United States Patent [19]

Kato

[11] **3,919,818**

[45] **Nov. 18, 1975**

[54] **JOINT STRUCTURE FOR PANELS IN PREFABRICATED HOUSING**

[75] Inventor: **Yoshiya Kato,** Hachioji, Japan

[73] Assignee: **Misawa Homes Institute of Research & Development,** Tokyo, Japan

[22] Filed: **May 21, 1974**

[21] Appl. No.: **471,843**

[30] **Foreign Application Priority Data**

May 24, 1973 Japan 48-60959
May 24, 1973 Japan 48-60960

[52] **U.S. Cl.** **52/220;** 52/270; 52/285
[51] **Int. Cl.²** **E04B 5/48;** E04F 17/00
[58] **Field of Search** 52/270, 272, 279, 280, 52/220, 221, 285

[56] **References Cited**

UNITED STATES PATENTS

2,187,408	1/1940	Thumm	52/220
2,664,740	1/1954	Cochrane	52/285 X
3,093,218	6/1963	Peterson	52/220 X
3,462,897	8/1969	Weinrott	52/285

Primary Examiner—J. Karl Bell

[57] **ABSTRACT**

A joint structure for panels in prefabricated housing comprises vertical side frames provided at the adjacent lateral ends of two or three panels and having a complementary shape to each other so that the panels are joined into an L or T form, and channeled communicating sections provided in the vertical side frame of one of the panels which define connecting chambers in cooperation with the vertical side frames of the other panels. Pipes for electric wires in the panels are open at the vertical side frames to the connecting chambers, thereby eliminating the necessity of the provision of any additional components or parts for the communication between the pipes in the different panels.

5 Claims, 6 Drawing Figures

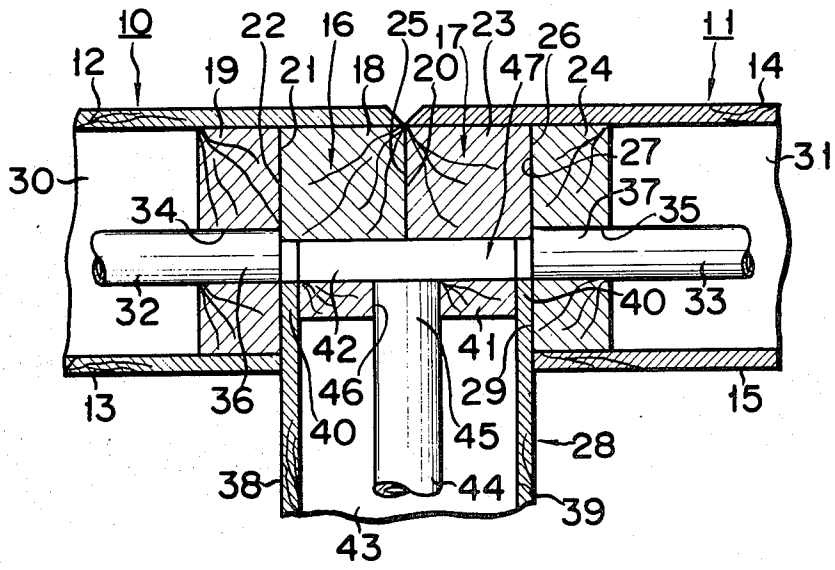


FIG. 1

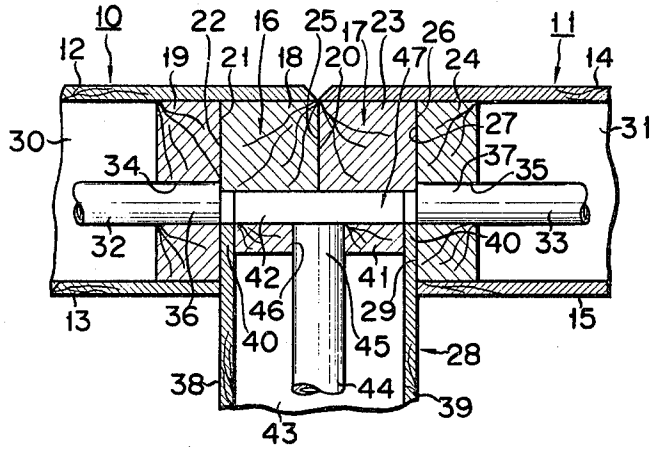


FIG. 2

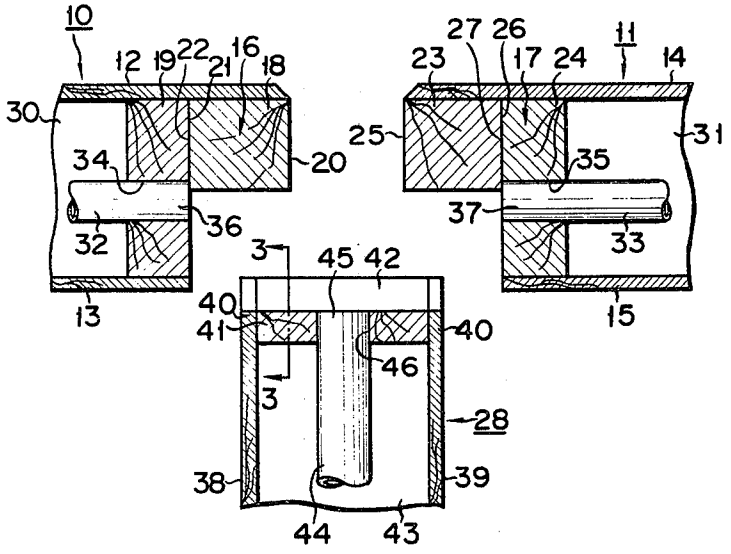


FIG. 3

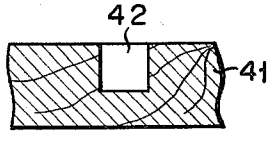


FIG. 4

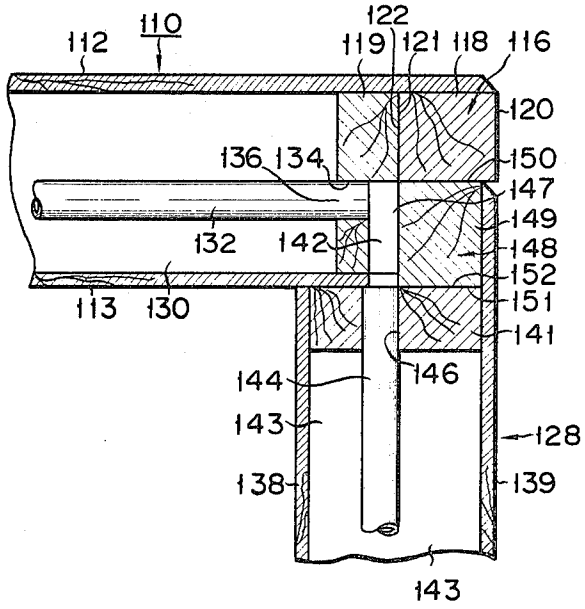


FIG. 5

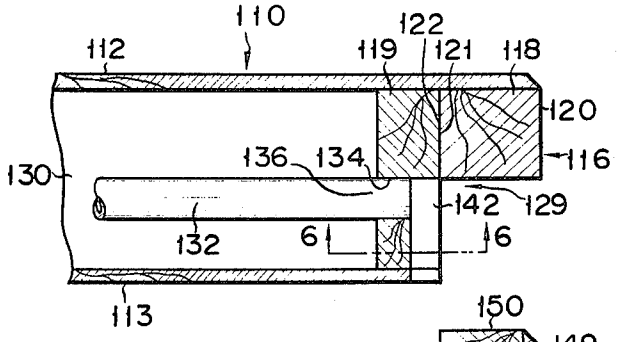
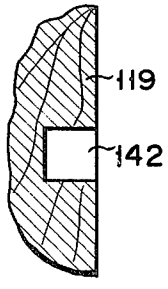
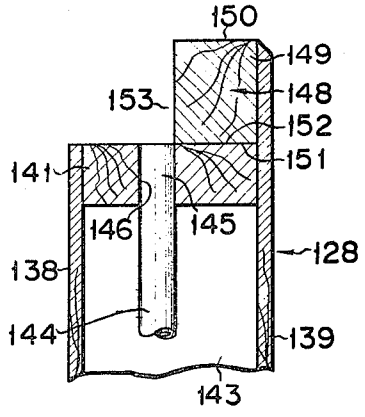


FIG. 6





JOINT STRUCTURE FOR PANELS IN PREFABRICATED HOUSING

This invention relates to a joint structure for panels in prefabricated housing, and more particularly to a joint structure for joining panels in an L or T shape and for causing wire pipes in one of the panels to communicate with wire pipes in the other panels.

It is well known that with the increasing demand for houses which can be constructed simply and rapidly, prefabricated houses using panels have been most widely used in recent years. To build a prefabricated house in a shorter time and at a lower cost, it has been required that wires for electric lights, telephones, televisions, power supplies, etc. be arranged with ease in panels during the assembly of the panels.

In the known prefabricated housing, wall panels and floor panels each comprise a frame work and a pair of plates fixed to both lateral sides of the frame work. If pipes admitting electric wires therein are previously mounted in the space defined between the paired plates, a considerable amount of labor cost for wire arrangement will be saved.

However, the prior art prefabricated house has the following drawbacks. First, despite such built-in pipes, additional connection parts, such as pipe joints, must be used to connect between the pipes corresponding to the joined wall or floor panels. It is labor-consuming to build these parts in the wall or floor panels. Secondly, when the electric wires in the pipes of the adjacent panels are not required to be connected, the connection parts therebetween, if they are built in the panels during their manufacture, become useless, resulting in a waste of built-in cost.

Accordingly, an object of this invention is to provide a joint structure for joining the adjacent wall panels to each other, or wall panels or a wall panel to a floor panel, and connecting between wiring pipes in the adjacent panels without using any additional connection parts in the construction site.

According to this invention, there is provided a joint structure for panels in prefabricated housing comprising vertical side frames provided at adjacent lateral ends of panels with wiring pipes housed therein, said side frames having a complementary shape to each other so as to be joined into an L or T shape, channeled communicating sections formed in the vertical side frame of at least one of the panels, and connecting chambers defined by the communicating sections and the vertical side frame of the other panel, thereby enabling the pipes in the adjacent panels to communicate with each other through the connecting chambers.

This invention will be described by way of example with reference to the accompanying drawings.

FIG. 1 shows a plan view of an embodiment of the joint structure of panels in prefabricated housing according to this invention;

FIG. 2 is an exploded view of FIG. 1;

FIG. 3 is a sectional view on line 3—3 of FIG. 2;

FIG. 4 is a plan view of another embodiment of the joint structure according to this invention;

FIG. 5 is an exploded view of FIG. 4; and

FIG. 6 is a sectional view on line 6-6 of FIG. 5.

Referring now FIGS. 1 and 2, wall panels 10, 11 stand upright so as to be flush with a floor (not shown), and comprise plates 12, 13; 14, 15 and vertical side frames 16, 17 interposed between these pairs of plates 12, 13; 14, 15 and situated on the adjacent sides of the wall panels 10, 11.

In FIGS. 1 and 2, the vertical side frame 16 comprises a columnar joint member 18 and a columnar frame member 19. The joint member 18 has a thickness equal to a substantially half of a space 30 between the plates 12, 13 and its surface facing the plate 12 is fixed to the inner surface of the plate 12 and the right side 20 defines the right side end of the wall panel 10. The frame member 19 has the same thickness as the space 30 between the plates 12 and 13, and its sides facing the plates 12, 13 are respectively fixed to the inner surfaces of the plates 12, 13. Substantially that half portion of the right side 21 of the frame member 19 which is adjacent to the plate 12 is fixed to the left side 22 of the joint member 18. As shown in FIGS. 1 and 2, the vertical side frame 16 is L-shaped in cross section by the joint member 18 and the frame member 19.

The vertical side frame 17 within the right-hand wall panel 11 is symmetrical with the vertical side frame 16 within the left-hand wall panel 10, and comprises a joint member 23 with its surface facing the plate 14 fixed to the inner surface of the plate 14 and a frame member 24 with its surfaces facing the plates 14, 15 fixed to the inner surfaces of the plates 14, 15, respectively. The joint member 23 has the same thickness as the joint member 18 of the left-hand wall panel 10; and the left side thereof 25 defines the left side end of the wall panel 11. The right side 26 of the joint member 23 is fixed to the left side 27 of the frame member 24. The distance between the left side 22 of the joint member 18 and the right side 26 of the joint member 23 is equal to the width of a wall panel 28 standing upright on the floor perpendicular to the wall panels 10, 11. As shown in FIG. 1, the vertical side frames 16, 17, that is, the insides of the joint members 18, 23, the right side 21 of the frame member 19, and the left side 27 of the frame member 24 define a recess or engagement section 29 square in cross section.

Pipes 32, 33 for admitting wires for electric lights, television, and electric power supply, etc. are respectively arranged in the space 30 between the plates 12 and 13 and in a space 31 between the plates 14 and 15, and the mutually opposing ends 36, 37 of these pipes 32, 33 are respectively inserted into through holes 34, 35 perforated in the frame members 19, 24.

The wall panel 28 comprises a pair of parallel plates 38, 39 spaced from each other and a vertical side frame 41 disposed at one side end 40 of the wall panel 28 facing the wall panels 10, 11 with its opposed sides fixed to the inner walls of the plates 38, 39. A horizontal groove or a channeled communicating section 42 is formed so as to be open to the outside (upwardly in FIGS. 1 and 2) across the frame 41 and the plates 38, 39 (see FIG. 3). With one end 45 inserted in a through hole 46 perforated in the side frame 41, a pipe or pipes 44 for admitting electric wires (hereinafter referred to as "a wiring pipe or wiring pipes") are arranged in a space 43 defined between the plates 38, 39 so as to be open to the horizontal groove 42.

Referring to FIG. 1, a connecting chamber 47 for the mutual communication of the pipes 32, 33 is defined by the joint members 18, 23 and the horizontal groove 42 when the end 40 of the wall panel 28 is inserted into the recess 29. In this panel arrangement, unlike the conventional one, the electric wires can be arranged in the adjacent panels so as to extend from one panel to the other without using any additional connecting parts.

With the single exception of the groove **42**, the end **40** of the wall panel **28** has a complementary shape to the recess **29** formed at the mutually opposing ends of the wall panels **10, 11**, so that these end portions, when fixedly attached to each other, form a T-joint for fixedly holding the wall panels **10, 11, 28.** Even if the electric wires do not pass through the connecting chamber **42**, the joint end portions of the wall panels **10, 11, 28** can act as a T-joint, thus outweighing the disadvantages which the unavailability of the chamber **42** entails.

FIGS. **4** through **6** show another embodiment of the joint structure according to this invention, wherein a wall panel **110** comprises a pair of parallel spaced plates **112, 113** and a vertical side frame **116** forming one end side of the wall panel **110.**

The vertical side frame **116** comprises a joint member **118** and a frame member **119.** With reference to FIGS. **4** and **5**, the joint member **118** has a thickness equal to a substantially half of the spacing between the plates **112** and **113**; the side facing the plate **112** is fixed to the inner surface of the plate **112**; and the outside, that is, the right side **120** (in FIGS. **4** and **5**) defines the right side end of the wall panel **112.**

In the frame member **119**, the sides facing these plates **112, 113** are respectively fixed to the inner surfaces of the plates **112, 113**; and the outside thereof, that is, the right side **121** in FIGS. **4** and **5** is fixed to the opposite side to the side **120** of the joint member **118**, that is, the left side **122** thereof. With the vertical side frame **116** so constructed, the frame **116**, like the vertical side frame **16** of the wall panel **10** in FIGS. **1** and **2**, has an L shape in cross section, and an open space or an engagement section **129** is defined by the joint member **118** and the frame member **119.**

In FIGS. **4** and **5** is shown a groove or communicating section **142** having a square cross section (see FIG. **6**), extending substantially to the middle of the frame member **119** across the right end of the plate **113** and opening to the outside of the wall panel **110**, as is apparent from FIGS. **5** and **6.** In the frame member **119** is perforated a through hole **134** which causes the groove **142** to communicate with a space **130** between the plates **112** and **113** and into which one end portion **136** of a wiring pipe or pipes **132** arranged in the space **130** is inserted to communicate between the pipe or pipes and the groove **142.**

A wall panel **128** having a similar construction to the wall panel **110** is disposed perpendicular to the wall panel **110**; the wall panel **128** comprises a pair of parallel spaced plates **138, 139** and a vertical side frame **148**, L-shaped in cross section, disposed at lateral side end of the wall panel **128** facing the wall panel **110.** The vertical side frame **148** comprises a joint member **149** and a frame member **141.** The joint member **149** has a complementary shape to a space **129** of the wall panel **110.** The right side thereof (in FIGS. **4** and **5**) is fixed to the inner surface of the plate **139**, and the side **150** opposed to the wall panel **110** forms the end surface of the wall panel **110.** The frame member **141** has the sides adjacent to the inner surfaces of the plates **138, 139** respectively fixed to these inner surfaces and the sides **152** opposite to the side **150** connected to the inner side **151** of the joint member **149.** The joint member **149** and the frame member **141** define an open space or engagement section **153** having a complementary shape to the vertical side frame **116.**

In the frame member **141** is perforated a through hole **146** so as to cause the open space **153** to communicate with a space **143** defined between the plates **138, 139.** Into the hole **146**, an end or ends **145** of a wiring pipe or pipes **144** extending between the plates **138, 139** are inserted so as to communicate with the space **153** (FIG. **5**).

As shown in FIG. **4**, a connecting chamber **147** is defined by the joint member **149** and groove **142** when the joint member **149** is put into an open space **129** (FIG. **5**) of the wall panel **110.** Through the connecting chamber **147**, the pipes **132, 144** are made to communicate with each other. Thus it is very easy to arrange the electric wires so as to extend from one wall panel to the adjacent one.

Note that the firm connection between the vertical side frames **116** and **148** of the wall panels **110, 128** provides a joint for holding the wall panels **110, 128** in a perpendicular relation with each other. It will be understood that this embodiment has the same advantages as those of the embodiment shown in FIGS. **1** through **3.**

Although the reference numerals **10, 11, 28, 110** and **128** represent wall panels in the above embodiments, numerals **10, 11** and **110** may be floor panels or ceiling panels and numerals **28** and **128** may be wall panels, and vice versa.

What is claimed is:

1. A joint structure for panels in prefabricated housing comprising:

a. at least one first vertical panel comprising a pair of vertical plates spaced in parallel with each other, vertical frame members having a rectangular cross section, disposed at respective side ends of the vertical plates and effecting connection between the vertical plates, horizontally extending pipes for electric wires disposed in the first wall panel and each having ends passing through the respective frame members, and columnar joint members each fixed to the outer surface of the corresponding frame member and the inner surface of one of the vertical plates and extending from the inner surface to the substantially central line of the corresponding frame member so as to form an L-shaped recess with the respective frame members;

b. at least one second vertical wall panel disposed perpendicular to the first vertical wall panel and comprising a pair of second vertical plates spaced in parallel with each other, at least one vertical side frame disposed at a side end thereof and effecting connection between the second vertical plates, said side frame having a shape complementary to said L-shaped recess between the corresponding joint member and frame member of the first vertical wall panel, horizontally extending pipes for electric wires each having an end passing through the vertical side frame at the central line thereof; and

c. horizontally extending notch-shaped connecting chambers formed in the side frame of the second wall panel and the frame member of the first wall panel adjacent thereto for communication between the pipes of the first and second wall panels at the same level.

2. A joint structure according to claim **1**, wherein said connecting chambers are provided in the side frame of the second wall panel.

3. A joint structure according to claim 1, wherein said connecting chambers are provided in the frame members of the first wall panel.

4. A joint structure for panels in prefabricated housing comprising:

a. a pair of first vertical wall panels arranged in alignment with each other and each comprising a pair of first vertical plates spaced in parallel with each other, a first vertical frame member having a rectangular cross section, effecting connection between the first vertical plates and disposed at that side end of the vertical plates which faces the adjacent first vertical wall panels, horizontally extending pipes for electric wires each having one end passing through the first vertical frame member, a first vertical columnar joint member fixed to the outer surface of the first vertical frame member and the inner surface of the vertical plate which is aligned with one of the vertical plates of the adjacent first vertical wall panel, extending from the inner surface to the substantially central line of the first vertical frame member and abutting against the first columnar joint member of the adjacent wall panel, said first vertical frame members and first vertical columnar joint members of both the first vertical wall panels defining a generally U-shaped recess;

b. a second vertical wall panel disposed perpendicular to the first vertical wall panels and comprising a pair of second vertical plates, a second vertical frame member having a rectangular cross section, effecting connection between the second vertical plates and disposed at that side end of the second vertical plates which is adjacent to the recess in the first vertical wall panels, said side end of the second vertical plates and the second vertical frame member defining that side end of the second vertical wall panel which is complementary to the recess, and horizontally extending pipes for electric wires each having one end passing through the respective frame members; and

c. horizontally extending notch-shaped connecting chambers provided in the second vertical frame member so as to cause the pipes of the first and second vertical wall panels at the same level to communicate with each other.

5. A joint structure for panels in prefabricated housing comprising:

a. a pair of vertical wall panels arranged perpendicular to each other with one of the side ends of one of the wall panels connected to one of the side ends of the other wall panel and each comprising

i. a pair of vertical plates spaced in parallel with each other,

ii. a vertical side frame disposed at said one of the side ends and comprising a vertical frame member having a rectangular cross section, disposed between said vertical plates for connection therebetween, and a columnar joint member fixed to the outer surface of the vertical frame member and the inner surface of the vertical plate so as to extend from the inner surface to the substantially central line of the vertical frame member, the adjacent sides of the vertical frame member and the columnar joint member defining an L-shaped recess, the columnar joint member of one of the wall panels having a complementary shape to the recess of the other wall panel so as to be received therein, and

iii. horizontally extending pipes for electric wires each having one end passing through the vertical frame member; and

b. horizontally extending notch-shaped connecting chambers provided in the vertical frame member of one of the vertical wall panels so as to cause the pipes of the vertical wall panels at the same level to communicate with each other.

* * * * *