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(71) Applicant: **TB Kikaku Co., Ltd.**
Sapporo-shi
Hokkaido 001-0908 (JP)

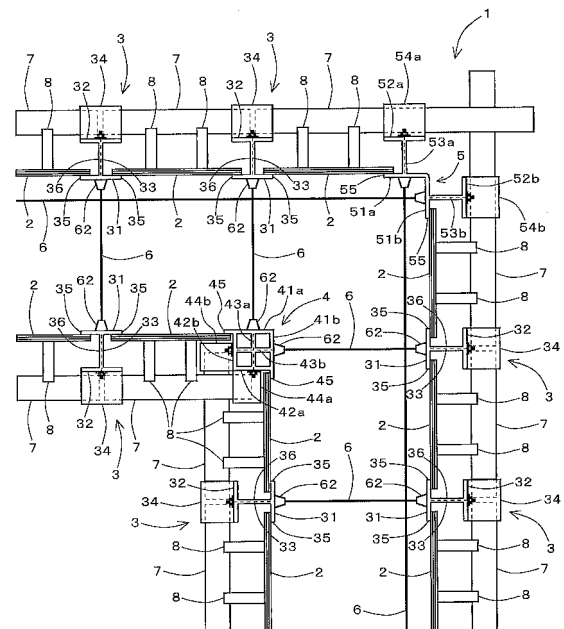
(72) Inventor: **KIYOTO, Kazuaki**
Ishikari-shi
Hokkaido 061-3202 (JP)

(74) Representative: **Prüfer & Partner GbR**
European Patent Attorneys
Sohnckestraße 12
81479 München (DE)

(54) **FORMS STRUCTURE, PANEL SUPPORT MATERIAL, PANEL SUPPORT MATERIAL FOR INTERNAL CORNER, PANEL SUPPORT MATERIAL FOR EXTERNAL CORNER AND CONSTRUCTION METHOD OF FORMS**

(57) A forms structure, a panel support member, a panel support member for internal corner, a panel support member for external corner, and a construction method of forms capable of realizing such features as enhancing safety in transportation work and assembling work through reduction in the number of components and compact unitization, eliminating lack of experience and shortening the assembling work by eliminating the fastening work by form tie or the boring work of a forms panel, preventing a crack in a concrete wall from expanding by narrowing the interval between induction joints, and concealing a P cone removing hole remaining due to the induction joint. The forms structure comprises forms panels 2 arranged oppositely, panel support members 3 which are erected on the opposite sides of the forms panel 2 in order to support the forms panel 2, a horizontal member 7 supported at the outer side face of the panel support member 3 while spaced apart by a predetermined distance from the forms panel 2, and a wedge member 8 inserted between the horizontal member 7 and the forms panel 2 and securing the forms panels 2 by pressing it against the panel support member 3.

[Figure 1]



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Description

Technical field

[0001] The present invention relates to a forms structure, a panel support member, a panel support member for internal corner, a panel support member for external corner and a construction method of forms suitable for use in constructing forms to cast concrete.

Background of the art

[0002] In conventional inventions, forms structures for casting concrete are proposed, as disclosed in e.g. Japanese Examined Utility Model (Registration) Application Publication No. 54-15946, mainly including form plates disposed oppositely, a separator which maintains an interval between the form plates, engaging members (P cones) disposed at both ends of the separator via a connecting shaft, form plate clamps (form ties) to be screwed into the connecting shaft, vertical battens which abut on an outer surface of each form plate, horizontal battens which abut on the vertical batten and a wedge to be hit into a hole of the form plate clamp to secure each batten (see Patent Document 1).

[0003] Patent Document 1: Japanese Examined Utility Model (Registration) Application Publication No. 54-15946

Disclosure of the invention

Problem to be solved

[0004] However, conventional forms structures, as in the invention described in Patent Document 1 and the like, involve vertically and horizontally disposing a combination of a plurality of long battens consisting of steel pipes, etc. and fastening them with a form tie to secure a form plate. Therefore, transportation of such many battens causes significant problems of enormous work and costs, as well as arduous on-site handling in a small construction site and even injuries to workers.

[0005] In addition, a form plate must normally be provided with a hole to be bored which penetrates one end of a separator, resulting in a long-time boring work and failure of a forms panel due to its decreased strength. Also, fastening work with a form tie usually requires technical experience and long construction duration, leading to insufficient number of skilled workers in construction sites and delay in construction schedule and higher construction costs.

[0006] It is also indicated that a completed concrete presents a removing hole, i.e. a mark of a washer by fastening the concrete with a P cone, leading to a poor appearance.

[0007] The concrete wall is provided with an induction joint at which crack is concentrated to prevent it from expanding. An induction joint formed within the boundary

between the form plates is made at a much longer interval from another induction joint according to conventional technical standards, which contribute to the generation of additional crack therebetween on the concrete wall.

[0008] To solve the aforementioned problems, it is, therefore, one object of the present invention to provide a forms structure, a panel support member, a panel support member for internal corner, a panel support member for external corner, and a construction method of forms capable of realizing such features as enhancing safety in transportation work and assembling work through reduction in the number of components and compact unitization, eliminating lack of experience and shortening the assembling work by eliminating the fastening work by form tie or the boring work of a forms panel, preventing a crack in a concrete wall from expanding by narrowing the interval between induction joints, and concealing a P cone removing hole remaining due to the induction joint.

Means for solving the problem

[0009] A forms structure according to the present invention comprising a forms panel disposed to intercept concrete, a panel support member erected on both sides of the forms panel in order to support the forms panel, a horizontal member supported at an outer side face of the panel support member at a plurality of upper and lower portions thereof while spaced apart by a predetermined distance from the forms panel, and a wedge member inserted between the horizontal member and said forms panel and securing the forms panel by pressing it against said panel support member.

[0010] A panel support member according to the present invention comprising a forms structure as set forth in Claim 1, furthermore comprising an inner wall surface part facing the inside of said forms structure, an outer wall surface part provided in substantially parallel with the inner wall surface part while spaced apart by a predetermined distance therefrom, a horizontal member supporting part provided at a plurality of upper and lower portions of the outer wall surface part to support one end of said horizontal member, and a panel holding part provided at both end side parts of said inner wall surface part to sandwich said forms panel with said wedge member.

[0011] A panel support member for internal corner according to the present invention mutually orthogonally supporting a forms panel disposed at an internal corner comprising a forms structure as set forth in Claim 1, furthermore comprising a first inner wall surface part and a second inner wall surface part mutually orthogonally connected at an internal corner of said forms structure to form a convex inner wall surface inside the forms structure, a first outer wall surface part provided in substantially parallel with said first inner wall surface part while spaced apart by a predetermined distance therefrom, a second outer wall surface part provided in substantially parallel with said second inner wall surface part while

spaced apart by a predetermined distance therefrom, a first horizontal member supporting part provided at a plurality of upper and lower portions of said first outer wall surface part to support one end of said horizontal member, a second horizontal member supporting part provided at a plurality of upper and lower portions of said second outer wall surface part to support one end of said horizontal member and a panel holding part provided at each outside end of said first inner wall surface part and said second inner wall surface part to sandwich said forms panel with said wedge member

[0012] Also, a panel support member for external corner according to the present invention mutually orthogonally supporting a forms panel disposed at an external corner comprising a forms structure as set forth in Claim 1, furthermore comprising a first inner wall surface part and a second inner wall surface part mutually orthogonally connected at an external corner of said forms structure to form a concave inner wall surface inside the forms structure, a first outer wall surface part provided in substantially parallel with said first inner wall surface part while spaced apart by a predetermined distance therefrom, a second outer wall surface part provided in substantially parallel with said second inner wall surface part while spaced apart by a predetermined distance therefrom, a first horizontal member supporting part provided at a plurality of upper and lower portions of said first outer wall surface part to support said horizontal member, a second horizontal member supporting part provided at a plurality of upper and lower portions of said second outer wall surface part to support said horizontal member and a panel holding part provided at each outside end of said first inner wall surface part and said second inner wall surface part to sandwich said forms panel with said wedge member.

[0013] Preferably in this invention, when forms panels are disposed oppositely, a separator which maintains an interval between panel support members erected on both sides of the forms panel and mutually oppositely disposed is provided, a cone member is provided at one end of the separator, a joint bar is disposed at upper and lower portions of the cone member to form an induction joint, and a truncated quadrangular pyramidal cone cover having the substantially same section as the joint bar is coated on said cone member.

[0014] A construction method of forms according to the present invention to support a forms panel to intercept concrete by panel support members, comprising the steps of:

erecting said panel support members while spaced apart by a predetermined distance from each other and disposing said forms panel therebetween;
supporting a horizontal member at an outer side face of said panel support members by a horizontal member supporting part while spaced apart by a predetermined distance from said forms panel; and
pressing and securing the forms panel to said panel

support members by inserting a wedge member between the horizontal member and said forms panel.

Advantageous effect of the invention

[0015] Accordingly, it is, of course, that this invention is capable of realizing such features as enhancing safety in transportation work and assembling work through reduction in the number of components and compact unitization, eliminating lack of experience and shortening the assembling work by eliminating the fastening work by form tie or the boring work of a forms panel, preventing a crack in a concrete wall from expanding by narrowing the interval between induction joints, and concealing a P cone removing hole remaining due to the induction joint.

Best mode for carrying out the invention

[0016] A first embodiment of a forms structure, a panel support member, a panel support member for internal corner, a panel support member for external corner and a construction method of forms according to the present invention will be described with reference to the drawings.

[0017] Figure 1 is a plan view indicative of the forms structure 1 of this first embodiment. Figures 2 and 3 are perspective views in the forms structure 1 of this first embodiment, indicative of an internal corner externally viewed and an external corner internally viewed, respectively.

[0018] As shown in Figures 1 to 3, the forms structure 1 of this first embodiment mainly includes a forms panel 2 to intercept concrete, a panel support member 3, a panel support member for internal corner 4, a panel support member for external corner 5 to support the forms panel 2, a separator 6 which maintains an interval between oppositely disposed panel support members 3, a horizontal member 7 supported at an outer side face of the panel support member 3 and a wedge member 8 inserted between the horizontal member 7 and said forms panel 2.

[0019] Each component of this embodiment will be described in detail as follows. The forms panel 2 plays a role in intercepting concrete cast. In this first embodiment, the forms panel 2, as shown in Figure 4, is formed of a plywood, composed of 3 panels press-fitted with an adhesive agent. A middle panel therein is formed with shorter length in the top and bottom than the other two panels, and up and down edges of the forms panel 2 are provided with recessed grooves 21. Thus, in this first embodiment, when forms panels 2 are disposed in vertically plural stages, as shown in Figure 4, a limewash stop member 22, having a length identical to a width of the forms panel 2, is fitted into recessed grooves 21 of upper and lower forms panels 2, thereby preventing flow of cast concrete.

[0020] The forms panel 2 may be a wooden board like veneer, a resin board like transparent acrylic board, a

steel plate, an aluminum plate and the like, as long as it plays a role in intercepting concrete. In this first embodiment, concrete-cast surface is formed of a concrete panel coated with urethane so as to provide a good appearance thereon, with other 2 panels from recycled veneer, leading to efficient use of wood resources. In lieu of 3 panels, the forms panel 2 may be formed of one panel having recessed grooves 21.

[0021] The separator 6 plays a role in fastening panel support members 3, 3 oppositely disposed inside and outside to maintain a predetermined distance therebetween. In this first embodiment, the separator 6 is formed of a rod-like shape by a steel material, etc., and both ends thereof are provided with a male screw 61. Also, a cone member 62 formed of a truncated cone from plastics, etc., is secured to both ends of the separator 6. The cone member 62 is provided with a female screw hole 63 which axially screws into the male screw 61 of the separator 6. A connecting bolt 64 is externally screwed into the female screw hole 63 to mount the separator 6.

[0022] In this first embodiment, as shown in Figure 3, upper and lower portions of the cone member 62 are provided with a joint bar 9 to form an induction joint. The joint bar 9 is formed of substantially trapezoidal section to be readily removed after concrete cures. Since the induction joint is prone to stress and crack concentration generated in a concrete wall, an effect of preventing crack on a finished surface can be expected.

[0023] Additionally, in this first embodiment, a substantially truncated quadrangular pyramidal cone cover 10 is externally covered on each cone member 62. The cone cover 10, as shown in Figure 5, is formed so as to have a width identical to the joint bar 9 to mold part of the induction joint with the joint bar 9. Therefore, a removing hole of the cone member 62 becomes part of the induction joint, and it is not necessary to fill the removing hole with a filler and the like, thereby improving an appearance of the finished surface.

[0024] The horizontal member 7 and the wedge member 8 play a role in pressing and securing the forms panel 2 to the panel support member 3. In this first embodiment, the horizontal member 7 is formed of a square pipe of substantially rectangular section, having a longer length than an interval between adjacent panel support members 3. The horizontal member 7 is supported at an outer side face of the panel support member 3 at a plurality of upper and lower portions thereof while spaced apart by a predetermined distance from the forms panel 2.

[0025] The wedge member 8 made of wood, etc. is formed, by inserting into a space between the horizontal member 7 and the forms panel 2 to apply pressing force to the forms panel 2. In this first embodiment, as shown in Figure 6, the wedge member 8 has a tapered part 81 for smooth attachment and a stopper part 82 for preventing detachment of the horizontal member 7.

[0026] The panel support members 3, the panel support members for internal corner 4 and the panel support members for external corner 5 are erected with a prede-

termined distance therebetween to support the forms panels 2. In this first embodiment, the panel support member 3 supports adjacent forms panels 2 almost in the same plane, and the panel support member for internal corner 4 mutually orthogonally supports the forms panels 2 disposed at an internal corner of the forms structure 1. The panel support member for external corner 5 mutually orthogonally supports the forms panels 2 disposed at an external corner of the forms structure 1.

[0027] As shown in Figures 1 to 3, the panel support member 3, which is formed of substantially H-shaped section from a steel material, an aluminum material, etc., mainly includes an inner wall surface part 31 facing the inside of the forms structure 1, an outer wall surface part 32 facing the outside of the forms structure 1 while spaced apart by a predetermined distance from the inner wall surface part 31, a through hole 33 bored from the inner wall surface part 31 through the outer wall surface part 32, a horizontal member supporting part 34 provided on the outer wall surface part 32 and a panel holding part 35 formed at both end side parts of the inner wall surface part 31.

[0028] Each component of the panel support member 3 will be described as follows. The inner wall surface part 31 and the outer wall surface part 32 are formed in a flat plate shape, and substantially middle parts of both thereof are connected by a plate-shaped connecting plate 36. The connecting plate 36 connects the inner wall surface part 31 and the outer wall surface part 32, both of which are disposed substantially in parallel with each other, at a longer interval than a thickness of the forms panel 2. As a result, parts of the inner wall surface part 31 extended to both end side parts thereof can engage with the forms panel 2 pressed by the wedge member 8, thereby providing a function as the panel holding part 35 of this first embodiment.

[0029] The through hole 33 penetrates a connecting bolt 64 screwed into the cone member 62 provided at one end of the separator 6. This invention is not particularly limited to this first embodiment where the through hole 33 passes from the inner wall surface part 31 through the outer wall surface part 32 via the connecting plate 36 as shown in Figure 1. However, the through hole 33 may be bored only at the inner wall surface part 31 and the outer wall surface part 32 not through the connecting plate 36, as long as it passes from the inner wall surface part 31 through the outer wall surface part 32.

[0030] The horizontal member supporting part 34 supports the horizontal member 7 while spaced apart by a predetermined distance from the forms panel 2. In this first embodiment, the horizontal member supporting part 34 is formed of a square pipe, having an insertion hole 34a whose length and width are greater than those of a section of the horizontal member 7. As shown in Figures 2 and 3, the horizontal member supporting part 34 is welded to the outer wall surface part 32 so that the axial direction of the insertion hole 34a is orthogonal to the longitudinal direction of the panel support members 3 to

support one end of the horizontal member 7. In this first embodiment, the horizontal member supporting parts 34 are provided with an upper stage, a middle stage and a lower stage of the panel support members 3 to determine a holding position of the forms panel 2.

[0031] In this first embodiment, when the panel support members 3 are vertically connected, a pair of connecting pieces 37,37 formed of a flat plate are used. Specifically, as shown in Figure 7, after the connecting pieces 37,37 have been screwed into a connecting plate 36 of one panel support member 3 in a holding manner, a connecting plate 36 of the other panel support member 3 is inserted into a space between the connecting pieces 37,37 to be screwed. Thus, each panel support member 3 can be readily and safely connected.

[0032] Next, the panel support member for internal corner 4 supports the forms panels 2 disposed at an internal corner of the forms structure 1, mainly including a first inner wall surface part 41a and a second inner wall surface part 41b forming an inner wall surface at an internal corner of the forms structure 1, a first outer wall surface part 42a and a second outer wall surface part 42b provided in substantially parallel with the first inner wall surface part 41a and the second inner wall surface part 41b while spaced apart by a predetermined distance therefrom, respectively, a first through hole 43a and a second through hole 43b bored from the first inner wall surface part 41a and the second inner wall surface part 41b through the first outer wall surface part 42a and the second outer wall surface part 42b, respectively, a first horizontal member supporting part 44a and a second horizontal member supporting part 44b provided at the first outer wall surface part 42a and the second outer wall surface part 42b, respectively, and a panel holding part 45 formed at each outside end of the first inner wall surface part 41a and the second inner wall surface part 41b.

[0033] The first inner wall surface part 41a and the second inner wall surface part 41b, as shown in Figure 1, are mutually orthogonally connected at the internal corner to form a convex inner wall surface inside the forms structure. Then, panel holding parts 45,45 are extended at each outside end of the first inner wall surface part 41a and the second inner wall surface part 41b along each inner wall surface. Therefore, one forms panel 2 supported by the panel holding part 45 of the first inner wall surface part 41a and the other forms panel 2 supported by the panel holding part 45 of the second inner wall surface part 41b are orthogonal to each other.

[0034] The first outer wall surface part 42a and the second outer wall surface part 42b, like the above-described outer wall surface part 32, are provided in substantially parallel with the first inner wall surface part 41a and the second inner wall surface part 41b via the connecting plate 36, respectively. Thus, the panel support member for internal corner 4 of this first embodiment, as shown in Figure 1, is formed of substantially particular Japanese Kanji character (representing a square and a cross therein). A detailed description is not provided re-

garding the first through hole 43a and the second through hole 43b corresponding to the above-described through hole 33, and the first horizontal member supporting part 44a and the second horizontal member supporting part 44b corresponding to the above-described horizontal member supporting part 34.

[0035] The panel support member for external corner 5 supports the forms panel 2 disposed at an external corner of the forms structure 1, mainly including a first inner wall surface part 51a and a second inner wall surface part 51b forming an inner wall surface at an external corner of the forms structure 1, a first outer wall surface part 52a and a second outer wall surface part 52b provided in substantially parallel with the first inner wall surface part 51a and the second inner wall surface part 51b while spaced apart by a predetermined distance therefrom, respectively, a first through hole 53a and a second through hole 53b bored from the first inner wall surface part 51a and the second inner wall surface part 51b through the first outer wall surface part 52a and the second outer wall surface part 52b, respectively, a first horizontal member supporting part 54a and a second horizontal member supporting part 54b provided at the first outer wall surface part 52a and the second outer wall surface part 52b, respectively, and a panel holding part 55 at each outside end of the first inner wall surface part 51a and the second inner wall surface part 51b.

[0036] Specifically, as shown in Figure 1, the panel support member for external corner 5 is formed of two above-described panel support members 3 orthogonally joined at one end of an inner wall surface part 31 of one panel support member 3 and one end of an inner wall surface part 31 of the other panel support member 3. The first inner wall surface part 51a and the second inner wall surface part 51b are mutually orthogonally connected at an external corner to form a concave inner wall surface inside the forms structure. Then, a panel holding parts 55 is formed at each outside end of the first inner wall surface part 51a and the second inner wall surface part 51b along each inner wall surface. Therefore, one forms panel 2 supported by the panel holding part 55 of the first inner wall surface part 51a and the other forms panel 2 supported by the panel holding part 55 of the second inner wall surface part 51b are orthogonal to each other.

[0037] A detailed description is not provided regarding other components corresponding to the above-described panel support members 3 or the panel support member for internal corner 4.

[0038] Next, operations of the forms structure 1, the panel support member 3, the panel support member for internal corner 4 and the panel support member for external corner 5, and the construction method of forms of this first embodiment having the above components will be described with reference to the drawings.

[0039] Firstly, a use of the panel support member 3, the panel support member for internal corner 4 and the panel support member for external corner 5 of this first embodiment constructs the forms structure 1 of this first

embodiment. In this case, the panel support member for internal corner 4 is erected at an internal corner and the panel support member for external corner 5 is erected at an external corner. In other places, the panel support member 3 is erected so that the inner wall surface part 31 internally faces the forms structure 1. Adjacent panel support members 3 are erected while spaced apart by a predetermined distance so that an interval between the panel holding parts 35 thereof is shorter than a width of the forms panel 2.

[0040] Next, when each of panel support members 3 is lower than a required height of a desired forms structure 1, a plurality of panel support members 3 must be vertically connected. In this case, while a pair of connecting pieces 37,37 are secured to an upper end of one panel support member 3, a connecting plate 36 of the other panel support member 3 is inserted into a space between the connecting pieces 37,37 to be secured. The connecting pieces 37,37 hold the connecting plate 36 of the panel support member 3 inserted to prevent the panel support members 3 from tumbling down, thereby achieving operational safety.

[0041] Like the panel support members 3, the panel support members for internal corner 4 and the panel support members for external corner 5 are vertically connected. Since a connecting plate 36 is concealed in the panel support member for internal corner 4, connecting pieces 37,37 are additionally secured to the first outer wall surface part 42a and the second outer wall surface part 42b.

[0042] Subsequently, forms panels 2 are disposed between adjacent panel support members 3,3. Since the forms panels 2 are externally mounted with each of panel holding parts 35,35, the panel holding parts 35,35 are designed to hold both end edge parts of the forms panel 2 to prevent them from internally tumbling down. Likewise, forms panels 2 are disposed between the panel support member for internal corner 4 and its 2 adjacent panel support members 3,3 in the direction orthogonal thereto, and between the panel support member for external corner 5 and its 2 adjacent panel support members 3,3 in the direction orthogonal thereto.

[0043] Here, when each of forms panels 2 is lower than a required height of a desired forms structure 1, a lime-wash stop member 22 is fitted into a recessed groove 21 of an upper end of one forms panel 2, into which a recessed groove 21 of a lower end of the other forms panel 2 is fitted to be connected. By this operation, the limewash stop member 22 prevents cast concrete from infiltrating into a connecting part between upper and lower forms panels 2 and coming out of the surface.

[0044] Next, a separator 6 is disposed between panel support members 3,3 oppositely disposed. Specifically, by adjusting a position of a cone member 62 provided at both ends of the separator 6, the separator 6 is secured so as to make a predetermined distance between outer end faces of the cone members 62. Then, the separator 6 is disposed so that the outer end faces abut on each

of inner wall surface parts 31 of the panel support members 3, and a connecting bolt 64 penetrated in each through hole 33 is screwed into a female screw hole 63 of each cone member 62.

[0045] As shown in Figure 2, a nut 66 is fastened via a washer 65 to one end of the connecting bolt 64 protruding from an outer wall surface part 32 of the panel support member 3. Then, an interval between panel support members 3,3 disposed oppositely is maintained at a predetermined distance in an easy and ensured manner, thereby requiring no fastening work by form tie, batten, etc. Likewise, separators 6 are disposed between oppositely disposed panel support members 3, panel support members for internal corner 4 and panel support members for external corner 5 to maintain a predetermined distance therebetween.

[0046] In this first embodiment, a cone cover 10 is coated on each cone member 62, and a joint bar 9 is disposed on upper and lower portions of the cone cover 10. In this case, upper and lower end faces of the cone cover 10 formed in a flat plate provide an easy positioning of an end of the joint bar 9 and a continuous configuration thereof. Subsequently, a removing hole of the cone member 62 is concealed within an induction joint, resulting in no such mark on a finished surface of a concrete wall. Also, it is not necessary to fill the removing hole with a filler, etc. Crack can be concentrated only at the induction joint formed, thereby preventing the crack from expanding to the finished surface.

[0047] Next, horizontal member supporting parts 34,34 of adjacent panel support members 3,3 are inserted into one end of the horizontal member 7 and the other end of the horizontal member 7. As a result, the horizontal member 7 is substantially horizontally supported outside of the forms panels 2 while spaced apart by a slight interval. The panel support members 3 are aligned in a correct straight line by the horizontal member 7. Viewed at the internal corner and external corner, panel support members 3, which are each adjacent to the panel support member for internal corner 4 and the panel support member for external corner 5, are aligned substantially in the direction orthogonal thereto.

[0048] A wedge member 8 is hit into a space between the horizontal member 7 and the forms panel 2. Therefore, the wedge member 8 internally presses an outer surface of the forms panel 2, which is received by a panel holding part 35, thereby sandwiching the forms panel 2 between the wedge member 8 and the panel holding part 35 to be secured. Thus, concrete can be cast between forms panels 2 oppositely secured.

[0049] From the above description of this first embodiment, the following advantages can be obtained.

1. The forms structure 1 can be constructed in an easy and swift manner without specific skills and training.
2. With no use of a plurality of battens and reduction in the number of components, the forms panels 2

can be firmly secured.

3. Fastening work by form tie and boring work on forms panels 2 are not required, resulting in shortening construction period and reducing construction costs.

4. By the compact unitization of each component, the safety of transportation and assembling work can be enhanced.

5. Working hours and thus construction costs can be reduced.

6. A removing hole of the cone member 62 can be concealed in an induction joint.

7. Crack expansion in a concrete wall can be prevented.

[0050] Next, a second embodiment of a forms structure 11, a panel support member 13, a panel support member for internal corner 14, a panel support member for external corner 15 and a construction method of forms according to the present invention will be described. A detailed description is not provided regarding components of this second embodiment whose construction is equivalent or corresponding to the above-described first embodiment, using the same signs.

[0051] The forms structure 11 of this second embodiment is characterized by, as shown in the above-described first embodiment, not holding oppositely disposed forms panels 2 by a tensional operation of the separator 6, but as shown in Figure 8, externally pressing and supporting oppositely disposed forms panels 2 on a wall surface like a cliff and a slant surface by a support member 16.

[0052] Specifically, a vertical member 12 vertically erected abuts at an outer side face of each horizontal member 7 of the forms structure 11. The support member 16 is provided to press the vertical member 12 against the horizontal member 7. The support member 16 is designed to be slidably assembled and formed of two steel pipes having different diameters to be secured by a predetermined length in an adjustment range. Therefore, when one end of the support member 16 abuts on a vertical member 12, and the other end thereof abuts on a different structure to install the support member 16, the forms panel 2 can be externally pressed and supported via the horizontal member 7 and the wedge member 8.

[0053] Since the forms structure 11 of this second embodiment doesn't require a separator 6, the panel support member 13, the panel support member for internal corner 14 and the panel support member for external corner 15 require no such through holes 33, 43, 53 described above. As for a joint bar 9 additionally mounted, it is not necessary to cut the joint bar 9 in accordance with the shape of the cone cover 10 because it includes no cone member 62. Wherever the joint bar 9 is mounted, a removing hole of the cone member 62 cannot be produced.

[0054] According to the above second embodiment, the forms structure 11, only composed of one side surface, can be readily constructed in addition to the effect

of the above-described first embodiment, resulting in an improved appearance of a concrete finished surface.

[0055] The forms structure 1, 11, the panel support members 3, 13, the panel support member for internal corner 4, 14, the panel support member for external corner 5, 15 and the construction method of forms according to the present invention are not particularly limited to the above embodiments, but may be altered accordingly.

[0056] For example, the structure using no form tie is described in each of the above embodiments, but this invention is not particularly limited thereto. For example, when there are no panel support members 3 oppositely disposed, forms panels 2 may be provided with a hole bored for a separator and fastened by a form tie after vertical battens abut on the outside of the horizontal member 7, as in conventional inventions.

Brief description of the drawings

[0057]

Figure 1 is a plan view indicative of a first embodiment of a forms structure according to the present invention;

Figure 2 is a perspective view indicative of an internal corner externally viewed of a forms structure of this first embodiment;

Figure 3 is a perspective view indicative of an external corner internally viewed of a forms structure of this first embodiment;

Figure 4 is a perspective view indicative of a forms panel of this first embodiment;

Figure 5 is an elevation view in (a) and a sectional view in 5B-5B in (b) indicative of a cone member and a cone cover of this first embodiment, respectively;

Figure 6 is a perspective view indicative of a wedge member of this first embodiment;

Figure 7 is a perspective view indicative of a way a panel support member is connected by a connecting piece of this first embodiment; and

Figure 8 is a plan view indicative of a second embodiment of a forms structure according to the present invention.

Claims

1. A forms structure, comprising:

a forms panel disposed to intercept concrete;
a panel support member erected on both sides of the forms panel, the panel support member supporting the forms panel;
a horizontal member supported at an outer side face of the panel support member at a plurality of upper and lower portions thereof while spaced apart by a predetermined distance from said forms panel; and

a wedge member inserted between the horizontal member and said forms panel, the wedge member securing the forms panel by pressing it against said panel support member.

2. A panel support member comprising a forms structure as set forth in Claim 1, furthermore comprising:

an inner wall surface part facing the inside of said forms structure;

an outer wall surface part provided in substantially parallel with the inner wall surface part while spaced apart by a predetermined distance therefrom;

a horizontal member supporting part provided at a plurality of upper and lower portions of the outer wall surface part, the horizontal member supporting part supporting one end of said horizontal member; and

a panel holding part provided at both end side parts of said inner wall surface part, the panel holding part sandwiching said forms panel with said wedge member.

3. A panel support member for internal corner, the panel support member for internal corner mutually orthogonally supporting a forms panel disposed at an internal corner comprising a forms structure as set forth in Claim 1, furthermore comprising:

a first inner wall surface part and a second inner wall surface part mutually orthogonally connected at an internal corner of said forms structure, the first inner wall surface part and the second inner wall surface part forming a convex inner wall surface inside the forms structure;

a first outer wall surface part provided in substantially parallel with said first inner wall surface part while spaced apart by a predetermined distance therefrom;

a second outer wall surface part provided in substantially parallel with said second inner wall surface part while spaced apart by a predetermined distance therefrom;

a first horizontal member supporting part provided at a plurality of upper and lower portions of said first outer wall surface part, the first horizontal member supporting part supporting one end of said horizontal member;

a second horizontal member supporting part provided at a plurality of upper and lower portions of said second outer wall surface part, the second horizontal member supporting part supporting one end of said horizontal member; and

a panel holding part provided at each outside end of said first inner wall surface part and said second inner wall surface part, the panel holding

part sandwiching said forms panel with said wedge member.

4. A panel support member for external corner, the panel support member for external corner mutually orthogonally supporting a forms structure disposed at an external corner comprising a forms structure as set forth in Claim 1, furthermore comprising:

a first inner wall surface part and a second inner wall surface part mutually orthogonally connected at an external corner of said forms structure, the first inner wall surface part and the second inner wall surface part forming a concave inner wall surface inside the forms structure;

a first outer wall surface part provided in substantially parallel with said first inner wall surface part while spaced apart by a predetermined distance therefrom;

a second outer wall surface part provided in substantially parallel with said second inner wall surface part while spaced apart by a predetermined distance therefrom;

a first horizontal member supporting part provided at a plurality of upper and lower portions of said first outer wall surface part, the first horizontal member supporting part supporting said horizontal member;

a second horizontal member supporting part provided at a plurality of upper and lower portions of said second outer wall surface part, the second horizontal member supporting part supporting said horizontal member; and

a panel holding part provided at each outside end of said first inner wall surface part and said second inner wall surface part, the panel holding part sandwiching said forms panel with said wedge member.

5. The forms structure as set forth in Claim 1, wherein:

when forms panels are disposed oppositely, a separator which maintains an interval between panel support members erected on both sides of the forms panel and mutually oppositely disposed is provided;

a cone member is provided at one end of the separator;

a joint bar is disposed at upper and lower portions of the cone member, the joint bar forming an induction joint; and

a truncated quadrangular pyramidal cone cover, having the substantially same section as the joint bar, is coated on said cone member.

6. A construction method of forms, the construction method of forms supporting a forms panel to intercept concrete by panel support members, compris-

ing the steps of:

erecting said panel support members while
spaced apart by a predetermined distance from
each other and disposing said forms panel therebetween;
supporting a horizontal member at an outer side
face of said panel support members by a horizontal
member supporting part while spaced apart by a predetermined distance from said
forms panel; and
pressing and securing the forms panel to said
panel support members by inserting a wedge
member between the horizontal member and
said forms panel.

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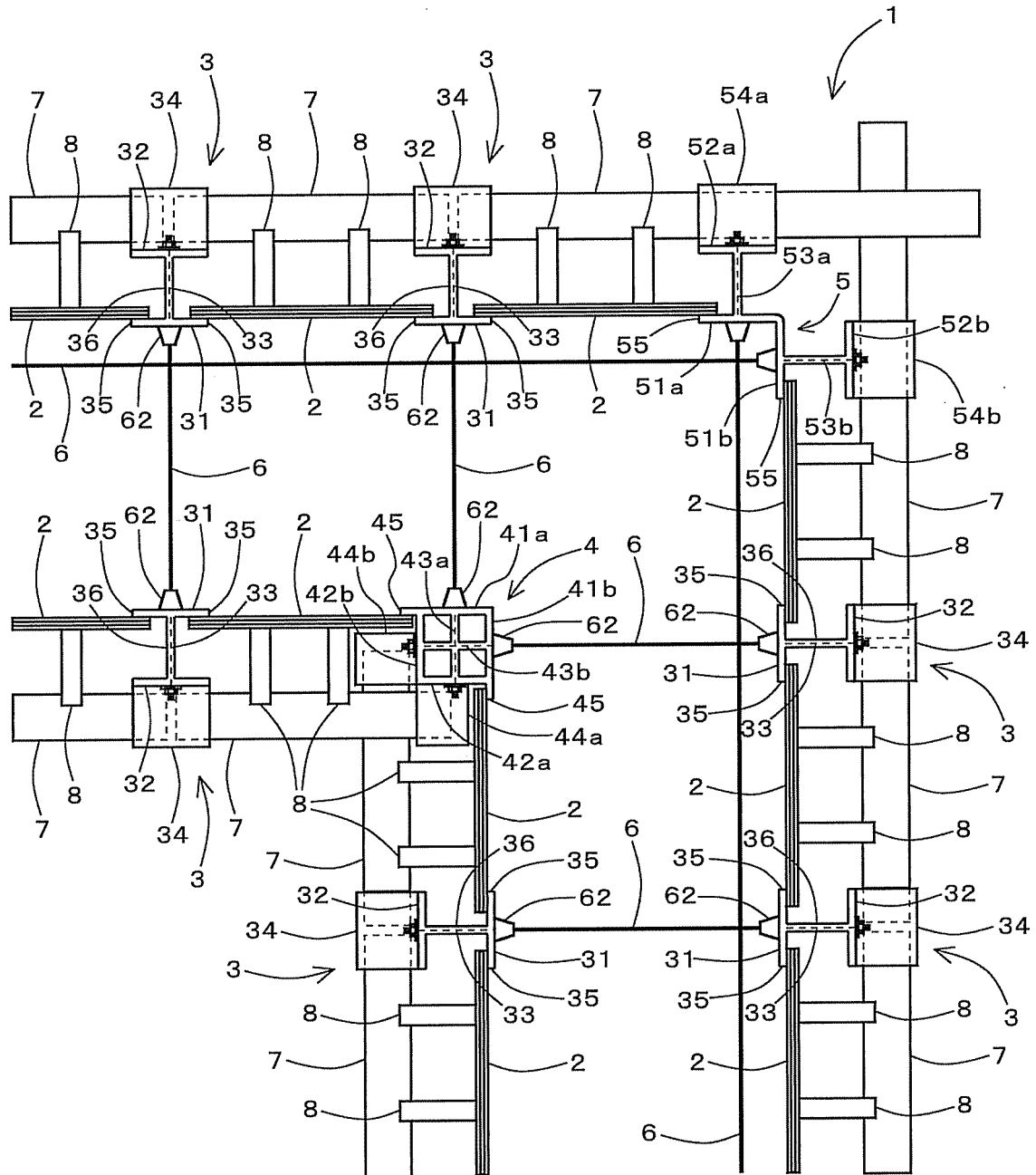
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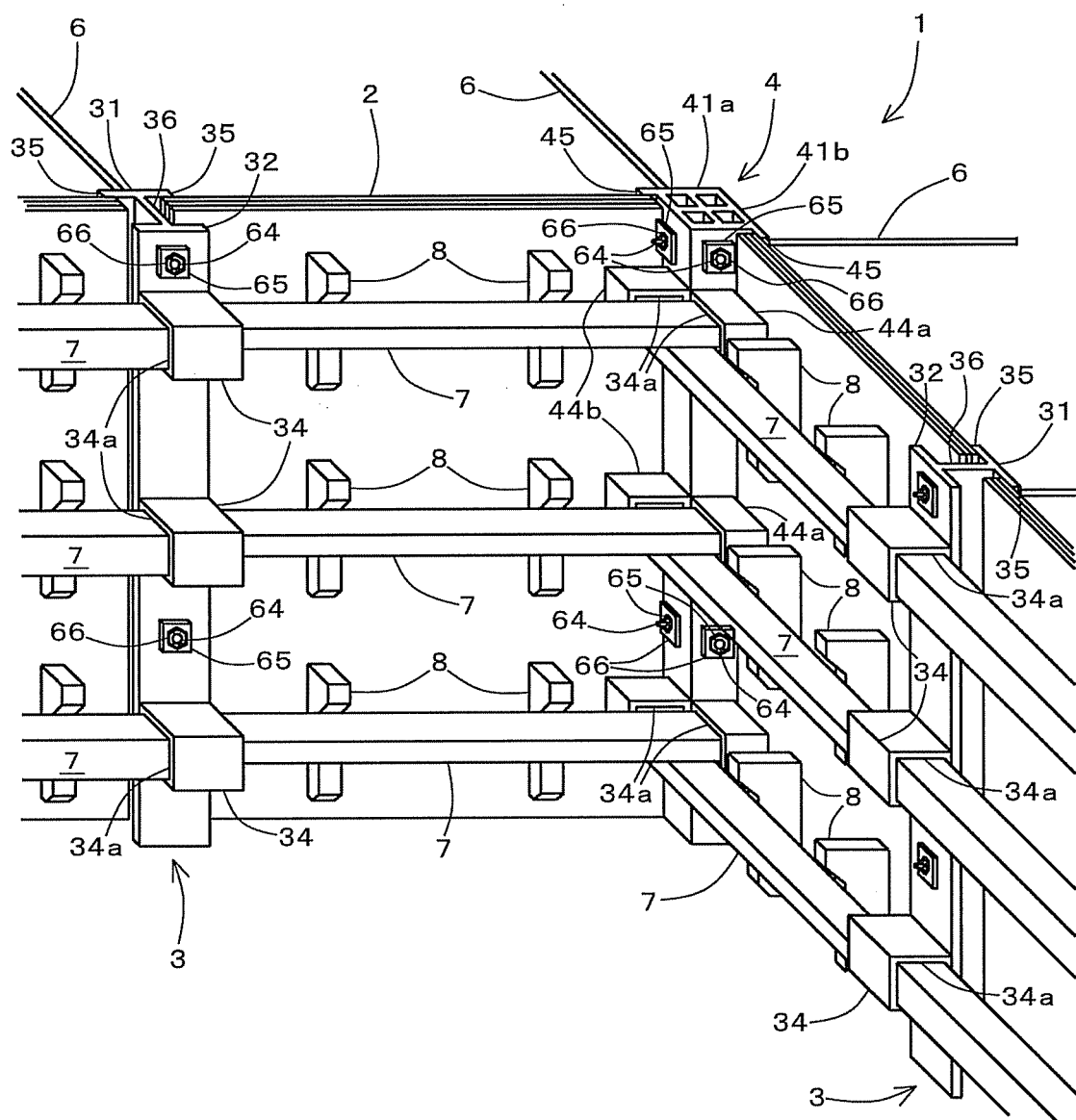
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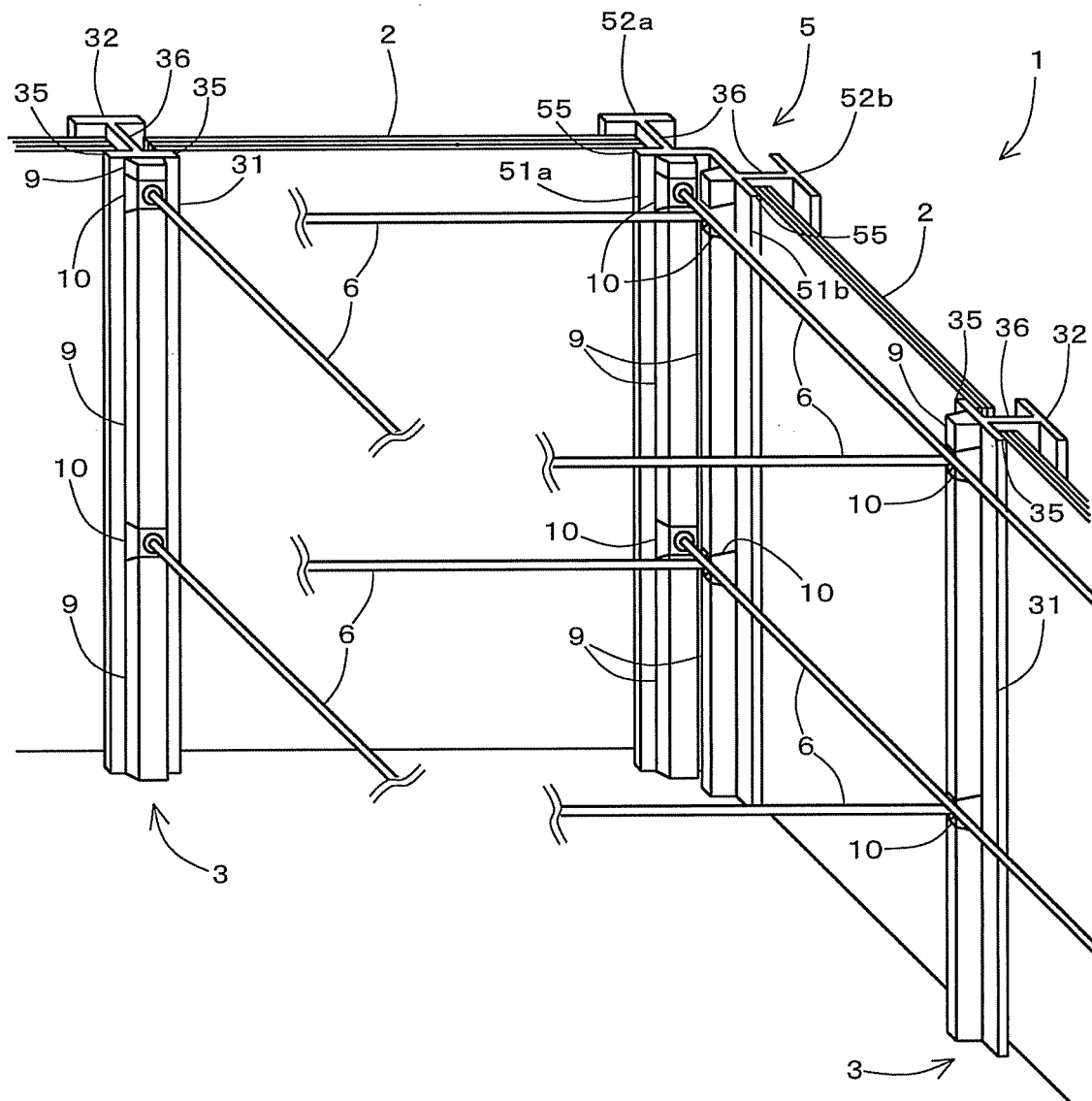
[Figure 1]



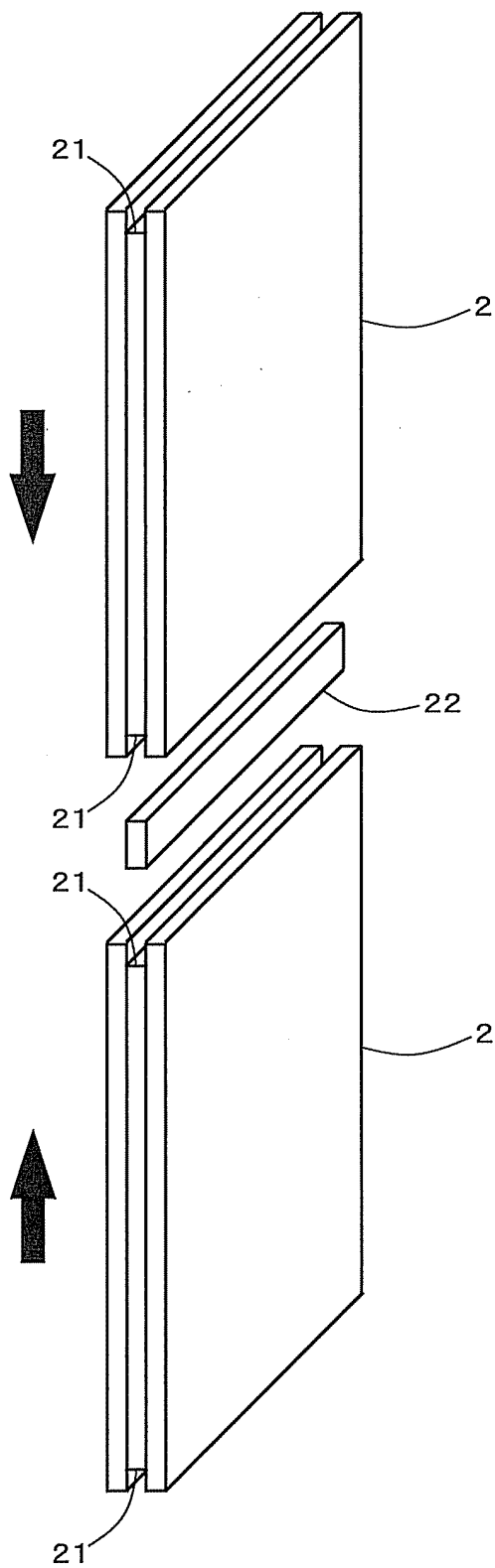
[Figure 2]



[Figure 3]

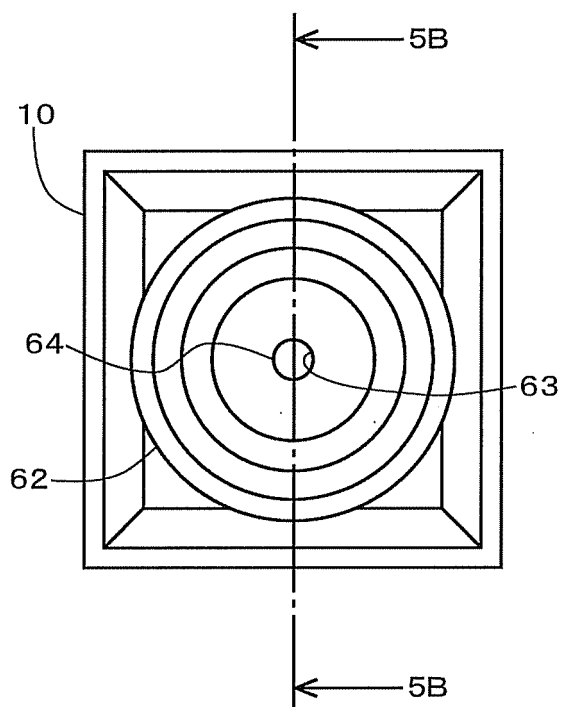


[Figure 4]

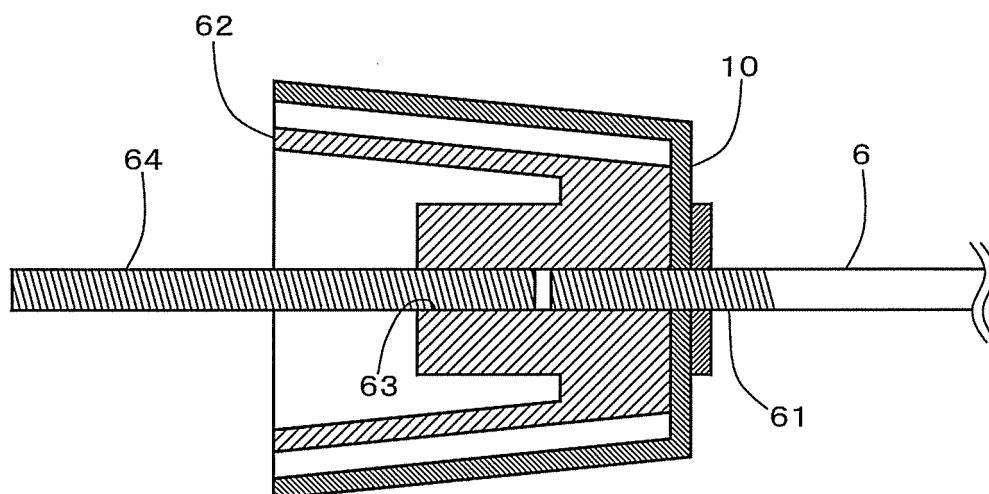


[Figure 5]

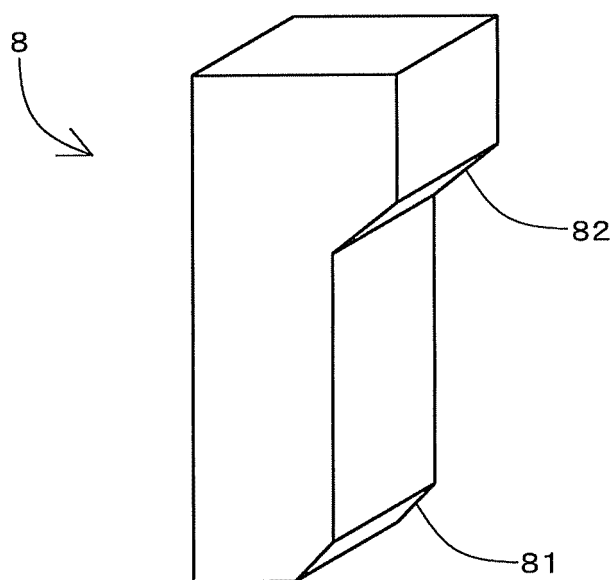
(a)



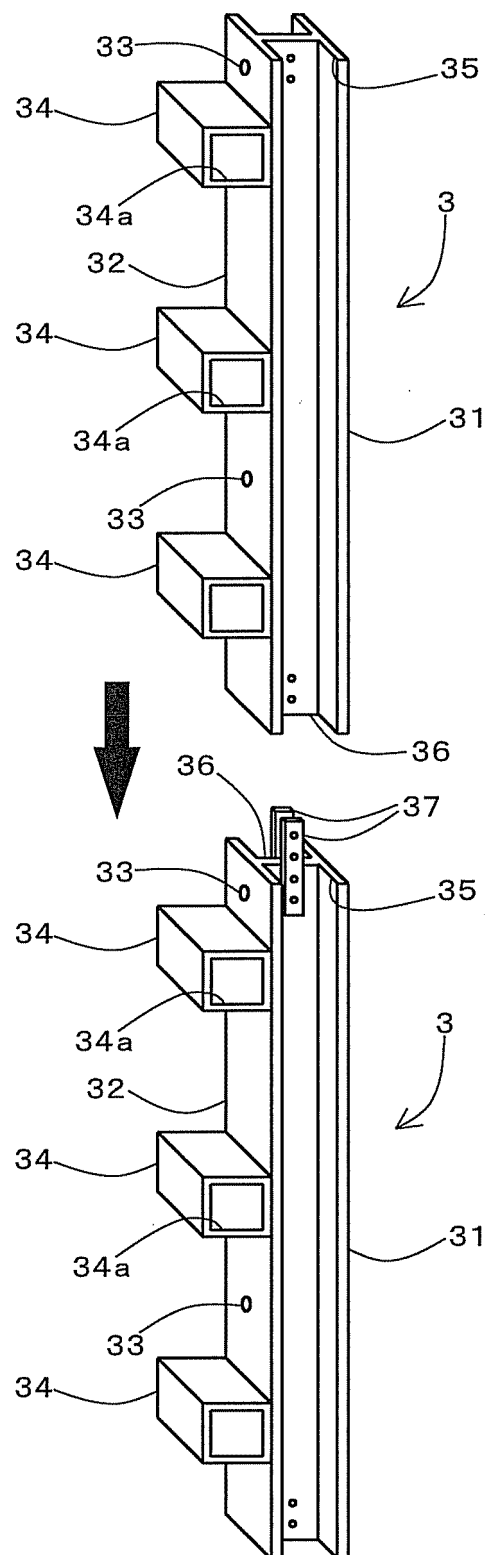
(b)



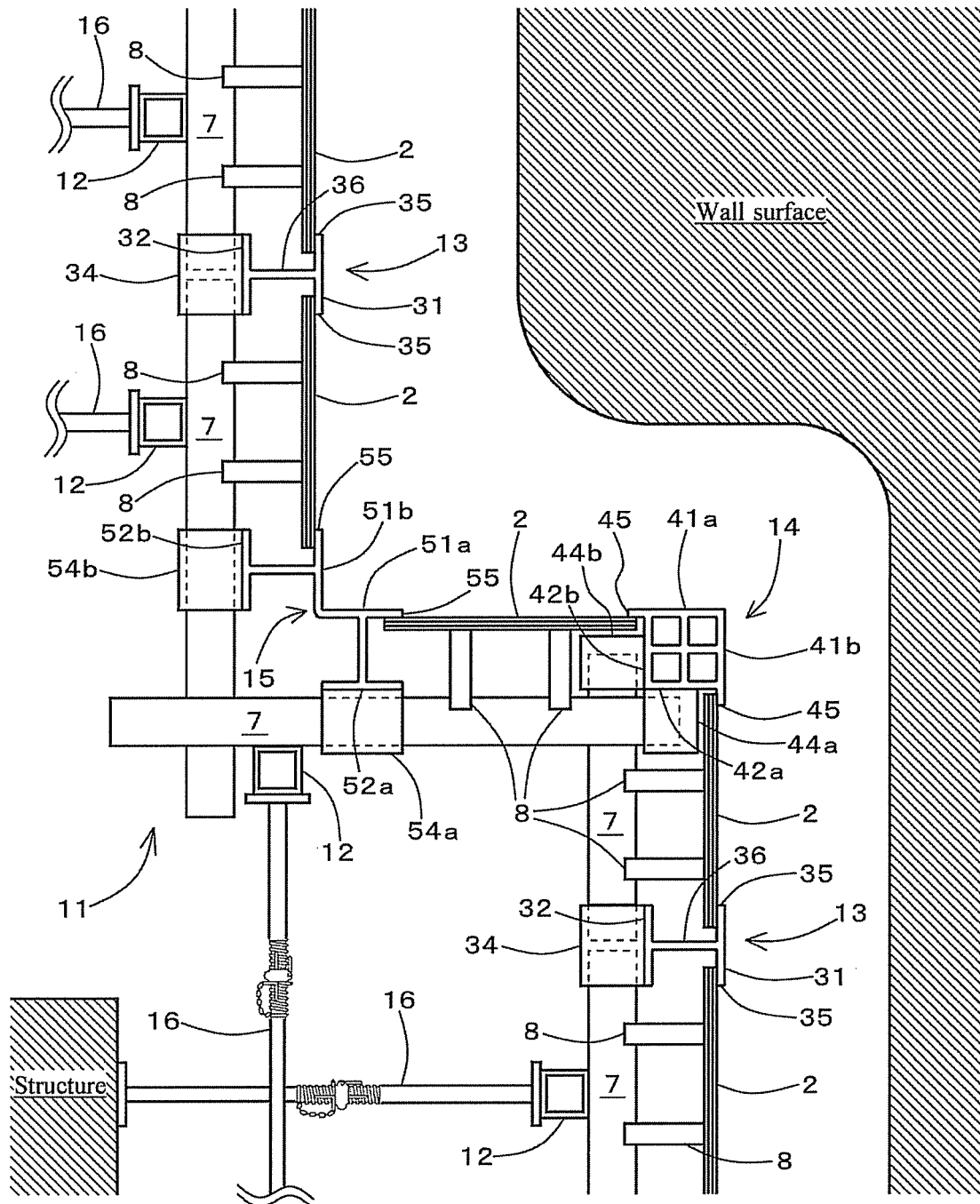
[Figure 6]



[Figure 7]



[Figure 8]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2007/070440

A. CLASSIFICATION OF SUBJECT MATTER

E04G17/00(2006.01)i, E04G11/14(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)

E04G17/00, E04G11/14, E04G17/06

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 1996-2007

Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007

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.
A	JP 2001-279927 A (Daiwa House Industry Co., Ltd.), 10 October, 2001 (10.10.01), Par. Nos. [0009] to [0017]; Figs. 1 to 10 (Family: none)	1-6
A	JP 08-209934 A (Yugen Kaisha Nisso Giken), 13 August, 1996 (13.08.96), Par. Nos. [0007] to [0014]; Figs. 1 to 5 (Family: none)	1-6
A	JP 11-229622 A (Obayashi Corp.), 24 August, 1999 (24.08.99), Par. Nos. [0024] to [0037]; Figs. 1 to 4 (Family: none)	5

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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Date of the actual completion of the international search
02 November, 2007 (02.11.07)Date of mailing of the international search report
13 November, 2007 (13.11.07)Name and mailing address of the ISA/
Japanese Patent Office

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 54015946 A [0002] [0003]