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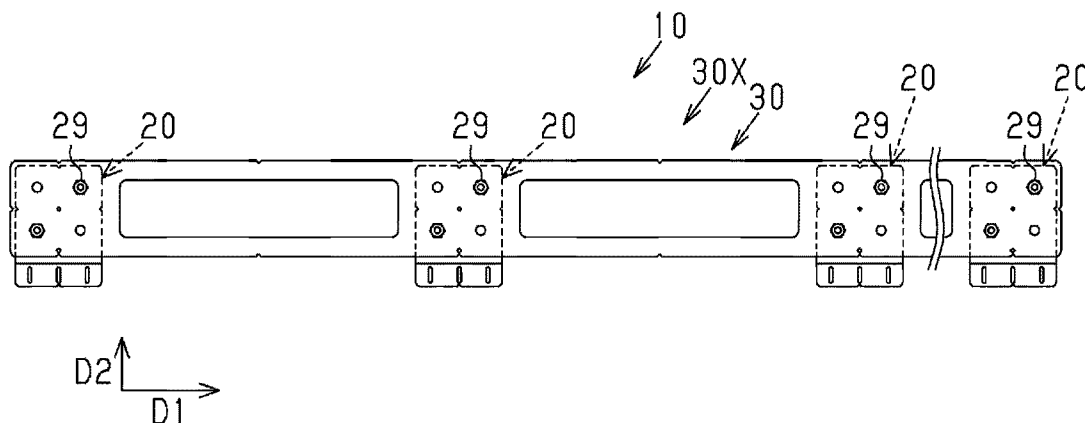
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(54) Title of the Invention: **Anchor bolt installing jig and anchor bolt installing method**
Abstract Title: **Anchor bolt setting jig, and anchor bolt setting method**

(57) This anchor bolt setting jig (10) is for setting an anchor bolt in a foundation. The anchor bolt setting jig (10) comprises: a support tool (20) which supports the anchor bolt; and a positioning tool (30) which positions the support tool (20) relative to the foundation. The positioning tool (30) is configured such that a plurality of support tools (20) are temporarily assembled on the positioning tool (30).

Fig 3



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Fig.1

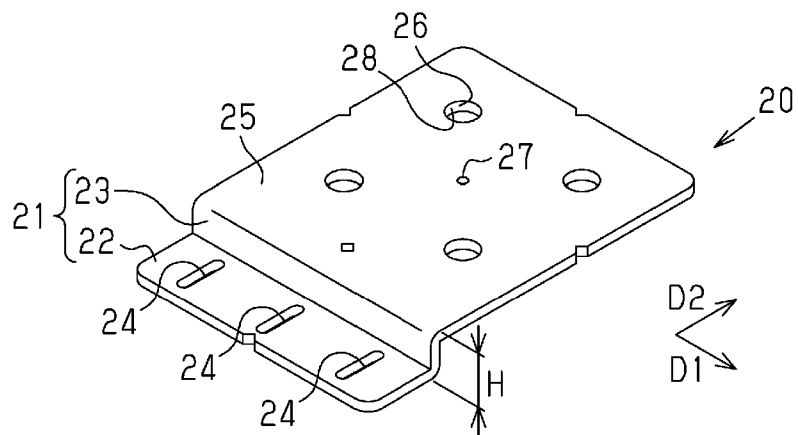


Fig.2

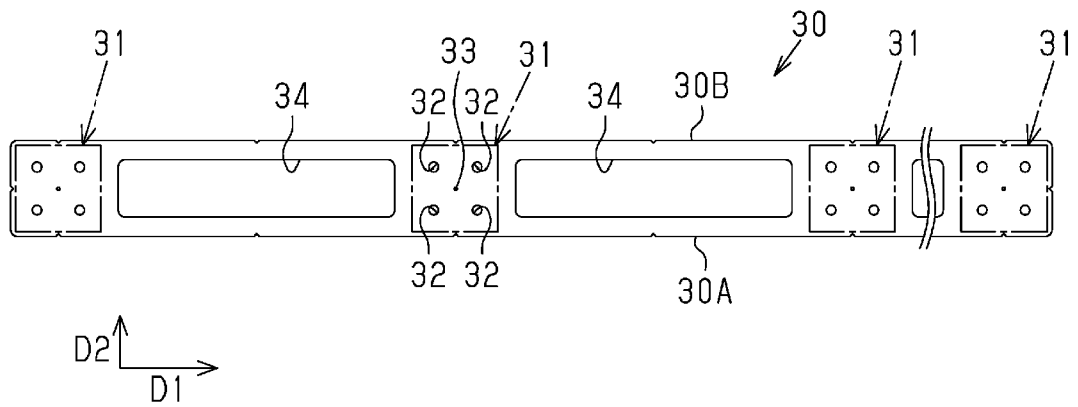


Fig.3

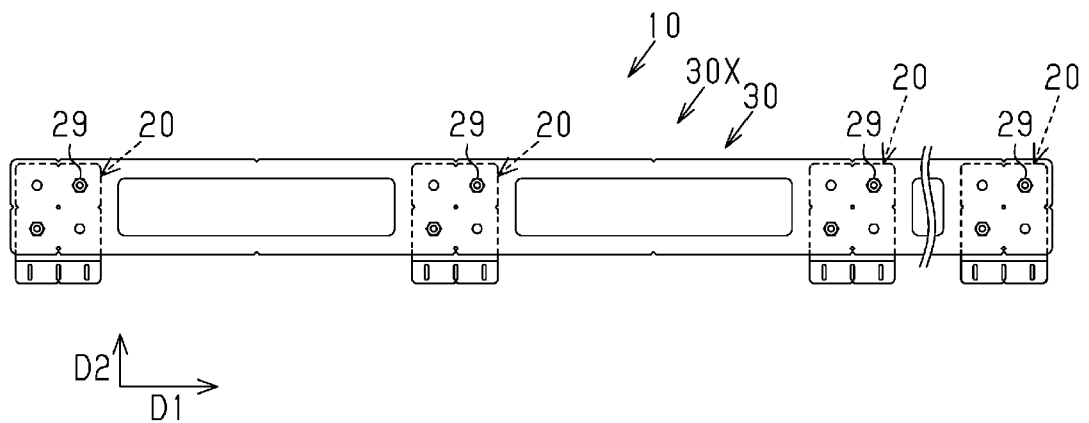


Fig.4

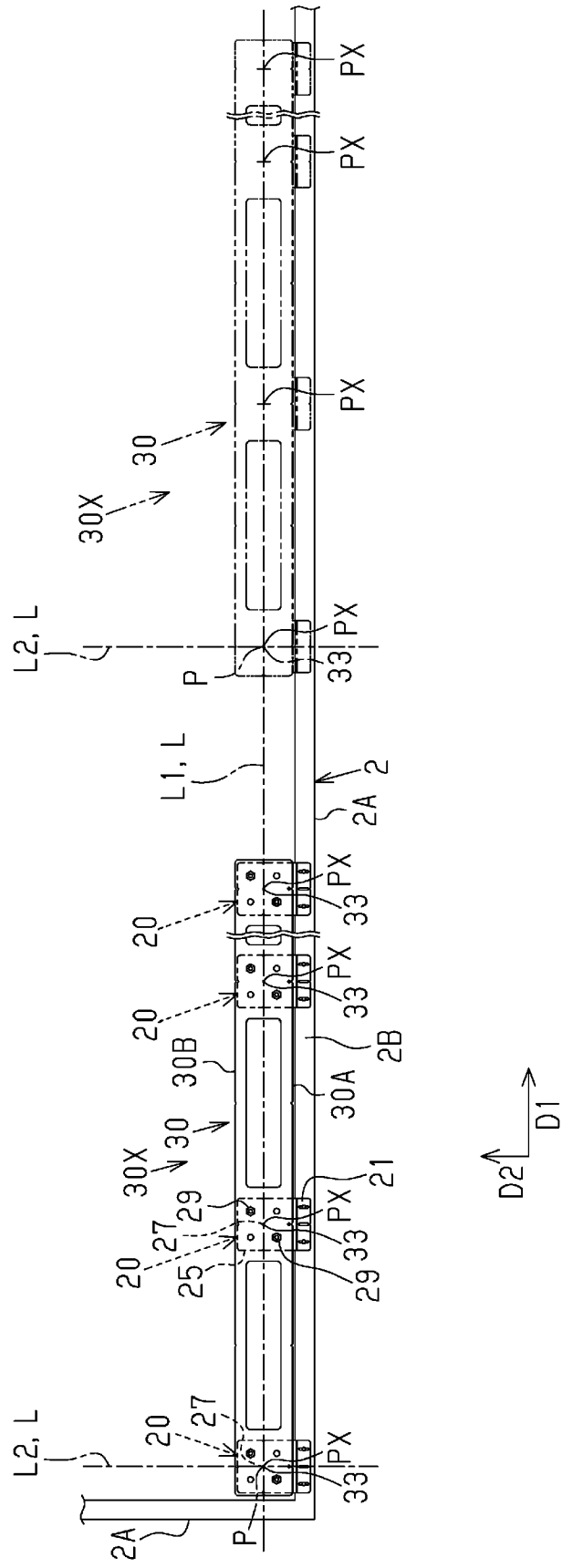


Fig.5

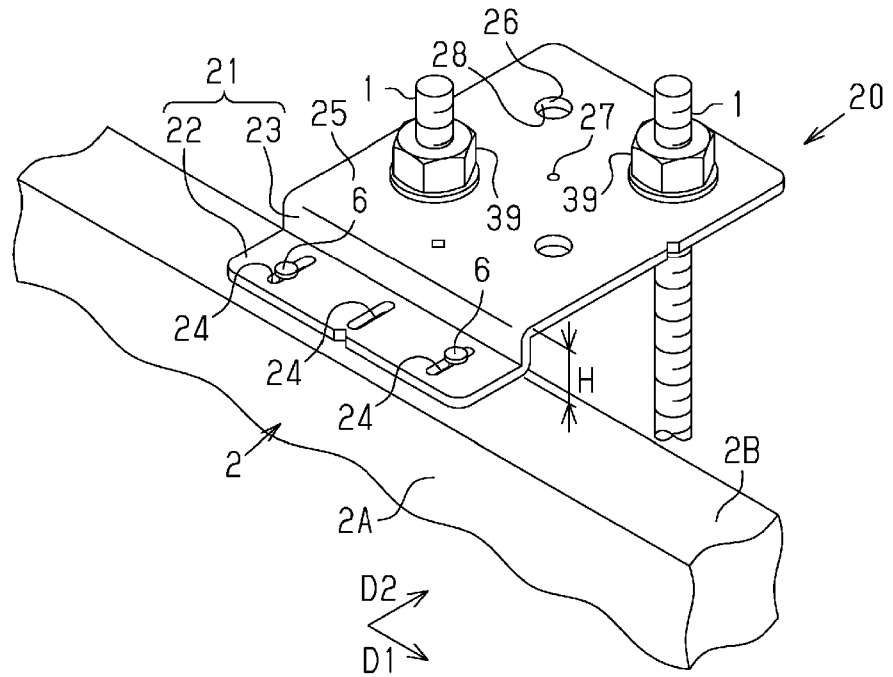


Fig.6

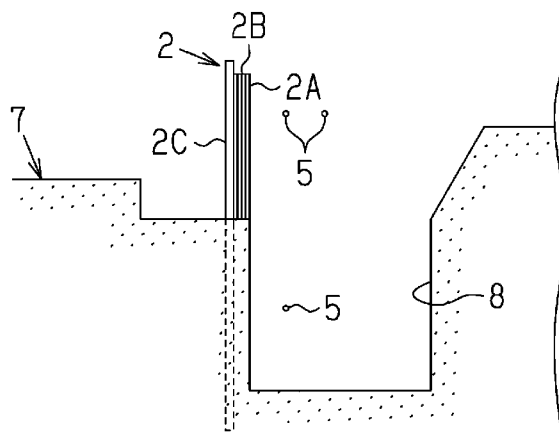


Fig.7

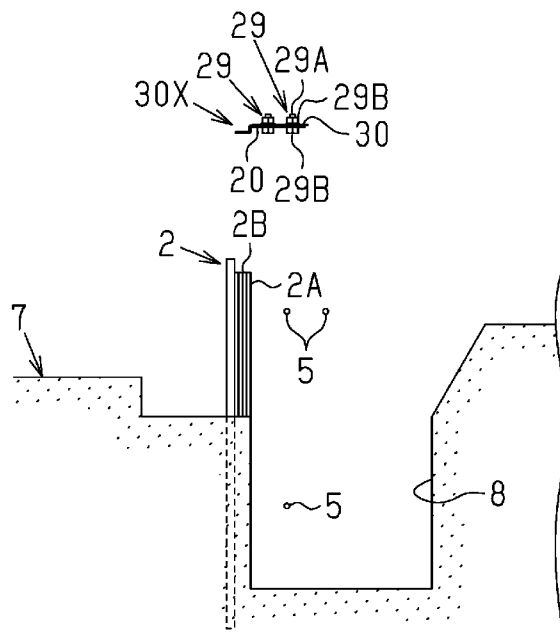


Fig.8

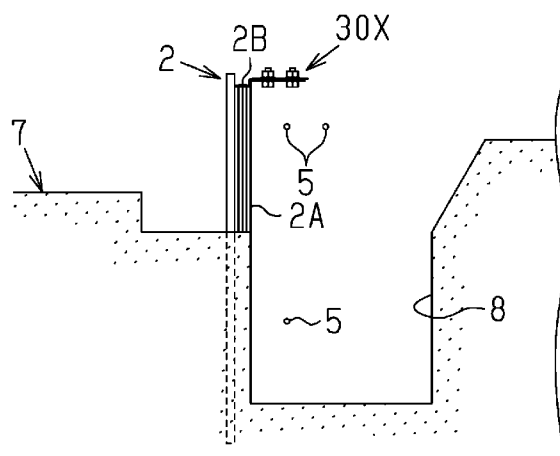


Fig.9

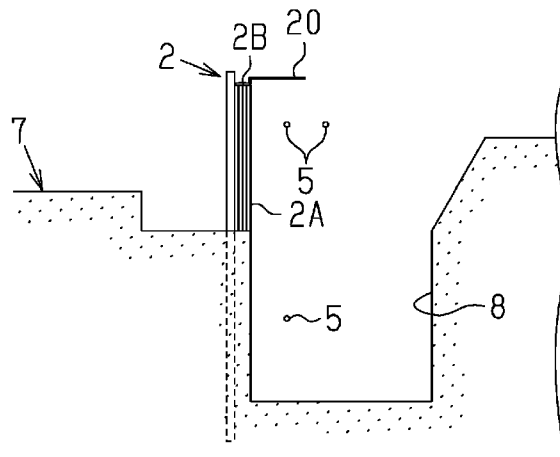


Fig.10

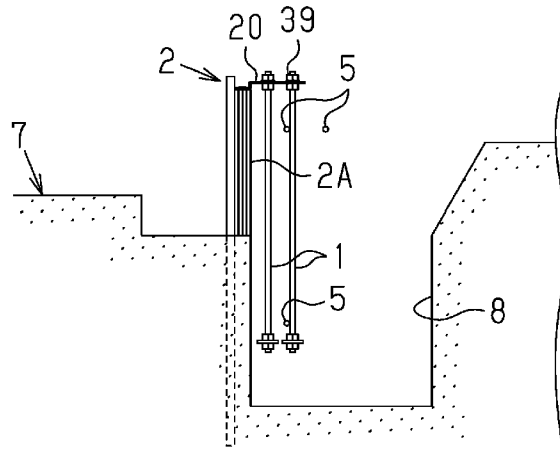


Fig.11



DESCRIPTION

TITLE OF INVENTION

ANCHOR BOLT INSTALLING JIG AND ANCHOR BOLT INSTALLING METHOD

TECHNICAL FIELD

[0001] The present disclosure relates to an anchor bolt installing jig and an anchor bolt installing method for anchor bolts configured to be installed in the foundation of a building.

BACKGROUND

[0002] The foundation of a building may include anchor bolts. The anchor bolts are installed in the foundation to couple the foundation to a body of the building. The anchor bolts are located at specified positions on the foundation.

[0003] Patent Literature 1 discloses an example of a technique of attaching extensions to the heads of anchor bolts, respectively. The anchor bolts are positioned using a positioning member (a template in the literature).

CITATION LIST

Patent Literature

[0004] Patent Document 1: Japanese Laid-Open Patent Publication No. 2018-031179

SUMMARY OF INVENTION

Technical Problem

[0005] A builder may be involved in multiple building properties. In this case, if foundations are constructed concurrently, a set of positioning members is required at each site. Thus, the builder needs to prepare multiple sets of positioning members in advance.

Maintaining an inventory of multiple sets of positioning members places a management burden on the builder.

Solution to Problem

[0006] (1) An anchor bolt installing jig that solves the above problem is used to install anchor bolts in a foundation. The anchor bolt installing jig includes supports, each supporting the anchor bolts, and a positioning member that positions the supports relative to the foundation. The positioning member is configured to allow the supports to be temporarily coupled to the positioning member.

[0007] In this configuration, after the supports are temporarily coupled to the positioning member at predetermined positions, the positioning member is disposed in the formwork with the supports temporarily coupled. This allows the supports to be positioned relative to one another and fixes the supports to the formwork. Further, the positioning member can be removed from the supports fixed to the formwork. Thus, the removed positioning member can be reused. This reduces an inventory of the anchor bolt installing jigs.

[0008] (2) In the anchor bolt installing jig according to (1), the supports each include a fixed portion configured to be fixed to a formwork of the foundation under construction, and a support portion extending from the fixed portion to support the anchor bolts. The support portion includes anchor holes through which the anchor bolts are respectively inserted, and first engagement portions with which temporary coupling members are respectively engaged. The temporary coupling members are used to temporarily couple the support to the positioning member. The positioning member includes second engagement portions with which the temporary coupling members are respectively engaged, and a reference portion that determines a position of the positioning member relative to the foundation. This

configuration allows the supports to be positioned relative to the positioning member by the temporary coupling members.

[0009] (3) In the anchor bolt installing jig according to (2), the anchor holes of the support serve as the first engagement portions. This configuration makes the structure of the support simpler.

[0010] (4) In the anchor bolt installing jig (2) or (3), the fixed portion includes a fixed body configured to be fixed to the formwork and a coupling portion extending upward from an end edge of the fixed body to couple the fixed body to the support portion. In this configuration, in a state where the concrete is placed in the formwork, the gap is created between the upper surface of the concrete and the support portion. This allows the upper surface of the concrete below the support portion to be easily leveled using a trowel.

[0011] (5) In the anchor bolt installing jig according to any one of (2) to (4), the fixed portion includes a temporarily fixed portion configured to be temporarily fixed to the formwork. In this configuration, when the positioning member temporarily coupled to the supports at specified positions on the foundation, the supports are temporarily fixed to the formwork. This allows the worker to adjust the positions of the supports without supporting the positioning member, after arranging the temporarily coupled positioning member to which the supports are temporarily fixed at the specified positions.

[0012] (6) An anchor bolt installing method that solves the above problem is a method for installing anchor bolts in a formwork of a foundation. The anchor bolt installing method includes a first step that temporarily couples supports to a positioning member, the supports each supporting the anchor bolts, a second step that arranges the positioning member, to which the supports are temporarily coupled, such that the supports are located at specified positions on the foundation, a third step that fixes the supports to the formwork of the foundation, and a fourth step that removes the positioning member from the supports.

[0013] This configuration allows the positioning member to be reused after fixing the supports to the formwork. For example, one can bring the positioning member to another site. Conventionally, the installment of multiple anchor bolts in the foundation requires multiple positioning members. In the technique of the present disclosure, the positioning member can be immediately removed from the supports fixed to the formwork after the installment of the supports. Thus, the number of positioning members used at one site is reduced.

[0014] (7) In the anchor bolt installing method according to (6), the supports each include a fixed portion configured to be fixed to the formwork, and a support portion extending from the fixed portion to support the anchor bolts. The support portion includes anchor holes through which the anchor bolts are respectively inserted, and first engagement portions with which temporary coupling members are respectively engaged. The temporary coupling members are used to temporarily couple the support to the positioning member. The positioning member includes second engagement portions with which the temporary coupling members are respectively engaged, and a reference portion that determines a position of the positioning member relative to the foundation. This configuration allows the supports to be positioned relative to the positioning member at specified positions by the temporary coupling members.

Advantageous Effects of Invention

[0015] The anchor bolt installing jig and the anchor bolt installing method reduce an inventory of anchor bolt installing jigs.

BRIEF DESCRIPTION OF DRAWINGS

[0016] Fig. 1 is a perspective view of a support in an anchor bolt installing jig.

Fig. 2 is a plan view of a positioning member in the anchor bolt installing jig.

Fig. 3 is a plan view of a temporarily coupled positioning member.

Fig. 4 is a diagram showing how temporarily coupled positioning members are arranged on the foundation.

Fig. 5 is a perspective view of the support to which anchor bolts are fastened.

Fig. 6 is a cross-sectional view of the ground immediately before the anchor bolts are installed during construction of the foundation.

Fig. 7 is a cross-sectional view of the ground and the formwork in a first step of the anchor bolt installing method.

Fig. 8 is a cross-sectional view of the ground and the formwork in a second step of the anchor bolt installing method.

Fig. 9 is a cross-sectional view of the ground and the formwork in a third step of the anchor bolt installing method.

Fig. 10 is a cross-sectional view of the ground and the formwork when the anchor bolts are fastened to the supports after a fourth step of the anchor bolt installing method is performed.

Fig. 11 is a cross-sectional view of the ground and the formwork when the concrete is placed in the formwork.

Fig. 12 is a perspective view showing the support according to a modification.

DESCRIPTION OF EMBODIMENTS

[0017] Anchor Bolt Installing Jig

An anchor bolt installing jig 10 will now be described with reference to Figs. 1 to 11. In the present embodiment, anchor bolts 1 are installed in a foundation 3 of a building under construction. To simplify the description, “in the foundation 3 under construction” is hereinafter simply referred to as “in the foundation 3.” Thus, “in the foundation 3” in the following description refers to “in the foundation 3 under construction.” Specifically, “in the

foundation 3 under construction” refers to “with respect to a reference line L in the foundation 3 under construction.”

[0018] The anchor bolt installing jig 10 is used to install the anchor bolts 1 in the foundation 3 of the building. The foundation 3 includes concrete 4 and reinforcing bars 5. The foundation 3 further includes the anchor bolts 1. The foundation 3 is formed by placing concrete 4 into the formwork 2. When a mat foundation is used, the formwork 2 includes frame plates 2A. The frame plates 2A are installed so as to surround the perimeter of the foundation 3 that will be constructed. The frame plates 2A are supported on the ground 7 by support rods 2C (see Fig. 6).

[0019] The foundation 3 to which the anchor bolt installing jig 10 is applied is not limited to the above example. Examples of the foundation 3 include a mat foundation and a continuous footing. The anchor bolt installing jig 10 of the present embodiment is used for a continuous footing in a favorable manner.

[0020] The formwork 2 that corresponds to a rising part of a continuous footing includes two frame plates 2A installed in parallel to each other. Thus, the anchor bolts 1 between the two frame plates 2A are supported by a support member supported by the two frame plates 2A. When a mat foundation is used, frame plates 2A are installed so as to surround the foundation 3. Thus, supports 20, each supporting the anchor bolts 1, are fixed to the frame plates 2A in a cantilevered state (see Figs. 5 and 9). The anchor bolt installing jig 10 of the present embodiment is favorably used for the supports 20 supported by the frame plates 2A in such a cantilevered state to be located at specified positions.

[0021] The anchor bolts 1 are installed such that part of each anchor bolt 1 is exposed from an upper surface 3A of the foundation 3 (see Fig. 11). A part 1B other than the exposed part 1A of the anchor bolt 1 is embedded in the concrete 4 of the foundation 3. The exposed part

1A exposed in the anchor bolt 1 is connected to columns of a body of the building body built on the foundation 3.

[0022] For example, the anchor bolts 1 are installed along the perimeter of the foundation 3. Subsequent to installing the formwork 2 of the foundation 3 and prior to placing the concrete 4 in the formwork 2, the anchor bolts 1 are installed so as to be located inside the formwork 2. The anchor bolt installing jig 10 is used to install the anchor bolts 1 in this step. The structure of the anchor bolt installing jig 10 will now be described.

[0023] The anchor bolt installing jig 10 includes the supports 20, each of which supports the anchor bolts 1, and a positioning member 30 (see Fig. 3). In plan view, the direction extending along the formwork 2 is hereinafter referred to as a first direction D1, and the direction that is orthogonal to the first direction D1 is referred to as a second direction D2.

[0024] Support

The supports 20 will now be described with reference to Fig. 1. The supports 20 each include a fixed portion 21 configured to be fixed to the formwork 2, and a support portion 25.

[0025] The fixed portion 21 includes a fixed body 22. The fixed body 22 is configured to be fixed to the formwork 2. The fixed body 22 is arranged on the upper surface 2B of the formwork 2. The width of the fixed body 22 is less than or equal to the width of the formwork 2. The fixed body 22 has screw holes 24. The screw holes 24 are elongated. The screw holes 24 extend in the second direction D2, with the fixed body 22 disposed on the upper surface 2B of the formwork 2. The elongated shapes of the screw holes 24 allow the positions of the support 20 to be adjusted relative to the formwork 2 in the second direction D2.

[0026] The fixed portion 21 may further include a coupling portion 23. The coupling portion 23 couples the fixed body 22 to the support portion 25. The coupling portion 23 may

be omitted. In this case, the support portion 25 is directly connected to the fixed body 22. For example, the fixed body 22, the support portion 25, and the coupling portion 23 are integrated with each other. Specifically, the fixed body 22, the support portion 25, and the coupling portion 23 are integrally formed by pressing a sheet metal.

[0027] The coupling portion 23 extends upward from an end of the fixed body 22 in the second direction D2. The coupling portion 23 is arranged for the following purpose. When the concrete 4 is placed in the formwork 2, the concrete 4 may be poured to the same height as the upper surface 2B of the formwork 2. Thus, the coupling portion 23 is included in the support 20 so as to create a gap S between the support portion 25 and an upper surface 4A of the concrete 4. The height of the coupling portion 23 is set such that a trowel used to level the concrete 4 can enter the gap S. The height H of the coupling portion 23 determines the heights of the exposed parts 1A of the anchor bolts 1, which are exposed from the concrete 4.

[0028] The support portion 25 supports the anchor bolts 1. The support portion 25 extends from the fixed portion 21. Specifically, in side view, the support portion 25 extends from the upper end of the coupling portion 23 in parallel with the fixed body 22. In plan view, the support portion 25 extends from the coupling portion 23 toward a side opposite the fixed body 22.

[0029] The support portion 25 has anchor holes 26 through which the anchor bolts 1 are inserted. For example, the support portion 25 includes four anchor holes 26 and an anchor reference portion 27. The four anchor holes 26 are arranged at positions equally distant from the anchor reference portion 27. Further, the four anchor holes 26 are arranged such that the shape formed by the four anchor holes 26 is a square. The anchor reference portion 27 is also used as a mark indicating a reference position of the support 20. The anchor reference portion 27 is used to adjust the position of the support 20 after the support 20 is fixed to the

formwork 2. For example, the anchor reference portion 27 is used as the reference position of the support 20 to check the displacement of the support 20 from the reference line L (e.g., a leveling string) that is set for the foundation 3. The anchor reference portion 27 is a hole, a recess, or an engraved mark that extends through the support portion 25. The anchor reference portion 27 has a visible size.

[0030] The support portion 25 further includes first engagement portions 28. Each first engagement portion 28 is a portion with which a temporary coupling member 29 is engaged. The temporary coupling member 29 is used to temporarily couple each support 20 to the positioning member 30. The temporary coupling member 29 is, for example, a bolt 29A (see Fig. 7). Another example of the temporary coupling member 29 is a wedge-shaped pin (bolt-hole aligner). The first engagement portion 28 is, for example, a through-hole through which the bolt 29A is inserted. In the present embodiment, the anchor hole 26 serves as the first engagement portion 28.

Positioning Member

[0031] The positioning member 30 will now be described with reference to Figs. 2 and 3. The positioning member 30 is used to position the supports 20 relative to the foundation 3. Specifically, the positioning member 30 positions the supports 20 with respect to the reference line L (e.g., a leveling string), which is set during construction of the foundation 3.

[0032] The positioning member 30 is an elongated plate member. During use of the positioning member 30, the positioning member 30 is arranged along the formwork 2.

[0033] The positioning member 30 includes a first end 30A extending in the longitudinal direction of the positioning member 30. The first end 30A extends straight. The positioning member 30 includes a second end 30B on the side opposite the first end 30A. The second end 30B extends parallel to the first end 30A.

[0034] The positioning member 30 is configured to allow multiple supports 20 to be temporarily coupled to the positioning member 30 at predetermined positions. The positioning member 30 includes temporary coupling portions 31. Each temporary coupling portion 31 is a portion to which the corresponding support 20 is temporarily fixed. The temporary coupling portions 31 are arranged at predetermined intervals in the longitudinal direction of the positioning member 30. For example, the temporary coupling portions 31 are arranged at equal intervals. Each temporary coupling portion 31 is sized so as to contact the entire support portion 25 of the corresponding support 20.

[0035] The positioning member 30 includes second engagement portions 32 with which the temporary coupling members 29 are respectively engaged and a reference portion 33 that determines the position of the positioning member 30 relative to the foundation 3. As described above, each temporary coupling member 29 is the bolt 29A or a wedge-shaped pin. Each second engagement portion 32 is, for example, a through-hole through which the corresponding bolt 29A is inserted. The second engagement portions 32 and the reference portion 33 are arranged in the temporary coupling portion 31.

[0036] The second engagement portions 32 have the same structure as the first engagement portions 28. In the present embodiment, the anchor holes 26 serve as the first engagement portions 28. As the support portion 25 has four anchor holes 26, the temporary coupling portion 31 has four second engagement portions 32 in the same manner. The arrangement of the four second engagement portions 32 is the same as that of the four anchor holes 26 of the support 20. Specifically, the four second engagement portions 32 are arranged such that the shape formed by the four second engagement portions 32 is a square.

[0037] As shown in Fig. 3, when the positioning member 30 is temporarily coupled to the supports 20, the supports 20 are located below the positioning member 30. Specifically, the supports 20 are arranged such that the support portions 25 of the supports 20 respectively

come into contact with the temporary coupling portions 31 on the lower surface of the positioning member 30. The supports 20 are arranged on the positioning member 30 such that the four first engagement portions 28 respectively overlap the four second engagement portions 32. Then, the bolts 29A are inserted into the first engagement portions 28 and the second engagement portions 32 that are respectively connected to each other. Nuts 29B are attached to the bolts 29A and then fastened to temporarily couple the supports 20 to the positioning member 30.

[0038] The reference portion 33 of the positioning member 30 is used as a reference position of the positioning member 30. Specifically, the positioning member 30 is disposed in the formwork 2. Then, the reference portion 33 is used as the reference position of the positioning member 30 to position the positioning member 30 with respect to the reference line L (e.g., a leveling string), which is set for the foundation 3.

[0039] The reference portion 33 is located at a position equally distant from the four second engagement portions 32. The reference portion 33 is a through-hole that extends through the positioning member 30. The reference portion 33 is sized such that the anchor reference portion 27 of the support 20 is visible through the through-hole (reference portion 33) in a state where the positioning member 30 is temporarily coupled to the support 20.

[0040] The positioning member 30 may include holes 34 that reduce the weight of the positioning member 30. Each hole 34 is located between two temporary coupling portions 31. Instead of the holes 34, the positioning member 30 may include cutouts in the second end 30B.

[0041] The method for using the anchor bolt installing jig 10 will now be described with reference to Figs. 4 and 5. To install the supports 20 in the formwork 2, the supports 20 are first temporarily coupled to the positioning member 30. A worker uses the positioning

member 30, to which the supports 20 are temporarily coupled, to install the support 20 at specified positions of the formwork 2.

[0042] The reference line L (e.g., a leveling string), which indicates positions where the anchor bolts 1 are installed, is set for the ground 7 on which the foundation 3 is constructed. The reference line L includes a first reference line L1 and a second reference line L2. The second reference line L2 is set so as to be orthogonal to the first reference line L1. An intersection point P at which the first reference line L1 intersects the second reference line L2 coincides with an installation reference point PX for the anchor bolts 1. The intersection point P is located near an outside corner of the foundation 3 or near an inside corner of the foundation 3.

[0043] As shown in Fig. 4, each positioning member 30 to which the supports 20 are temporarily coupled is arranged such that the reference portion 33 of the positioning member 30 overlaps the intersection point P of the first and second reference lines L1, L2 and the reference portions 33 of the positioning members 30 are laid out so as to be located on the first reference line L1. As a result, the supports 20 temporarily fixed to each positioning member 30 are arranged at specified positions on the foundation 3.

[0044] As shown in Fig. 5, each support 20 arranged at the corresponding specified position is fixed to the frame plate 2A using screws 6. Then, the positioning member 30 is removed from the support 20, which is fixed using the screws 6. The anchor bolts 1 are installed in the fixed support 20 in such a manner. Since the supports 20 are arranged at the specified positions on the foundation 3, the anchor bolts 1 are arranged at the specified positions on the foundation 3 only by inserting the anchor bolts 1 into the supports 20.

[0045] Anchor Bolt Installing Method

The anchor bolt installing method will now be described with reference to Figs. 4 and 6 to 11. The anchor bolt installing method refers to a method for installing the anchor

bolts 1 in the formwork 2 of the foundation 3. The anchor bolt installing method is employed to construct the foundation 3.

[0046] Fig. 6 shows a state in which the formwork 2 is installed on the ground 7. The ground 7 includes a groove 8. The formwork 2 is installed so as to surround the foundation 3 under construction. The formwork 2 is arranged along the groove 8 at the outside of the groove 8. The reinforcing bars 5 are disposed along the groove 8. The reinforcing bars 5 are arranged on the entire surface of the ground 7 on which the foundation 3 is provided.

[0047] Figs. 7, 8, and 9 each illustrate the anchor bolt installing method. The anchor bolt installing method includes at least first to fourth steps.

[0048] As shown in Fig. 7, in the first step, the supports 20 are temporarily coupled to the positioning member 30. Specifically, the supports 20 are disposed below the positioning member 30 (see Figs. 3 and 7). The supports 20 are arranged such that the support portions 25 of the supports 20 respectively come into contact with the temporary coupling portions 31 on the lower surface of the positioning member 30. The supports 20 are each arranged such that the four first engagement portions 28 respectively overlap the four second engagement portions 32 (see Fig. 3). Then, as described above, the positioning member 30 and the supports 20 are temporarily coupled to each other.

[0049] In the second step, the positioning member 30 to which the supports 20 are temporarily coupled (hereinafter referred to as a temporarily coupled positioning member 30X) is arranged so that the supports 20 are arranged at specified positions on the foundation 3. Specifically, the temporarily coupled positioning member 30X is positioned with respect to the reference line L, which is set for the ground 7 on which the foundation 3 is provided (see Fig. 4).

[0050] As shown in Fig. 4, the reference lines L (e.g., leveling strings) are set for the ground 7 on which the foundation 3 is provided. The first reference line L1 is set along the

formwork 2 so as to be separated from the formwork 2 by a predetermined distance in the second direction D2. Each second reference line L2 is set so as to be orthogonal to the first reference line L1 and pass through the installation reference point PX for the anchor bolts 1 on the first reference line L1. The intersection point P of the first and second reference lines L1, L2 coincides with the installation reference point PX for the anchor bolts 1. When the second reference lines L2 are arranged at all the installation reference points PX for the anchor bolts 1, an excessive number of reference lines L are set for the ground 7. This hinders leveling of the concrete 4. Thus, some of the second reference lines L2 are not used.

[0051] Each temporarily coupled positioning member 30X is arranged such that the reference portion 33 at an end of the positioning member 30 overlaps the intersection point P of the first and second reference lines L1, L2 and the reference portions 33 of the positioning members 30 are located on the first reference line L1. This allows the supports 20 temporarily coupled to the positioning member 30 to be arranged at specified positions with respect to the reference line L. At this time, the opposite ends of the temporarily coupled positioning member 30X are supported by the worker.

[0052] As shown in Fig. 8, in the third step, the supports 20 are fixed to the formwork 2 of the foundation 3. Specifically, in a state where the temporarily coupled positioning member 30X is located at a specified position on the foundation 3, the fixed portion 21 of each support 20 temporarily coupled to the positioning member 30 is fixed to the formwork 2 using the screws 6.

[0053] As shown in Fig. 9, in the fourth step, the positioning member 30 is removed from each support 20. The positioning member 30, from which the support 20 is removed, can be used for temporary coupling of other supports 20.

[0054] As shown in Fig. 10, the anchor bolts 1 are installed in the support 20 fixed to the formwork 2. Specifically, the anchor bolts 1 are respectively inserted through the anchor holes 26 (see Fig. 5). Then, the anchor bolts 1 are fixed to the support 20 using nuts 39.

[0055] Subsequent to the installment of the anchor bolts 1, as shown in Fig. 11, the concrete 4 is placed in the formwork 2. Then, the surface of the concrete 4 is leveled by a rake or trowel. On the surface of the concrete 4, the portion below the support 20 is leveled using a trowel.

[0056] Operation of Embodiment

The operation of the present embodiment will now be described. Conventionally, the anchor bolts 1 are supported by anchor supports fixed to the formwork 2. These anchor supports are fixed at portions where the anchor bolts 1 are installed. Thus, if a large number of anchor bolts 1 are installed along the perimeter of the foundation 3, positioning of the anchor supports requires a huge amount of time.

[0057] In the present embodiment, the supports 20 are temporarily coupled to the temporary coupling portions 31 at predetermined positions on the positioning member 30, respectively. The temporary coupling of the supports 20 to the temporary coupling portions 31 of the positioning member 30 accurately positions the supports 20 relative to one another. Thus, when one support 20, temporarily coupled to the positioning member 30, is arranged at a specified position on the foundation 3, the other supports 20 will also be arranged on the foundation 3 at specified positions by laying out the positioning member 30 on the foundation 3 in a given orientation. Specifically, as described above, each temporarily coupled positioning member 30X is arranged such that the reference portion 33 at the end of the positioning member 30 overlaps the intersection point P of the first and second reference lines L1, L2 and the reference portions 33 of the positioning members 30 are located on the first reference line L1. This allows the supports 20 temporarily coupled to the positioning

member 30 to be arranged at the specified positions with respect to the reference line L. Accordingly, the supports 20 are arranged at the specified positions on the foundation 3 substantially at the same time. This allows the supports 20 to be positioned in a shorter period of time.

[0058] In addition, after each support 20 is fixed to the formwork 2, the positioning member 30 is removed from the support 20. This allows the positioning member 30 to be reused. For example, at one construction site, repeated use of one to several positioning members 30 enables the installment of a large number of anchor bolts 1 in the foundation 3. In addition, when a builder constructs multiple building properties concurrently, the positioning member 30 that has been used at one building property can be brought to another site.

[0059] Advantages of Embodiment

The advantages of the present embodiment will now be described.

(1) The anchor bolt installing jig 10 includes the supports 20, each of which supports the anchor bolts 1, and the positioning member 30, which positions the supports 20 relative to the foundation 3. The positioning member 30 is configured to allow the supports 20 to be temporarily coupled to the positioning member 30.

[0060] In this configuration, after the supports 20 are temporarily coupled to the positioning member 30 at predetermined positions, the positioning member 30 is disposed in the formwork 2 with the supports 20 temporarily coupled. This allows the supports 20 to be positioned relative to one another and fixes the supports 20 to the formwork 2. Subsequently, the positioning member 30 is removed from each support 20 fixed to the formwork 2. Thus, one can bring the removed positioning member 30 to another site. Conventional positioning members are used to support the anchor bolts 1 until the concrete 4 of the foundation 3 hardens. Thus, the positioning member 30 cannot be frequently reused. In this regard, the

above configuration allows the positioning member 30 to be reused after fixing the supports 20 to the formwork 2. For example, one can bring the positioning member 30 to another site.

[0061] Conventionally, the installment of a large number of anchor bolts 1 in the foundation 3 requires multiple positioning members 30. The above configuration produces the following effect. Subsequent to the installment of the supports 20, the positioning member 30 can be immediately removed from the supports 20 fixed to the formwork 2. The positioning member 30 can be used repeatedly at one site. Thus, the number of positioning members 30 used at one site is reduced. This allows the builder to reduce an inventory of the anchor bolt installing jigs 10. In particular, an inventory of the positioning members 30 is reduced.

[0062] (2) The support portion 25 of each support 20 includes the first engagement portions 28, with which the temporary coupling member 29 are respectively engaged. The positioning member 30 includes the second engagement portions 32, with which the temporary coupling members 29 are engaged. This configuration allows the support 20 to be positioned relative to the positioning member 30 by the temporary coupling members 29.

[0063] (3) The anchor holes 26 of each support 20 serve as the first engagement portions 28. This configuration makes the structure of the support 20 simpler.

[0064] (4) The fixed portion 21 of each support 20 includes the fixed body 22, which is configured to be fixed to the formwork 2, and the coupling portion 23. The coupling portion 23 extends upward from the end edge of the fixed body 22 to couple the fixed body 22 to the support portion 25. In this configuration, in a state where the concrete 4 is placed in the formwork 2, the gap S is created between the upper surface 4A of the concrete 4 and the support portion 25 (see Fig. 11). This allows the upper surface 4A of the concrete 4 below the support portion 25 to be easily leveled using a trowel.

[0065] (5) The anchor bolt installing method includes the first to fourth steps. In the first step, the supports 20, each supporting the anchor bolts 1, are temporarily coupled to the positioning member 30. In the second step, the positioning member 30, to which the supports 20 are temporarily coupled, is arranged so that the supports 20 are arranged at specified positions on the foundation 3. In the third step, the supports 20 are fixed to the formwork 2 of the foundation 3. In the fourth step, the positioning member 30 is removed from the supports 20.

[0066] This configuration allows the positioning member 30 to be reused after fixing the supports 20 to the formwork 2. For example, one can bring the positioning member 30 to another site. Conventionally, the installment of multiple anchor bolts 1 in the foundation 3 requires multiple positioning members 30. In the technique of the present disclosure, the positioning member 30 can be immediately removed from the supports 20 fixed to the formwork 2 after the installment of the supports 20. Thus, the number of positioning members 30 used at one site is reduced.

[0067] (6) In the anchor bolt installing method, the support portion 25 of each support 20 includes the first engagement portions 28, with which the temporary coupling member 29 are respectively engaged. The positioning member 30 includes the second engagement portions 32, with which the temporary coupling members 29 are engaged. This configuration allows the supports 20 to be positioned relative to the positioning member 30 at predetermined positions by the temporary coupling members 29.

[0068] Modifications

The above embodiment exemplifies, without any intention to limit, an applicable form of the anchor bolt installing jig 10 and the anchor bolt installing method. The anchor bolt installing jig 10 and the anchor bolt installing method exemplified in the embodiment can take a form different from those illustrated in the embodiment. For example, some of the

components of the embodiment may be replaced, changed, or omitted. Alternatively, another component may be added to the embodiment. Modifications of the embodiment will now be described.

[0069] As shown in Fig. 12, the fixed portion 21 of the support 20 may include a temporarily fixed portion 50. The temporarily fixed portion 50 is configured to be temporarily fixed to the formwork 2. The temporarily fixed portion 50 includes a temporarily fixed body 51 and two drooping portions 52. The temporarily fixed body 51 is connected to the lower surface of the fixed body 22. The two drooping portions 52 are configured such that the frame plate 2A is inserted between the two drooping portions 52. The two drooping portions 52 extend downward from the opposite ends of the temporarily fixed body 51 in the second direction D2, respectively. The distance between the two drooping portions 52 is shorter than the width of the frame plate 2A of the formwork 2.

[0070] In such a support 20, when the temporarily coupled positioning member 30X is arranged at a specified position on the foundation 3, the support 20 is temporarily fixed to the formwork 2 by inserting the frame plate 2A between the two drooping portions 52 of the temporarily fixed portion 50. This causes the positioning member 30 to be supported by multiple supports 20 temporarily fixed to the frame plate 2A. This allows the worker to adjust the positions of the supports 20 without supporting the positioning member 30, after arranging the temporarily coupled positioning member 30X at the specified position.

[0071] In the above embodiment, the fixed body 22, the support portion 25, and the coupling portion 23 of the support 20 are integrated with each other. Instead, the support 20 may include members that are separate from each other. For example, one member is used to form the fixed body 22 and the coupling portion 23, and the support portion 25 is formed using a member different from the member including the fixed body 22 and the coupling portion 23.

[0072] The supports 20 may be made of resin. When the supports 20 are made of resin, the supports 20 have a reduced weight.

REFERENCE SIGNS LIST

[0073] 1) Anchor Bolt; 2) Formwork, 3) Foundation; 10) Anchor Bolt Installing Jig; 20) Support; 21) Fixed Portion; 22) Fixed Body; 23) Coupling Portion; 25) Support Portion; 26) Anchor Hole; 28) First Engagement Portion; 29) Temporary Coupling Member; 30) Positioning member; 32) Second Engagement Portion; 33) Reference Portion; 50) Temporarily Fixed Portion

CLAIMS

1. An anchor bolt installing jig used to install anchor bolts in a foundation, the anchor bolt installing jig comprising:

supports, each supporting the anchor bolts; and

a positioning member that positions the supports relative to the foundation,

wherein the positioning member is configured to allow the supports to be temporarily coupled to the positioning member.

2. The anchor bolt installing jig according to claim 1, wherein

the supports each include:

a fixed portion configured to be fixed to a formwork of the foundation under construction; and

a support portion extending from the fixed portion to support the anchor bolts,

the support portion includes:

anchor holes through which the anchor bolts are respectively inserted; and

first engagement portions with which temporary coupling members are respectively engaged, the temporary coupling members being used to temporarily couple the support to the positioning member, and

the positioning member includes:

second engagement portions with which the temporary coupling members are respectively engaged; and

a reference portion that determines a position of the positioning member relative to the foundation.

3. The anchor bolt installing jig according to claim 2, wherein the anchor holes of the support serve as the first engagement portions.

4. The anchor bolt installing jig according to claim 2 or 3, wherein the fixed portion includes:

a fixed body configured to be fixed to the formwork; and

a coupling portion extending upward from an end edge of the fixed body to couple the fixed body to the support portion.

5. The anchor bolt installing jig according to any one of claims 2 to 4, wherein the fixed portion includes a temporarily fixed portion configured to be temporarily fixed to the formwork.

6. An anchor bolt installing method for installing anchor bolts in a formwork of a foundation, the anchor bolt installing method comprising:

a first step that temporarily couples supports to a positioning member, the supports each supporting the anchor bolts;

a second step that arranges the positioning member, to which the supports are temporarily coupled, such that the supports are located at specified positions on the foundation;

a third step that fixes the supports to the formwork of the foundation; and

a fourth step that removes the positioning member from the supports.

7. The anchor bolt installing method according to claim 6, wherein

the supports each include:

a fixed portion configured to be fixed to the formwork; and

a support portion extending from the fixed portion to support the anchor bolts,

the support portion includes:

anchor holes through which the anchor bolts are respectively inserted; and

first engagement portions with which temporary coupling members are respectively engaged, the temporary coupling members being used to temporarily couple the support to the positioning member, and

the positioning member includes:

second engagement portions with which the temporary coupling members are respectively engaged; and

a reference portion that determines a position of the positioning member relative to the foundation.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/033181

A. CLASSIFICATION OF SUBJECT MATTER

E04G 21/18(2006.01)i; *E02D 27/00*(2006.01)i; *E04B 1/41*(2006.01)i
 FI: E04G21/18 A; E04B1/41 502B; E02D27/00 B

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)

E04G21/18; E02D27/00; E04B1/41

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

Published examined utility model applications of Japan 1922-1996
 Published unexamined utility model applications of Japan 1971-2022
 Registered utility model specifications of Japan 1996-2022
 Published registered utility model applications of Japan 1994-2022

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 11-6160 A (SEKISUI HOUSE LTD) 12 January 1999 (1999-01-12) paragraphs [0012]-[0028], fig. 1-3	1-2
A	paragraphs [0012]-[0028], fig. 1-3	3-7
A	JP 63-9620 Y2 (SEKISUI HOUSE LTD) 22 March 1988 (1988-03-22) entire text, all drawings	1-7
A	JP 8-189189 A (ASAHI CHEM IND CO LTD) 23 July 1996 (1996-07-23) entire text, all drawings	1-7

Further documents are listed in the continuation of Box C.

See patent family annex.

* 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
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 “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

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 11-6160 A	12 January 1999	(Family: none)	
JP 63-9620 Y2	22 March 1988	(Family: none)	
JP 8-189189 A	23 July 1996	(Family: none)	