

DESCRIPTION

SUPPORT LEG

Technical Field

[0001]

The present invention relates to a support leg.

Background Art

[0002]

A support leg in the related art is disclosed in Fig. 3 in Patent Document 1. The support leg is arranged between a prefabricative pan and an installation surface for supporting the prefabricative pan on the installation surface. The support leg includes a support member extending vertically from the lower surface of the prefabricative pan and a cylindrical member having an opening for allowing insertion of the support member at one end and a closed end at the other end. Filled in the interior of the cylindrical member is a curable material which cures with time.

[0003]

When the support leg in the related art as described above is used for supporting the prefabricative pan on the installation surface, the length of insertion of the support member with respect to the cylindrical member varies with the distance between the lower surface of the prefabricative pan

and the installation surface, and hence an adequate length is achieved. When the support member is excessively inserted into the cylindrical member when attaching the support leg to the lower surface of the prefabricative pan, a gap may be generated between the installation surface and the cylindrical member when installing the prefabricative pan. In this case as well, the cylindrical member settles down by its own weight and comes into abutment with the installation surface, the support leg is adjusted into an adequate length. Since the curable material filled in the interior of the cylindrical member cures with time after having installed the prefabricative pan, the support member and the cylindrical member are firmly integrated.

[0004]

Therefore, with this support leg, adjustment of the length is not necessary, and hence the time required for installation may be reduced. By the support member and the cylindrical member integrated firmly, the prefabricative pan may be reliably supported in the horizontal state.

Patent Document 1: JP-UM-B-7-38419

Disclosure of Invention

[0005]

However, with the support leg in the related art as described above, when the cylindrical member comes into contact

with and caught by the support member, the cylindrical member likely fails to settle down to the installation surface. When the curable material is cured with time in this state, the support member and the cylindrical member are integrated in a state of having a gap between the cylindrical member and the installation surface, and hence insufficient support of the prefabricative pan is resulted.

[0006]

In view of such circumstance, it is a problem to be solved by the present invention to provide a support leg which allows easy installation of a prefabricative pan and reliably supports the same in the horizontal state.

Means for Solving the Problem

[0007]

A support leg according to the present invention is a support leg arranged between a prefabricative pan and an installation surface for supporting the prefabricative pan on the installation surface including:

- a support member extending vertically from the lower surface of the prefabricative pan;

- a cylindrical member having an opening for allowing insertion of the support member at one end and a closed end at the other end;

- an elastic member provided between the support member

and the cylindrical member and having an elastic force in the direction to move the both members apart from each other; and

a curable material filled in the interior of the cylindrical member and curing with time.

[0008]

With the support leg of the present invention configured as describe above, even when the support member and the cylindrical member come into contact with each other, the support member and the cylindrical member are mounted to the lower surface of the prefabricative pan in a state of being away from each other to a maximum extent by an elastic force of the elastic member, that is, in a state in which the support leg has a maximum length. Therefore, when the prefabricative pan is installed on the installation surface, the cylindrical member may be brought into abutment with the installation surface without fail. Then, when the prefabricative pan is installed horizontally, the support leg is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material in the cylindrical member cures with time, the support member and the cylindrical member are firmly integrated.

[0009]

Therefore, the support leg of the present invention is able to install the prefabricative pan easily and reliably support the same in the horizontal state.

[0010]

The cylindrical member may be formed of an elastic material such as rubber. In this configuration, when the prefabricative pan is used as a floor surface of a bathroom unit or the like, vibrations generated during the use of the prefabricative pan are prevented from being propagated to the installation surface. Even when the cylindrical member is moved apart from the installation surface and then collides therewith due to the vibrations, the sound of collision may be reduced. Therefore, the bathroom unit or the like may be used comfortably.

[0011]

The cylindrical member may be provided with a vibration-resistant member formed of an elastic member such as rubber on the lower surface thereof. In this configuration as well, the vibrations generated when using the prefabricative pan may be prevented from being propagated to the installation surface. Even when the cylindrical member is moved apart from the installation surface and then collides therewith due to the vibrations, the sound of collision may be reduced. Therefore, the bathroom unit or the like may be used comfortably.

[0012]

The support leg may be arranged to a position where a builder's hand cannot reach such as the lower surface of the

center portion of the prefabricative pan. In this case as well, the support leg is automatically adjusted to an adequate length and supports the prefabricative pan, so that the prefabricative pan may be reliably supported in the horizontal state.

[0013]

The elastic member is preferably in abutment with the support member. In this case, since the elastic force of the elastic member is applied directly on the support member and the elastic force reliably acts in the direction to move the cylindrical member away, the cylindrical member may be brought into abutment with the installation surface further reliably.

[0014]

The cylindrical member of the present invention includes a movable portion which is expandable and contractable in the axial direction, and the elastic member is preferably formed integrally with the movable portion. In this case, since the support leg may be assembled only by inserting the support member into the cylindrical member, the prefabricative pan may be installed with more ease.

[0015]

The cylindrical member may be provided with the elastic member on the outer periphery thereof. In this case, since the elastic member is not provided in the interior of the cylindrical member, the resistance generated when filling the curable material in the interior of the cylindrical member is

eliminated, so that the curable material is filled easily in the interior of the cylindrical member. Therefore, fluctuation of the quality of the cylindrical members is reduced, and the manufacturing time may be reduced.

[0016]

Preferably, the elastic member is a coil spring. In this case, the coil spring may be provided easily in the interior or on the outer periphery of the cylindrical member.

[0017]

The coil spring having a diameter increasing gradually from one end to the other end so as not to be overlapped in the radial direction may be employed. In this case, the axial length of the coil spring when being compressed may be reduced. Therefore, the movable range of the cylindrical member with respect to the support member is increased. In other words, the range of adjustment of the support leg may be increased. Since the coil spring has a stable elastic force in the entire range of compression, the cylindrical member may be brought into abutment with the installation surface further reliably.

Brief Description of Drawings

[0018]

[Fig. 1] Fig. 1 is a cross-sectional view showing a state in which a prefabricative pan for bathtub and a prefabricative pan for washing place are installed.

[Fig. 2] Fig. 2 is a partly exploded cross-sectional view showing a support leg in Example 1.

[Fig. 3] Fig. 3 is a cross-sectional view showing a state after having installed the support leg in Example 1.

[Fig. 4] Fig. 4 is a partly exploded cross-sectional view showing the support leg in Example 2.

[Fig. 5] Fig. 5 is a cross-sectional view showing a state after having installed the support leg in Example 2.

[Fig. 6] Fig. 6 is a cross-sectional view of the support leg in Example 2 taken along the line A-A in Fig. 5.

[Fig. 7] Fig. 7 is a perspective view of a cylindrical member in Example 2.

[Fig. 8] Fig. 8 is a cross-sectional view showing a state in which the support leg in Example 3 is installed.

[Fig. 9] Fig. 9 is a cross-sectional view showing a state after having installed the support leg in Example 3.

[Fig. 10] Fig. 10 is a schematic drawing showing a dropout-preventing mechanism of the support leg in Example 3.

[Fig. 11] Fig. 11 is an exploded cross-sectional view of the support leg in Example 4.

[Fig. 12] Fig. 12 is a cross-sectional view showing a state after having installed the support leg in Example 4.

[Fig. 13] Fig. 13 is a cross-sectional view showing a state when installing the support leg in Example 5.

[Fig. 14] Fig. 14 is a cross-sectional view showing a state

after having installed the support leg in Example 5.

[Fig. 15] Fig. 15 is a cross-sectional view showing the cylindrical member in Example 6.

[Fig. 16] Fig. 16 is a cross-sectional view showing a state when installing the support leg in Example 7.

[Fig. 17] Fig. 17 is an exploded perspective view partly in cross-section of the cylindrical member in Example 7.

[Fig. 18] Fig. 18 is an exploded cross-sectional view of the cylindrical member in Example 8.

[Fig. 19] Fig. 19 is a perspective view partly in cross-section of the cylindrical member in Example 8.

Description of the Reference Numerals and Signs

[0019]

1...installation surface

5a, 5b... prefabricative pan (5a...prefabricative pan for bathtub, 5b... prefabricative pan for washing place)

8, 28, 38, 48... support member

9, 29, 39, 49, 59, 69, 79, 89... cylindrical member

10, 20, 30, 40, 50, 60, 70... support leg

11, 21, 31, 41, 51, 61, 71... elastic member

12... filled material

59c, 69c... movable portion

Best Mode for Carrying Out the Invention

[0020]

Referring now to the drawings, Examples 1 to 8 embodying the present invention will be described below.

EXAMPLE 1

[0021]

As shown in Fig. 1, the floor structure of a wooden architecture includes a foundation 2 extending upright so as to surround four sides of a prefabricative pan on an installation surface (floor slab) 1 for installing the prefabricative pan. The ground sills 3 are provided on the foundation 2, and a sleeper 4 is provided between the opposed ground sills 3. Provided above the ground sills 3 and the inner peripheral side surface on the interior side where the prefabricative pan is to be installed are Hoor joists 6a, 6b. The prefabricative pan includes a prefabricative pan for bathtub 5a and a prefabricative pan for washing place 5b integrated to each other. The peripheral portion of the prefabricative pan is engaged by the Hoor joists 6a, 6b and positioned thereby. The prefabricative pan for washing place 5b is supported by the sleeper 4 via a support leg 40 in Example 4 described later.

[0022]

Although not shown in the drawing, a plurality of support leg mounting portions each having a nut which allows screwing of a support member 8 of a support leg 10 are provided on the

lower surface of the prefabricative pan for bathtub 5a. Attached to the support leg mounting portion provided in a range where the builder's hand cannot reach (for example, at the center position of the prefabricative pan for bathtub 5a or the like) is the support leg 10 in Example 1 shown in Fig. 2 and Fig. 3. Attached to specific support leg mounting portion provided in a range where the builder's hand can reach is a hexagon coupling bolt having a length which reaches from the lower surface of the prefabricative pan for bathtub 5a to the installation surface 1. The support leg is used at the time of installing the prefabricative pan for adjusting the extent of screwing of the support leg mounting portion into the nut to adjust the prefabricative pan into a horizontal state.

[0023]

A locker room is provided adjacent to the bathroom in which the prefabricative pan is installed, and a surface 7a of a floor material 7 has substantially the same level as the surface of the prefabricative pan for washing place 5b.

[0024]

As shown in Fig. 2 and Fig. 3, the support leg 10 in Example 1 is adapted to be arranged between the prefabricative pan for bathtub 5a and the installation surface 1 for supporting the prefabricative pan for bathtub 5a on the installation surface 1.

[0025]

The support leg 10 includes the support member 8 to be screwed into the nut of the support leg mounting portion provided on the lower surface of the prefabricative pan for bathtub 5a so as to extend in the vertical direction. The support member 8 is a hexagon coupling bolt having a nominal diameter on the order from M16 to M20.

[0026]

The support leg 10 includes a cylindrical member 9 having an opening 9a which allows insertion of the support member 8 at one end thereof and a closed end at the other end 9b. The cylindrical member 9 is formed of an elastic material such as rubber. A projecting strip 9c which projects in the horizontal direction in the radial direction is integrally formed on the inner surface of the opening 9a. The inner diameter of a narrowed portion 9d formed by the projecting strip 9c is smaller than the outer diameter of a head portion 8a of the support member 8.

[0027]

The support leg 10 has an elastic member 11 provided between the support member 8 and the cylindrical member 9, and the elastic member 11 has an elastic force in the direction to move the both members apart from each other in the interior of the cylindrical member 9. The elastic member 11 is a coil spring having a diameter increasing gradually from one end to the other end.

[0028]

The interior of the cylindrical member 9 is filled with curable resin 12 which cures with time.

[0029]

The prefabricative pan is installed using the support leg 10 in Example 1 having a configuration as described above. The procedure will be described below.

[0030]

First of all, the support member 8 is attached to the lower surface of the prefabricative pan (first process). In the first process, the support members 8 are screwed into nuts of the plurality of support leg mounting portions provided in a range that the builder cannot reach in a state in which the prefabricative pan for bathtub 5a is installed.

[0031]

The hexagon coupling bolts having a length which reaches from the lower surface of the prefabricative pan for bathtub 5a to the installation surface are screwed onto specific support leg mounting portions in a range which the builder can reach in a state in which the prefabricative pan for bathtub 5a is installed. This hexagon coupling bolt is used for adjusting the extent of screwing of the support leg mounting portion into the nut to adjust the prefabricative pan into a horizontal state at the time of installing the prefabricative pan.

[0032]

Subsequently, as shown in Fig. 2, the cylindrical member 9 is joined to the support member 8 (second process). In the second process, since the cylindrical member 9 is formed of an elastic material such as rubber, the opening 9a, the narrowed portion 9d and the projecting strip 9c are deformed to assemble the elastic member 11 into the interior of the cylindrical member 9. After having assembled the elastic member 11 into the interior of the cylindrical member 9, the curable resin 12 is filled therein. When the support member 8 is inserted into the cylindrical member 9, the curable resin 12 is filled into the interior of the cylindrical member 9 from the opening 9a of the cylindrical member 9 by an amount which does not overflow. Then, the head portion 8a of the support member 8 is pushed and inserted from the opening 9a of the cylindrical member 9. In this case as well, since the cylindrical member 9 is formed of an elastic member such as rubber, the opening 9a, the narrowed portion 9d and the projecting strip 9c are deformed.

[0033]

Subsequently, the prefabricative pan for bathtub 5a and the prefabricative pan for washing place 5b are installed (third process). In the third process, as shown in Fig. 1, the prefabricative pan for bathtub 5a and the prefabricative

pan for washing place 5b are installed from above the installation surface 1. The builder adjusts the extent of screwing of the hexagon coupling bolts having a length which reaches from the lower surface of the prefabricative pan for bathtub 5a to the installation surface into the nut of the support leg mounting portion so as to settle the prefabricative pan for bathtub 5a and the prefabricative pan for washing place 5b in the horizontal state, and then the peripheral portions of the prefabricative pan for bathtub 5a and the prefabricative pan for washing place 5b are fixed to the Hoor joists 6a, 6b. In this state, the cylindrical members 9 come into abutment with the installation surface 1 by the elastic force of the elastic member 11, and the support legs 10 are automatically adjusted to adequate lengths.

[0034]

Then, the curable resin 12 filled into the interior of the cylindrical member 9 is cured, and the support member 8 and the cylindrical member 9 are firmly integrated (fourth process). Accordingly, as shown in Fig. 3, the support member 8 and the cylindrical member 9 are firmly integrated, and the prefabricative pan for bathtub 5a is supported.

[0035]

In the support leg 10 in Example 1, even when the support member 8 and the cylindrical member 9 are in contact with each other, the support member 8 and the cylindrical member 9 are

mounted to the lower surface of the prefabricative pan for bathtub 5a in a state of being away from each other to a maximum extent by an elastic force of the elastic member 11, that is, in a state in which the support leg 10 has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 9 may be brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg 10 is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material 12 in the support leg 10 cures with time, the support member 8 and the cylindrical member 9 are firmly integrated.

[0036]

Therefore, the support leg 10 in Example 1 is able to install the prefabricative pan easily and reliably support the same in the horizontal state.

[0037]

Since the cylindrical member 9 is formed of the elastic material such as rubber, vibrations generated when the prefabricative pan is used as the floor surface of the bathroom unit may be prevented from being propagated to the installation surface 1. Even when the cylindrical member 9 is moved apart from the installation surface 1 and then collides therewith due to the vibrations, the sound of collision may be reduced.

Therefore, the bathroom unit may be used comfortably.

[0038]

Since the support leg 10 is arranged to a position where the builder's hand cannot reach such as the lower surface of the center portion of the prefabricative pan 5a, the prefabricative pan 5a may be further reliably supported in the horizontal state.

[0039]

Since the elastic member 11 is in direct abutment with the support member 8, the elastic force of the elastic member 11 is applied directly on the support member 8 and the elastic force reliably acts in the direction to move the cylindrical member 9 away, so that the cylindrical member 9 may be brought into abutment with the installation surface 1 further reliably.

[0040]

Since the elastic member 11 is a coil spring having a diameter increasing gradually from one end to the other end so as not to be overlapped in the radial direction, the axial length of the coil spring when being compressed may be reduced. Therefore, the movable range of the cylindrical member 9 with respect to the support member 8 is increased. In other words, the range of adjustment of the support leg 10 may be increased. Since the coil spring has a stable elastic force in the entire range of compression, the cylindrical member 9 may be brought into abutment with the installation surface 1 further reliably.

[0041]

Since the projecting strip 9c which projects horizontally in the radial direction is integrally formed on the inner surface of the opening 9a of the cylindrical member 9, when the head portion 8a of the support member 8 is pushed and inserted therein, the projecting strip 9c comes into abutment with the head portion 8a, so that the cylindrical member 9 may be prevented from dropping out from the support member 8.

Example 2

[0042]

As shown in Fig. 4 to Fig. 7, in a support leg 20 in Example 2, a support member 28 includes a pin 28b projecting outward from the side surface of a head portion 28a. A cylindrical member 29 includes an opening 29a which allows insertion of the support member 28 at one end thereof and a closed end at the other end 29b. A rubber-made vibration preventing member 25 is adhered to the lower surface of the other end 29b.

[0043]

As shown in Fig. 7, a slit 29d which allows insertion of the pin 28b is formed on the side surface of the cylindrical member 29 in the vertical direction. Formed above the slit 29d are projecting strips 29e so as to narrow the slit width.

[0044]

A curved cover 29f is formed on the outer side surface

of the slit 29d. The elastic member 21 is a coil spring having the constant diameter from one end to the other end. Other components are the same as in Example 1. Therefore, the same components are designated by the same reference numerals and detailed description will be omitted.

[0045]

The procedure for installing the prefabricative pan using the support leg 20 in Example 2 is the same as that in Example 1 except for those described below.

[0046]

When installing the prefabricative pan using the support leg 20 in Example 2, in the second process, as shown in Fig. 4 to Fig. 6, the head portion 28a of the support member 28 is inserted from the opening of the cylindrical member 29 while inserting the pin 28b in the slit 29. The support member 28 is inserted into the interior of the cylindrical member 29 until the pin 28b comes to a position lower than the projecting strips 29e provided at the slit 29d.

[0047]

In the support leg 20 in Example 2 as described above, even when the support member 28 and the cylindrical member 29 are in contact with each other, the support member 28 and the cylindrical member 29 are mounted to the lower surface of the prefabricative pan for bathtub 5a in a state of being away from each other to a maximum extent by an elastic force of the elastic

member 21, that is, in a state in which the support leg 20 has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 29 may be brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg 20 is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material 12 in the support leg 20 cures with time, the support member 28 and the cylindrical member 29 are firmly integrated.

[0048]

Therefore, the support leg 20 in Example 2 provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0049]

Since the rubber-made vibration preventing member 25 is adhered to the lower surface of the other end 29b of the cylindrical member 29, vibrations generated when the prefabricative pan is used as the floor surface of the bathroom unit may be prevented from being propagated to the installation surface 1. Even when the vibration preventing member 25 is moved apart from the installation surface 1 and then collides therewith due to the vibrations, the sound of collision may be reduced by the cylindrical member 29. Therefore, the bathroom unit may be used comfortably.

[0050]

Since the support leg 20 is arranged to a position where the builder's hand cannot reach such as the lower surface of the center portion of the prefabricative pan 5a, the prefabricative pan 5a may be further reliably supported in the horizontal state.

[0051]

Since the elastic member 21 is in direct abutment with the support member 28, the elastic force of the elastic member 21 is applied directly on the support member 28 and the elastic force reliably acts in the direction to move the cylindrical member 29 away, so that the cylindrical member 29 may be brought into abutment with the installation surface 1 further reliably.

[0052]

Since the elastic member 21 is a coil spring, it may be provided easily in the interior of the cylindrical member 29.

[0053]

Since the pin 28b comes into abutment with the slit 29d, the cylindrical member 29 may be prevented from dropping out from the support member 28.

[0054]

Since the curved cover 29f is formed on the outer side surface of the slit 29d, when the curable resin 12 is filled in the interior of the cylindrical member 29, leakage to the outside may be prevented.

Example 3

[0055]

As shown in Fig. 8 to Fig. 10, in a support leg 30 in Example 3, a support member 38 is formed of a tube member opened at the lower end and provided with an air-vent hole 38a on the upper side surface thereof. A flange 38c to be fixed to the lower surface of the prefabricative pan for bathtub 5a with a screw is integrally formed at the upper end of the support member 38. The support member 38 is provided with a pin 38b on the side surface thereof.

[0056]

The cylindrical member 39 is formed of a tube member having the opening 39a opened at the upper end. As shown in Fig. 10, the cylindrical member 39 is provided on the side surface thereof with a slit 39d which allows insertion of the pin 38b and has a horizontal opening 39g in the middle. The lower end of the cylindrical member 39 is sealed and a rubber made vibration preventing material 34 is attached with a screw 33. A large diameter head portion 33a of the screw 33 is embedded into the interior of a recess 34 provided on the lower surface of the vibration preventing material 34.

[0057]

The elastic member 31 is a coil spring having a constant diameter from one end to the other end, and the support member 38 is inserted in the inside thereof. The elastic member 31

is engaged at one end with the lower surface of the flange 38c and is engaged at the other end with the upper end of the cylindrical member 39. Other components are the same as in Example 1. Therefore, the same components are designated by the same reference numerals and detailed description will be omitted.

[0058]

The procedure for installing the prefabricative pan using the support leg 30 in Example 3 is the same as that in Example 1 except for those described below.

[0059]

When installing the prefabricative pan using the support leg 30 in Example 3, in the first process, the support member 38 is fixed to the support leg mounting portion on the lower surface of the prefabricative pan for bathtub 5a with a screw. In the second process, as shown in Fig. 8 to Fig. 10, the support member 38 is inserted into and connected with the cylindrical member 39 which only has the curable resin 12 in the interior thereof. In this case, the support member 38 is inserted until the pin 38b reaches the horizontal opening 39g of the slit 39d provided on the cylindrical member 39, and then the cylindrical member 39 is rotated so that the pin 38b comes into abutment with and is engaged with the upper surface of the horizontal opening 39g.

[0060]

In the support leg 30 in Example 3, even when the support member 38 and the cylindrical member 39 are in contact with each other, the support member 38 and the cylindrical member 39 are mounted to the lower surface of the prefabricative pan for bathtub 5a in a state of being away from each other to a maximum extent by an elastic force of the elastic member 31, that is, in a state in which the support leg 30 has a maximum length. Therefore, when the prefabricative pan for bathtub 5a may be installed on the installation surface 1, the cylindrical member 39 is brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg 30 is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material 12 in the support leg 30 cures with time, the support member 38 and the cylindrical member 39 are firmly integrated.

[0061]

Therefore, the support leg 30 in Example 3 provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0062]

Since the rubber-made vibration preventing material 34 is attached to the lower end of the cylindrical member 39, vibrations generated when the prefabricative pan is used as the floor surface of the bathroom unit may be prevented from

being propagated to the installation surface 1. Even when the vibration preventing member 34 is moved apart from the installation surface 1 and then collides therewith due to the vibrations, the sound of collision may be reduced. Therefore, the bathroom unit may be used comfortably.

[0063]

Since the support leg 30 is arranged to a position where the builder's hand cannot reach such as the lower surface of the center portion of the prefabricative pan 5a, the prefabricative pan 5a may be further reliably supported in the horizontal state.

[0064]

Since the elastic member 31 is in direct abutment with the flange 38c provided integrally with the support member 38, the elastic force of the elastic member 21 is applied directly on the flange 38c and the elastic force reliably acts in the direction to move the cylindrical member 39 away, so that the cylindrical member 39 may be brought into abutment with the installation surface 1 further reliably.

[0065]

Since the elastic member 31 is not provided in the interior of the cylindrical member 39, resistance generated when filling the curable resin 12 in the interior of the cylindrical member 39 is eliminated, so that the curable resin 12 may easily be filled in the interior of the cylindrical

member 39. Therefore, fluctuation of the quality of the cylindrical members 39 is reduced, and the manufacturing time may be reduced.

[0066]

Since the pin 38b comes into abutment with and is engaged with the upper surface of the horizontal opening 39g of the slit 39d, the cylindrical member 39 may be prevented from dropping out from the support member 38.

Example 4

[0067]

As shown in Fig. 11 and Fig. 12, in a support leg 40 in Example 4, a support member 48 includes a flange 48c having a projection 48d formed integrally at the center portion thereof and a folded portion 48e formed integrally around the outer periphery thereof. A rubber-made vibration preventing member 45 is provided on the upper surface of the flange 48c, and a double-faced adhesive tape 46 is adhered to the upper surface of the vibration preventing member 45.

[0068]

The cylindrical member 49 includes an opening 49a which allows insertion of the projection 48d of the support member 48 at one end thereof, and a closed end at the other end 49b. A rubber-made vibration preventing member 45 is provided on the lower surface of the other end 49b, and the double-faced adhesive tape 46 is adhered to the lower surface of the

vibration preventing member 45. The curable resin 12 is filled in the interior of the cylindrical member 49.

[0069]

An elastic member 41 is a coil spring having the constant diameter from one end to the other end, and is provided on the outer peripheral portion of the cylindrical member 49.

[0070]

The prefabricative pan is installed using the support legs 40 in Example 4 having the configuration as described above. The procedure will be described below. The support leg 40 is, as shown in Fig. 1 and Fig. 12, arranged between the prefabricative pan for washing place 5b and the sleeper 4.

[0071]

First of all, as shown in Fig. 12, the cylindrical member 49 filled with the curable resin 12 in the interior thereof is fixed to the upper surface of the sleeper 4 by the double-faced adhesive tape 46. Then, the elastic member 41 is arranged on the outer peripheral portion of the cylindrical member 49, and a support member 98 is aligned from above. Then, the prefabricative pan for washing place 5b is arranged from above. Accordingly, it is fixed to the prefabricative pan for washing place 5b by the double-faced adhesive tape 46. Subsequently, the curable resin 12 is cured with time, and hence the support member 48 and the cylindrical member 49 are firmly integrated, so that the prefabricative pan for washing place

5b is supported.

[0072]

In the support leg 40 in Example 4 as described above, an elastic force of the elastic member 41 is applied in the direction to move the support member 48 and the cylindrical member 49 away from each other, and the support leg 40 is mounted to the sleeper 4. Then, when the prefabricative pan for washing place 5b is installed horizontally, the support leg 40 is automatically shortened to an adequate length simultaneously. Subsequently, since the curable resin 12 in the support leg 40 is cured with time, the support member 48 and the cylindrical member 49 are firmly integrated.

[0073]

Therefore, the support leg 40 in Example 4 provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0074]

Since the vibration preventing members 45 are provided on the lower surface of the cylindrical member 49 and the upper surface of the flange 48c of the support member 48, vibrations generated when the prefabricative pan is used as the floor surface of the bathroom unit may be prevented from being propagated to the sleeper 4.

[0075]

Since the elastic member 41 is not provided in the

interior of the cylindrical member 49, the resistance generated when filling the curable resin 12 in the interior of the cylindrical member 49 is eliminated, so that the curable resin 12 may easily be filled in the interior of the cylindrical member 49. Therefore, fluctuation of the quality of the cylindrical members 49 is reduced, and the manufacturing time may be reduced.

Example 5

[0076]

As shown in Fig. 13 and Fig. 14, in the support leg 50 in Example 5, the side wall of a cylindrical member 59 is formed of an axially expandable movable portion 59c. A bottom member 59b is integrally formed with the lower end of the movable portion 59c. A flange 59bf projecting outward with respect to the movable portion 59c is formed on the outer periphery of the bottom member 59b.

[0077]

Formed on the upper end of the movable portion 59c are flange portion 59h extending outward, a vertical portion 59i extending upward from the outer peripheral portion of the flange portion 59h and an upper surface portion 59j folded from the upper end of the vertical portion 59i horizontally in the radial direction. An opening 59a is formed at the center portion of the upper surface portion 59j.

[0078]

The head portion 8a of the support member 8 is fitted to the upper portion of the cylindrical member 59. The cylindrical member 59 is entirely formed of an elastic material such as rubber.

[0079]

The elastic member 51 is a coil spring having the constant diameter from one end to the other end. The elastic member 51 is provided on the outer peripheral portion of the movable portion 59c with one end engaged with the upper surface of the flange 59bf, and the other end with the lower surface of the flange portion 59h. Other components are the same as Example 1. Therefore, the same components are designated by the same reference numerals and detailed description will be omitted.

[0080]

The procedure for installing the prefabricative pan using the support leg 50 in Example 5 is the same as that in Example 1 except for those described below.

[0081]

When installing the prefabricative pan using the support leg 50 in Example 5, in the second process, as shown in Fig. 13 and Fig. 14, only the head portion 8a of the support member 8 is inserted while deforming the opening 59a of the cylindrical member 59. Since the outer peripheral portion of the distal end of the inserted head portion 8a comes into abutment with the flange portion 59h of the cylindrical member 59, the support

member 8 is not further inserted into the interior of the cylindrical member 59.

[0082]

In the support leg 50 in Example 5 as described above, the support member 8 and the cylindrical member 59 are mounted to the lower surface of the prefabricative pan for bathtub 5a in the state of being away from each other to a maximum extent by the elastic force of the elastic member 31, that is, in a state in which the support leg 50 has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 59 may be brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg 50 is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material 12 in the support leg 50 cures with time, the support member 8 and the cylindrical member 59 are firmly integrated.

[0083]

Therefore, the support leg 50 in Example 5 provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0084]

Since the cylindrical member 59 is formed of an elastic material such as rubber, vibrations generated when the

prefabricative pan is used as the floor surface of the bathroom unit or the like may be prevented from being propagated to the installation surface 1. Even when the cylindrical member 59 is moved apart from the installation surface 1 and then collides therewith due to the vibrations, the sound of collision may be reduced. Therefore, the bathroom unit may be used comfortably.

[0085]

Since the support leg 50 is arranged to a position where the builder's hand cannot reach such as the lower surface of the center portion of the prefabricative pan 5a, the prefabricative pan 5a may be further reliably supported in the horizontal state.

[0086]

Since the elastic member 51 is not provided in the interior of the cylindrical member 59, resistance generated when filling the curable resin 12 in the interior of the cylindrical member 59 is eliminated, so that the curable resin 12 may easily be filled in the interior of the cylindrical member 59. Therefore, fluctuation of the quality of the cylindrical members 59 is reduced, and the manufacturing time may be reduced.

Example 6

[0087]

As shown in Fig. 15, a cylindrical member 69 in Example

6 as described above is formed by insert-molding an elastic member 61 as the coil spring in a movable portion 69c of the cylindrical member 69. Other components and the procedure for installing the prefabricative pan using the support leg in which the cylindrical member 69 is employed are the same as that in Example 5. Therefore, detailed description will be omitted.

[0088]

In the support leg in which the cylindrical member 69 in Example 6 is employed, the support member and the cylindrical member 69 are mounted to the lower surface of the prefabricative pan for bathtub 5a in the state of being away from each other to a maximum extent by an elastic force of the elastic member 61, that is, in a state in which the support leg has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 69 is brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material in the support leg cures with time, the support member and the cylindrical member 69 are firmly integrated.

[0089]

Therefore, the support leg in which the cylindrical

member 69 in Example 6 is employed provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0090]

Since the support leg may be assembled only by inserting the support member into the cylindrical member 69, the prefabricative pan may be installed further easily.

Example 7

[0091]

As shown in Fig. 16 and Fig. 17, in a support leg 70 in Example 7, a cylindrical member 79 includes a first cylindrical member 79u and a second cylindrical member 79b. The first cylindrical member 79u opens the lower end, and includes a cylindrical portion 79r having an opening 79a at the center portion of an upper surface portion 79s. The cylindrical portion 79r allows insertion of the shaft portion of the support member 8. The first cylindrical member 79u is formed of resin or metal.

[0092]

The second cylindrical member 79b opens at the upper end thereof and has a recess 79n at the center portion of the bottom surface. The second cylindrical member 79b includes a shoulder portion 79m on the outer periphery at a level higher than the bottom surface, and is provided above the shoulder portion 79m with a connecting portion 79l having a wedge shaped

concavo-convex on the outer periphery thereof. The second cylindrical member 79b is formed of elastic material such as rubber. The second cylindrical member 79b is filled with the curable resin 12 in the interior thereof.

[0093]

When the connecting portion of the second cylindrical member 79b is inserted into the opening at the lower end of the first cylindrical member 79u, the concavo-convex of the connecting portion 79l of the second cylindrical member 79b comes into tight contact with the inner peripheral surface of the lower portion of the first cylindrical member 79u, and the first cylindrical member 79u and the second cylindrical member 79b are firmly coupled.

[0094]

An elastic member 71 is a coil spring having a constant diameter from one end to the other end thereof and is fitted into the recess 79n. Other components are the same as those in Example 1. Therefore, the same components are designated by the same reference numerals and detailed description will be omitted.

[0095]

The procedure for installing the prefabricative pan using the support leg 70 in Example 7 is the same as that in Example 1 except for those described below.

[0096]

When installing the prefabricative pan using the support leg 70 in Example 7, in the first process, the shaft portion of the support member 8 is inserted into the cylindrical portion 79r of the first cylindrical member 79u, and then the support member 8 is screwed to the support leg mounting portion of the prefabricative pan for bathtub 5a. In the second process, as shown in Fig. 16, the second cylindrical member 79b having the elastic member 71 and the curable resin 12 in the interior thereof is coupled to the first cylindrical member 79u having the support member 8 inserted therein.

[0097]

In the support leg 70 in Example 7 as described above, even when the support member 8 and the cylindrical member 79 are in contact with each other, the support member 8 and the cylindrical member 79 are mounted to the lower surface of the prefabricative pan for bathtub 5a in a state of being away from each other to a maximum extent by an elastic force of the elastic member 71, that is, in a state in which the support leg 70 has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 79 may be brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg 70 is automatically shortened to an adequate length simultaneously. Subsequently, the curable material 12

in the support leg 70 cures with time, the support member 8 and the cylindrical member 79 are firmly integrated.

[0098]

Therefore, the support leg 70 in Example 7 provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0099]

Since the second cylindrical member 79b is formed of an elastic material such as rubber, vibrations generated when the prefabricative pan is used as the floor surface of the bathroom unit may be prevented from being propagated to the installation surface 1. Even when the second cylindrical member 79b is moved apart from the installation surface 1 and then collides therewith due to the vibrations, the sound of collision may be reduced. Therefore, the bathroom unit may be used comfortably.

[0100]

Since the support leg 70 is arranged to a position where the builder's hand cannot reach such as the lower surface of the center portion of the prefabricative pan 5a, the prefabricative pan 5a may be further reliably supported in the horizontal state.

[0101]

Since the elastic member 71 is in direct abutment with the support member 8, the elastic force of the elastic member

71 is applied directly on the support member 8 and the elastic force reliably acts to move the cylindrical member 79 away, so that the cylindrical member 29 may be brought into abutment with the installation surface 1 further reliably.

[0102]

Since the elastic member 71 is a coil spring, it may be provided easily in the interior of the cylindrical member 79.

[0103]

Since the second cylindrical member 79b is coupled with the first cylindrical member 79u having the support member 8 inserted therein, the cylindrical member 79 may be coupled easily to the support member 8.

[0104]

Since the head portion 8a of the support member 8 is in abutment with and engaged with the upper surface portion 79s of the first cylindrical member 79, the cylindrical member 79 may be prevented from dropping out from the support member 8.

Example 8

[0105]

As shown in Fig. 18 and Fig. 19, a cylindrical member 89 in Example 8 is configured in such a manner that a first cylindrical member 89u and a second cylindrical member 89b are coupled by screwing a female screw 89n provided on the inner surface of the lower portion of the first cylindrical member 89u and a male screw 89l provided on the connecting portion

of the second cylindrical member. Other components and the procedure for installing the prefabricative pan using the support leg in which the cylindrical member 89 is employed are the same as in Example 7. Therefore, detailed description will be omitted.

[0106]

In the support leg in which the cylindrical member 89 in Example 8 as described above is employed, even when the support member and the cylindrical member 89 are in contact with each other, the support member and the cylindrical member 89 are mounted to the lower surface of the prefabricative pan for bathtub 5a in the state of being away from each other to a maximum extent by the elastic force of the elastic member, that is, in a state in which the support leg has a maximum length. Therefore, when the prefabricative pan for bathtub 5a is installed on the installation surface 1, the cylindrical member 89 is brought into abutment with the installation surface 1 without fail. Then, when the prefabricative pan for bathtub 5a is installed horizontally, the support leg is automatically shortened to an adequate length simultaneously. Subsequently, since the curable material 12 in the support leg cures with time, the support member and the cylindrical member 89 are firmly integrated.

[0107]

Therefore, the support leg in Example 8 in which the

cylindrical member 89 in Example 8 is employed provides the same effects and advantages of the present invention as in the case of the support leg 10 in Example 1.

[0108]

Since coupling is achieved by screwing the female screw 89n of the first cylindrical member 89u and the male screw 89l of the second cylindrical member 89b, coupling of the support member and the cylindrical member 89 may be ensured.

Industrial Applicability

[0109]

The present invention is applicable to the support leg for supporting the prefabricative pan which constitutes the floor surface the bathroom unit or the like on the installation surface.

CLAIMS

1. A support leg arranged between a prefabricative pan and an installation surface for supporting the prefabricative pan on the installation surface comprising:

a support member extending vertically from the lower surface of the prefabricative pan;

a cylindrical member having an opening for allowing insertion of the support member at one end and a closed end at the other end;

an elastic member provided between the support member and the cylindrical member and having an elastic force in the direction to move the both members apart from each other; and

a curable material filled in the interior of the cylindrical member and curing with time.

2. The support leg according to Claim 1, wherein the elastic member is in abutment with the support member.

3. The support leg according to Claim 1 or Claim 2, wherein the cylindrical member includes a movable portion which is expandable in the axial direction, and the elastic member is formed integrally with the movable portion.

4. The support leg any one of Claims 1 to 3, wherein the elastic member is a coil spring.