

Fourth Embodiment

[0032] An exterior heat insulation cover panel 1C according to a fourth embodiment of the present invention will be described with reference to Fig. 6. Configurations similar to those in the first embodiment will be denoted by the same reference numerals, and description thereof will be omitted. Fig. 6 is a cross-sectional view of a set of exterior heat insulation cover panels 1C according to the fourth embodiment attached to the outer wall surface Wa of the building exterior wall W. The exterior heat insulation cover panel 1C differs from the exterior heat insulation cover panel 1 of the first embodiment only in that the exterior heat insulation cover panel 1C includes a heat insulation material 12. Besides this, they are the same.

[0033] As shown in Fig. 6, the exterior heat insulation cover panel 1C includes the heat insulation material 12 which is adhered to the back surface portion 2d of the plate member 2 and the outer wall surface Wa after the plate member 2 is attached to the exterior wall W. As shown in Fig. 6, the heat insulation material 12 is adhered in such a way as to cover the entire surface of the back surface portion 2d of the plate member 2 and the entire outer wall surface Wa. The heat insulation material 12 is a foamed in-situ heat insulation material, for example.

[0034] According to this embodiment, advantageous effects similar to those by the first embodiment can be achieved. At the same time, since including the heat in-

ulation material 12 to be adhered to the entire surface of the back surface portion 2d of the plate member 2 and the entire outer wall surface Wa, the exterior heat insulation cover panel 1B can more greatly improve the heat shielding and exterior heat insulation performance of the building.

[0035] Although embodiments of the present invention have been described hereinabove, the present invention is not limited to the above embodiments but various modifications are possible.

[0036] The entire content of Japanese Patent Application No. 2011-191671 (filed date: September 2, 2011) is incorporated herein.

Claims

1. An exterior heat insulation cover panel, comprising:
 - a plate member installed on an outer wall surface of an exterior wall of a building to form a heat insulation air layer between the plate member and the outer wall surface; and
 - a supporter configured to support the plate member on the outer wall surface in a point contact manner.
2. The exterior heat insulation cover panel according to claim 1, wherein the supporter includes a heat insulation member disposed between the plate member and the outer wall surface and configured to suppress heat transfer between the plate member and the exterior wall.
3. The exterior heat insulation cover panel according to claim 1 or 2, wherein the supporter includes one of a screw or a nail to be fixed at one end to the exterior wall.
4. The exterior heat insulation cover panel according to claim 1, wherein the supporter includes:
 - a heat insulation member having a ring-shape and made of resin, the heat insulation member being sandwiched between the plate member and the outer wall surface and configured to suppress heat transfer between the plate member and the exterior wall; and
 - one of a screw or a nail to be fixed at one end to the exterior wall while being inserted in an opening of the heat insulation member.
5. The exterior heat insulation cover panel according to claim 1, wherein the plate member includes an attachment surface portion facing the outer wall surface and having a through-hole, and wherein the supporter includes

- a heat insulation member having a ring-shape and made of resin, the heat insulation member being sandwiched between the attachment surface portion and the outer wall surface and configured to suppress heat transfer between the plate member and the exterior wall, and 5
- one of a screw or a nail to be fixed at one end to the exterior wall while being inserted in the through-hole of the attachment surface portion and an opening of the heat insulation member. 10
- 6.** The exterior heat insulation cover panel according to any one of claims 1 to 5, wherein the supporter is provided on only one of opposite side surface portions of the plate member. 15
- 7.** The exterior heat insulation cover panel according to any one of claims 1 to 6, wherein a plurality of the plate members are disposed side by side, and 20
- wherein the supporter includes a connecting fitting configured to, with a side surface portion of a first plate member of the plate members, elastically clamp a side surface portion of a second plate member of the plate members disposed adjacent to the first plate member, to connect the second plate member to the first plate member. 25
- 8.** The exterior heat insulation cover panel according to any one of claims 1 to 7, further comprising a heat insulation material disposed between the plate member and the outer wall surface. 30
- 9.** The exterior heat insulation cover panel according to claim 8, wherein the heat insulation material is provided in contact with the outer wall surface to cover the outer wall surface. 35
- 10.** The exterior heat insulation cover panel according to claim 8, wherein the heat insulation material is provided in contact with the plate member to cover a surface of the plate member at a side of the outer wall surface. 40
- 11.** The exterior heat insulation cover panel according to claim 8, wherein the heat insulation material is adhered to the outer wall surface and the plate member to cover the outer wall surface and a surface of the plate member at a side of the outer wall surface. 45
- 12.** The exterior heat insulation cover panel according to claim 11, wherein the heat insulation material is a foamed in-situ heat insulation material. 50

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FIG. 1

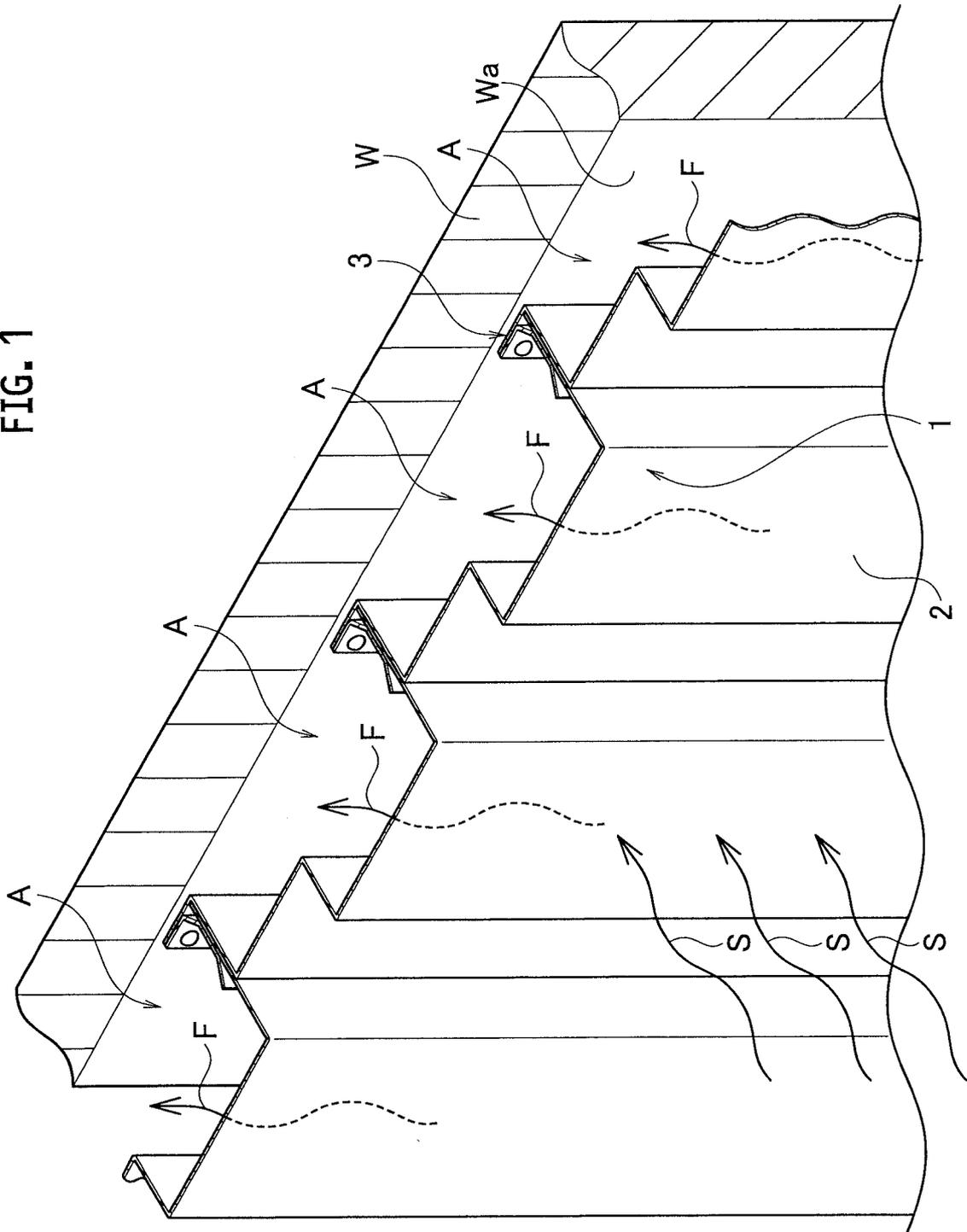
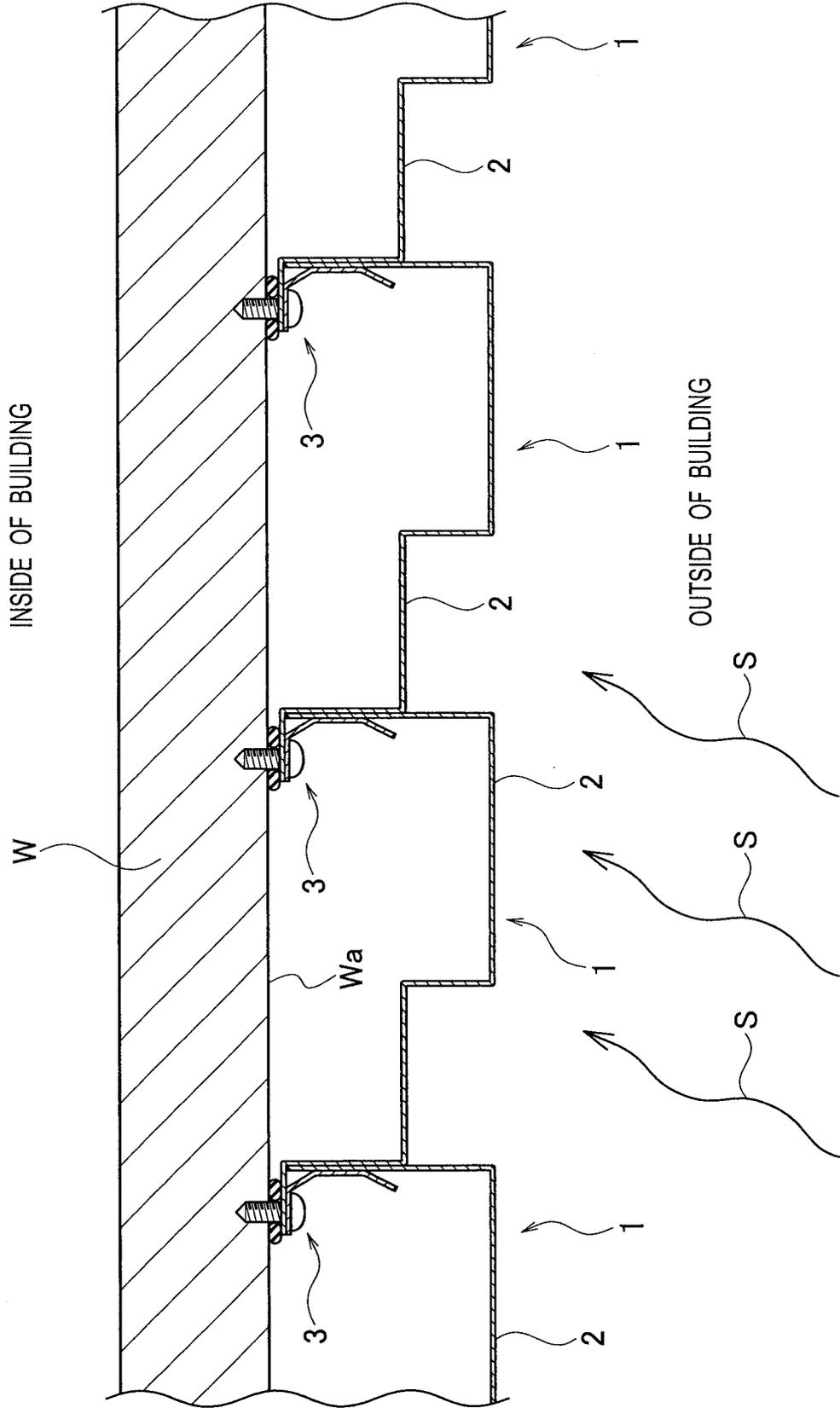


FIG. 2



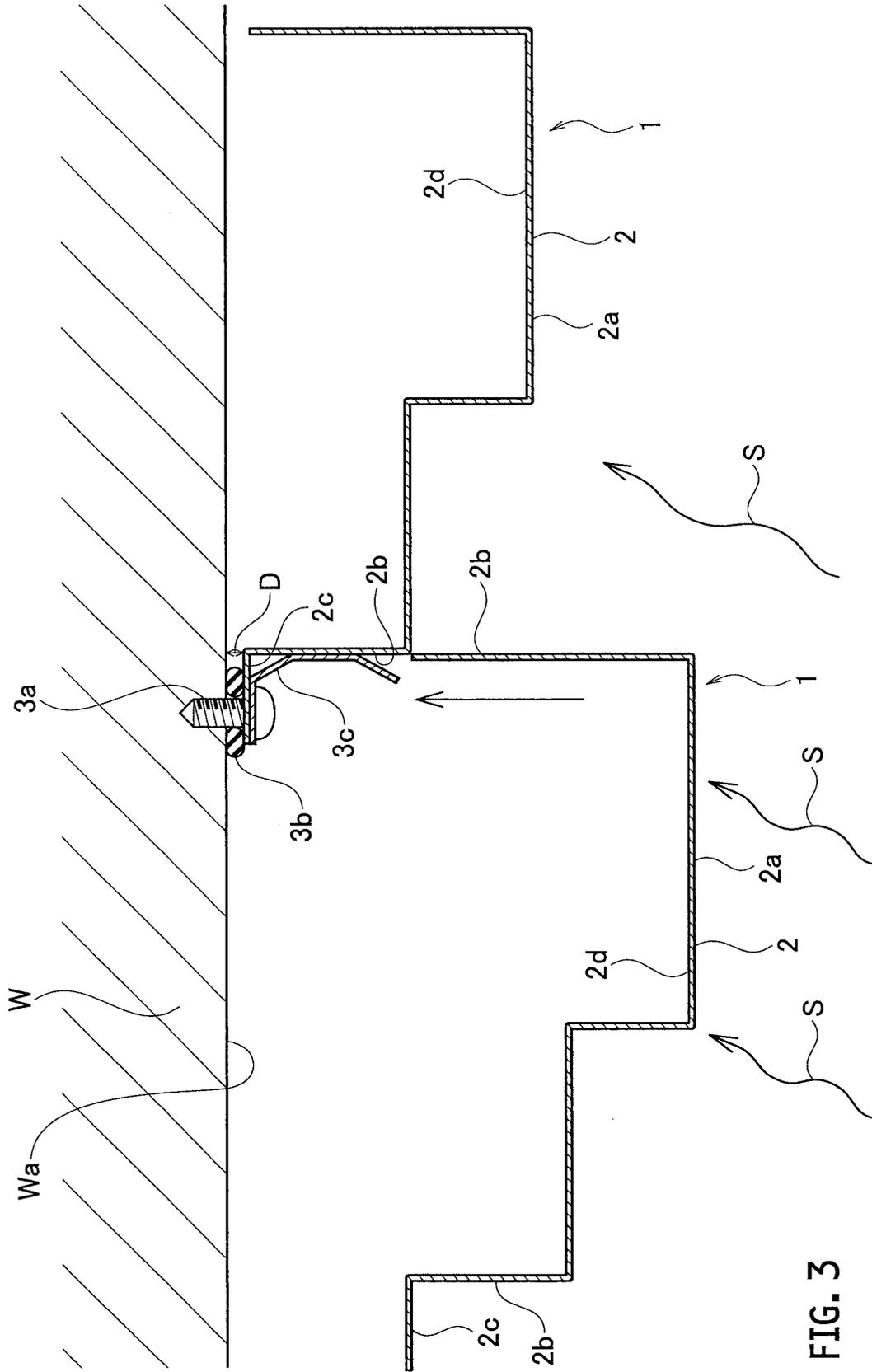


FIG. 3

FIG. 4

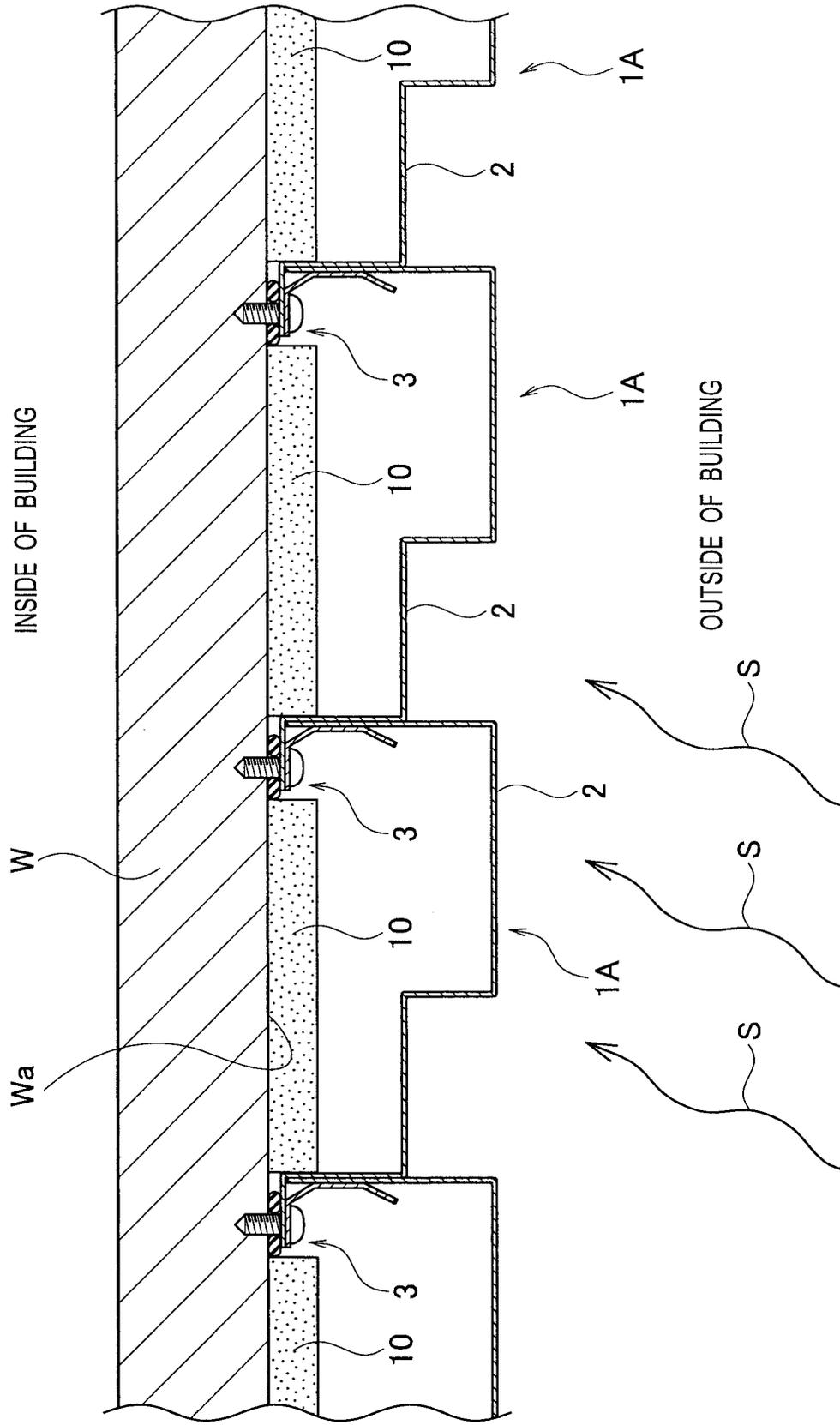


FIG. 5

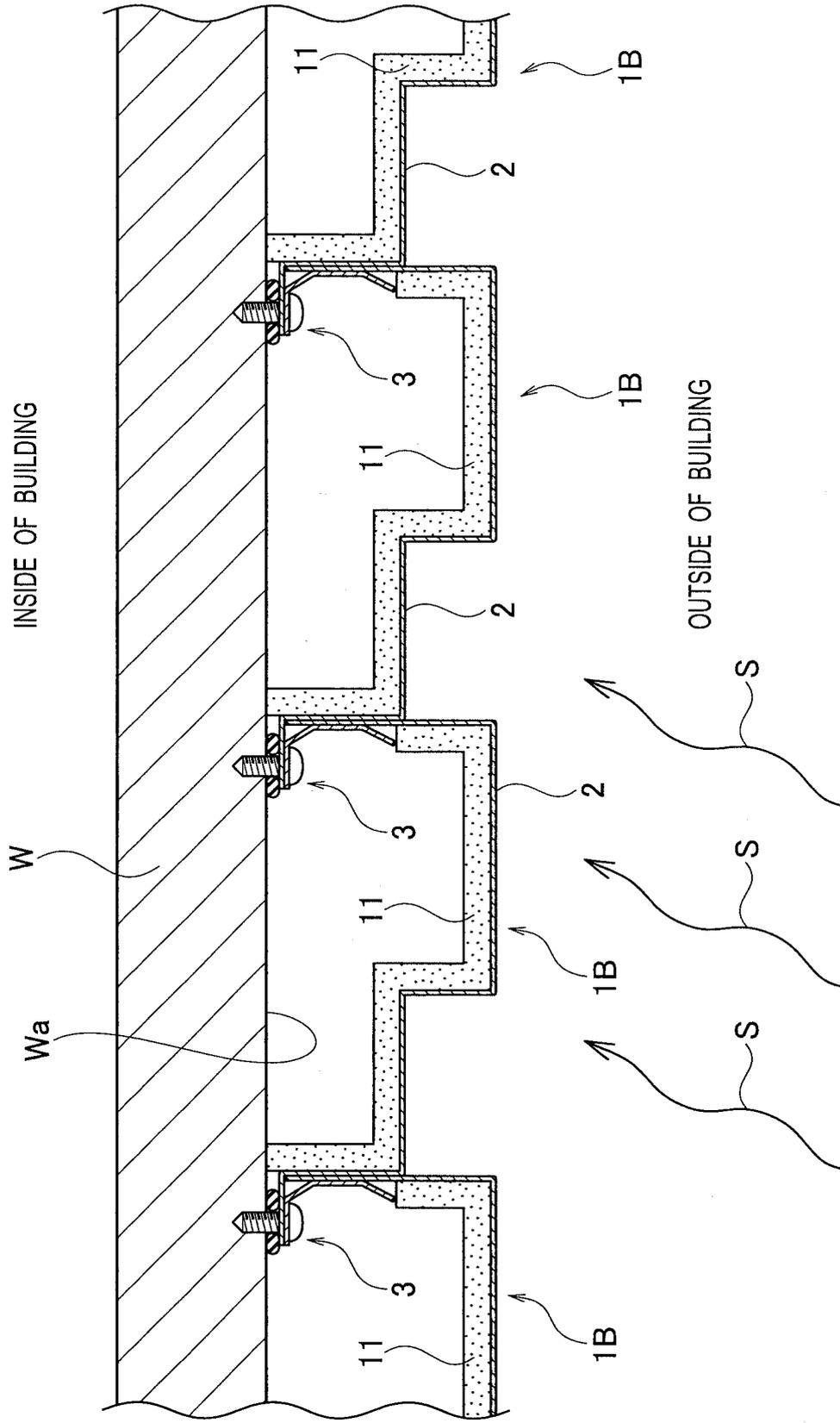
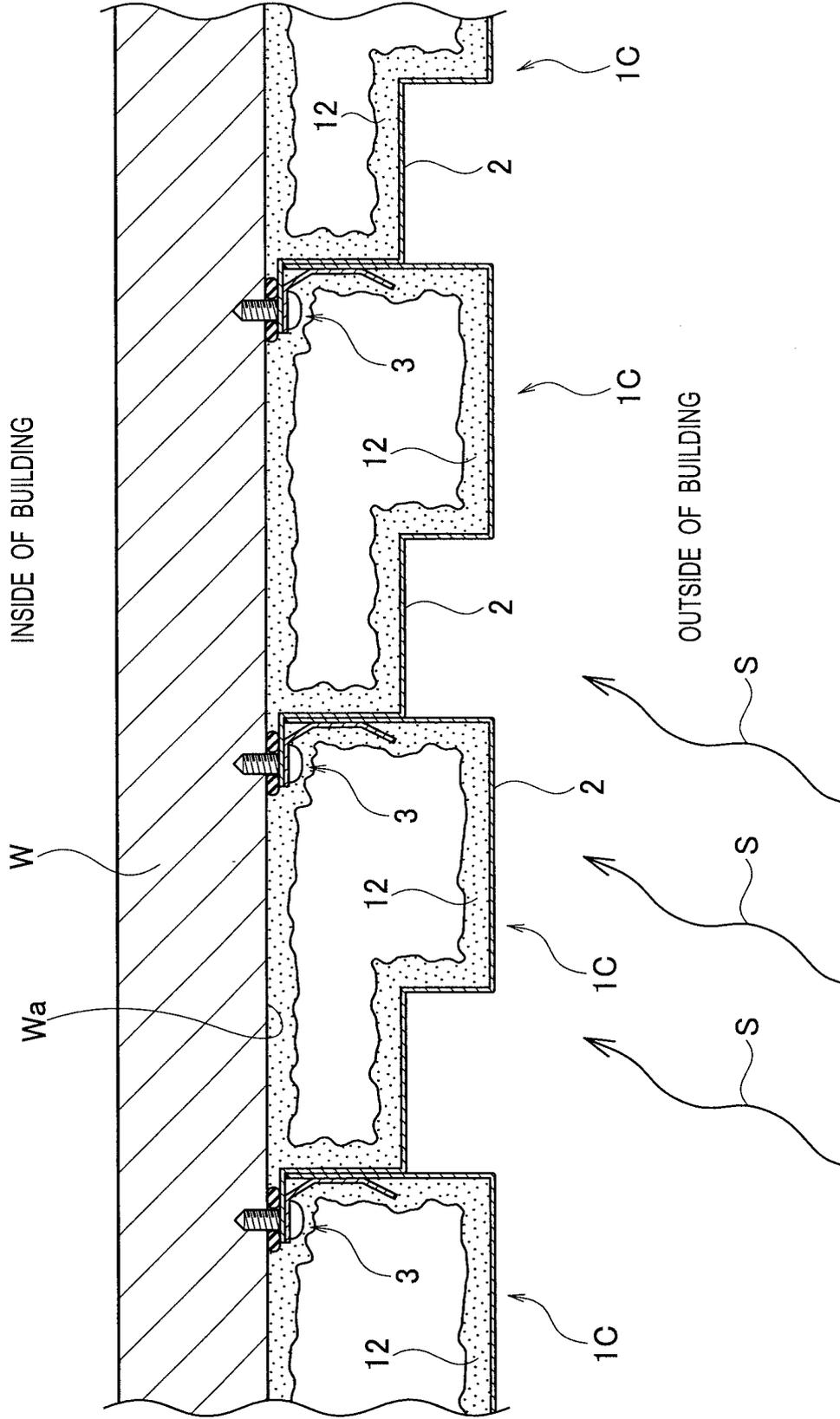


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/071691

5	A. CLASSIFICATION OF SUBJECT MATTER E04F13/21(2006.01) i, E04F13/12(2006.01) i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
10	B. FIELDS SEARCHED	
	Minimum documentation searched (classification system followed by classification symbols) E04F13/21, E04F13/12	
15	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)	
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
	Category*	Citation of document, with indication, where appropriate, of the relevant passages
25	Y	JP 2538292 Y2 (Toho Sheet & Frame Co., Ltd.), 11 June 1997 (11.06.1997), page 2, column 4, lines 8 to 37; fig. 3 (Family: none)
30	Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 10597/1983 (Laid-open No. 117752/1984) (Nippon Light Metal Co., Ltd.), 08 August 1984 (08.08.1984), specification, page 4, line 9 to page 5, line 12; fig. 3 (Family: none)
35		Relevant to claim No. 1-12 1-12
40	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.	
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
50	Date of the actual completion of the international search 13 November, 2012 (13.11.12)	Date of mailing of the international search report 20 November, 2012 (20.11.12)
55	Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
	Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/071691

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 8-54013 A (Taihei Corp.), 27 February 1996 (27.02.1996), claim 1; paragraph [0001] (Family: none)	4-12
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 97761/1981 (Laid-open No. 3504/1983) (Matsushita Electric Works, Ltd.), 11 January 1983 (11.01.1983), specification, page 2, line 19 to page 5, line 14; fig. 3(a) (Family: none)	7-12
Y	JP 7-11717 A (IG-Technical Research Inc.), 13 January 1995 (13.01.1995), paragraphs [0004], [0014] to [0019]; fig. 1 (Family: none)	9,11,12
A	JP 61-33780 Y2 (Matsushita Electric Works, Ltd.), 02 October 1986 (02.10.1986), page 1, column 1, line 23 to page 2, column 3, line 1; fig. 1, 2 (Family: none)	1-12

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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- JP 2010053619 A [0006]
- JP 2011191671 A [0036]