

DESCRIPTION

DECK PLATE AND MANUFACTURING METHOD FOR SAME

TECHNICAL FIELD

[0001]

The present invention relates to a deck plate used when a concrete slab is formed on a floor, a ceiling, or the like of a building and to a manufacturing method for the same, and particularly relates to a deck plate that is hardly deformed and easily reused and to a manufacturing method for the same.

BACKGROUND ART

[0002]

In a building in which reinforced concrete or steel-reinforced concrete is a structural material, a slab is formed on a floor, a ceiling, or the like by placing concrete in a form that is temporarily set on a beam or the like. A deck plate formed by machining a steel plate is often used for the form.

Since this deck plate finishes its role when the concrete is hardened, it is desirable that the deck plate be quickly separated and recovered from the concrete to be reused after the slab construction.

[0003]

For example, Patent Document 1 discloses an invention relating to a building construction method that efficiently forms a concrete slab between a first beam and a second beam arranged in a horizontal direction at a predetermined distance and which is capable of reusing a temporary floor plate corresponding to the aforementioned deck

plate.

In the invention disclosed in Patent Document 1, a variable length temporary floor plate and a fixed length temporary floor plate are used. In the variable length temporary floor plate, two flat plates are combined so as to be freely slidable in a longitudinal direction in a state in which a rear end part of one flat plate and a front end part of another flat plate overlap each other. Note that each of the variable length temporary floor plate and the fixed length temporary floor plate has a flat surface serving as a molding face.

Moreover, these temporary floor plates are bridged over between a pair of top edge parts facing each other of two beam molding forms via ties installed on timbering. Accordingly, a floor face for pouring concrete that serves as a molding material is constructed.

According to this method, since the timbering, the ties, and the beam molding forms are dismantled after the concrete is solidified, the variable length temporary floor plate and the fixed length temporary floor plate can be easily separated and recovered from the concrete slab.

[0004]

Further, Patent Document 2 discloses an invention titled “Slide type Deck Plate and Construction Method” that relates to a reusable and convertible deck plate capable of adjusting its length and to a slab construction method using the same.

The invention disclosed in Patent Document 2 includes two types of deck plates each having a plate main body whose top face serving as a temporary floor face and a slide holder provided on a bottom face of the plate main body. The plate main body and the slide holder are formed so as to be able to connect the two deck plates in a male and female manner.

Since a length of the deck plate can be adjusted according to an interval between slab forming regions, the deck plate with this structure has a wide range of convertible object and is excellent in versatility.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0005]

Patent Document 1: JP 3781425 B1

Patent Document 2: JP 2005-54354 A

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0006]

However, in the invention which is a conventional art and disclosed in Patent Document 1, bending stress is concentrated in a vicinity of a boundary of an end part of a projection part and a mount frame of a form member due to weight of the concrete placed on top faces of the temporary floor plates. Accordingly, there is a problem in that a crack or partial deformation occurs on the flat plate and the plate cannot be reused. Further, since the projection part joined to the flat plate by welding or the like is deformed when separated from the flat plate, there is a problem in that it is also not possible to reuse the projection part alone. Further, a sectional shape of the projection part at a part that is not joined to the flat plate is easily distorted, and it is necessary to slide the projection part carefully. Therefore, there is a problem in that workability when adjusting a length of the deck plate is bad.

[0007]

Further, in the invention disclosed in Patent Document 2, bending stress is concentrated on the plate main body in a vicinity of an end part of the slide holder due to weight of the concrete placed on top faces of the deck plates. Accordingly, there is a case where a crack or partial deformation occurs on the plate main body and the plate cannot be reused even when the deck plate is recovered after the slab construction. Further, since the slide holder is easily deformed when separated from the plate main body, it is also difficult to reuse the slide holder alone. Further, the slide holder having a shape whose top face is opened has low stiffness against torsional deformation or the like. Accordingly, a sectional shape of the slide holder is easily distorted when the slide holders are slid to each other. In other words, since it is necessary to perform the work carefully, there is a problem in that the length of the deck plate cannot be adjusted efficiently and in a short time.

[0008]

The present invention is made so as to deal with these conventional circumstances, and an object thereof is to provide a deck plate that allows an overall length to be adjusted efficiently and that is recovered and can be repeatedly used a plurality of times after construction of a concrete slab, and a manufacturing method for the same.

SOLUTIONS TO THE PROBLEMS

[0009]

In order to achieve the above-described objects, a first aspect of the present invention is a deck plate used as a form when a concrete slab is formed on a floor or the like of a building, including: a first square pipe and a second square pipe crushed into a flat shape over a predetermined length from one ends and respectively formed with a

flat part; a first flat plate in which a top face of the first square pipe is joined to a bottom face except a predetermined range along a longitudinal direction from another end; and a second flat plate in which a top face of the second square pipe is joined to a bottom face, wherein the first square pipe is formed so as to be insertable into the second square pipe, and the first square pipe and the second square pipe are respectively joined to the first flat plate and the second flat plate so that respective opened other ends can be inserted each other.

[0010]

In the deck plate with this structure, the flat part and an inclined part following it are formed on bottom faces of the first square pipe and the second square pipe along the longitudinal direction over the predetermined length from the one end crushed into a flat shape. Note that this flat part makes contact with a square timber or the like for supporting the deck plate when this deck plate is installed in the building as the form.

Further, for example, in the projection part whose section is V-shaped as in the invention described in Patent Document 1, a top part is opened, and stiffness of the projection part against torsional deformation is low. Accordingly, deformation easily occurs at a part of the projection part which is not joined to a flat plate part. Further, when the projection part is separated from the flat plate part as well, a sectional shape thereof is easily deformed.

Additionally, when the concrete is placed on top faces of the first flat plate and the second flat plate, lime wash (a state in which cement is kneaded with water only) leaked from a gap between the bottom face of the first flat plate and the top face of the second flat plate flows from the opened top part into an interior of the projection part along the bottom face of the first flat plate or the second flat plate. This lime wash is solidified in a state of being attached to an inner wall of the projection part and becomes

an obstacle when the other projection part is inserted. As a result, the deck plate cannot be reused.

[0011]

On the other hand, in the deck plate of the present invention, stiffness of the first square pipe and the second square pipe against torsional deformation is remarkably high compared with the aforementioned projection part. Accordingly, deformation hardly occurs even when the square pipe is not joined to the first flat plate or the second flat plate. In other words, in the deck plate of the present invention, even when the first square pipe is not joined to the first flat plate in the predetermined range along the longitudinal direction from the other end, and, for example, the first square pipe is slid while the other end thereof is inserted into the second square pipe, there is no possibility that a sectional shape of the first square pipe is deformed at that place. Further, even when the first square pipe or the second square pipe is separated from the first flat plate or the second flat plate, sectional shapes thereof are hardly deformed. Further, top parts of the first square pipe and the second square pipe are not opened. Accordingly, a situation where operation of adjusting the length of the deck plate by sliding the first square pipe inserted into the second square pipe is prevented by the flow and solidification of the aforementioned lime wash in the interior of the first square pipe or the second square pipe along the bottom face of the first flat plate or the second flat plate does not occur.

[0012]

Further, a second aspect of the present invention is the deck plate according to the first aspect, wherein bellows-shaped folding parts are respectively formed on side faces of the first square pipe and the second square pipe along a longitudinal direction from the one ends so as to at least go over the flat part.

When the concrete is placed on a top face of the deck plate, stress concentration easily occurs at a boundary between the flat part and the inclined part on the bottom faces of the first square pipe and the second square pipe. However, in the deck plate of the present invention, since stiffness at the aforementioned boundary between the flat part and the inclined part is enhanced by the bellows-shaped folding parts, breakage or deformation hardly occurs at that place.

[0013]

A third aspect of the present invention is the deck plate support according to the second aspect, including: an elongated member installed in an interior of the first square pipe and the second square pipe, respectively, along the longitudinal direction from vicinities of the respective one ends so as to at least go over the flat part.

In addition to an action according to the second aspect of the present invention, the deck plate with this structure has an action in which stiffness at the aforementioned boundary between the flat part and the inclined part is further enhanced by the elongated member.

[0014]

A fourth aspect of the present invention is a manufacturing method for a deck plate used as a form when a concrete slab is formed on a floor or the like of a building, including: with respect to a first square pipe and a second square pipe formed so as to be able to insert the first square pipe into an interior thereof, respectively forming V-shaped grooves with a predetermined length along a longitudinal direction thereof from one ends on a pair of facing side faces; with respect to bottom faces orthogonal to the pair of side faces of the first square pipe and the second square pipe, crushing into a flat shape and forming a flat part in a range which does not go over places where the V-shaped grooves are respectively formed along the longitudinal direction from the one

ends; joining a top face of the first square pipe to a bottom face of a first flat plate except a predetermined range along the longitudinal direction from another end; and joining a top face of the second square pipe to a bottom face of a second flat plate.

According to this manufacturing method for the deck plate, in the first square pipe and the second square pipe, a portion of the pair of side surfaces is deformed so as to be folded in the bellows shape according to the V-shaped grooves, and folding parts are formed. Moreover, the bottom faces are reasonably deformed without occurring a crack or the like at the pressed places, and the flat part is formed in a range which does not go over the folding parts along the longitudinal direction from the one ends. Further, since the invention of a product according to the first aspect or the second aspect is perceived as the invention of a process in the present invention, the present invention has an action similar to those in the first aspect and the second aspect of the present invention.

[0015]

A fifth aspect of the present invention is the manufacturing method for the deck plate according to the fourth aspect, further including: followed by the formation of the V-shaped grooves, installing an elongated member in the interior of the first square pipe and the second square pipe from vicinities of the one ends so as to at least go over places crushed into a flat shape.

According to this manufacturing method for the deck plate, the folding part formed from the V-shaped grooves acts so as to hold and fix the elongated member from above and below together with an inner face of the first square pipe or the second square pipe. Further, since the invention of a product according to the third aspect is perceived as the invention of a process in the present invention, the present invention has an action similar to that in the third aspect of the present invention.

EFFECTS OF THE INVENTION

[0016]

As described above, according to the deck plate in the first aspect of the present invention, for example, when the other end of the first square pipe is inserted into the second square pipe and the first square pipe is slid relative to the second square pipe, the sectional shape of the first square pipe is hardly distorted as well at the part that is not joined to the first flat plate over the predetermined range from the other end. Accordingly, work of adjusting an overall length of the deck plate can be performed repeatedly and safely. Further, when the deck plate is recovered and the first square pipe or the second square pipe is separated from the first flat plate or the second flat plate after the concrete slab is constructed, the sectional shape of the first square pipe or the second square pipe is hardly distorted. Accordingly, the deck plate can be repeatedly used a plurality of times. Further, since there is no possibility that the square pipes cannot be used due to the lime wash flowed and solidified in the interior of the first square pipe or the second square pipe, the recovered deck plate can be effectively reused.

[0017]

According to the deck plate in the second aspect of the present invention, since breakage or deformation hardly occurs in the first square pipe and the second square pipe, an effect of the first aspect of the present invention in which the deck plate can be repeatedly used a plurality of times is further exhibited.

[0018]

According to the deck plate in the third aspect of the present invention, an effect of the second aspect of the present invention is further exhibited.

[0019]

According to the manufacturing method for the deck plate in the fourth aspect of the present invention, an effect similar to that of the first aspect or the second aspect of the present invention is obtained. Additionally, an effect in which the deck plate according to the second aspect can be easily realized is obtained.

[0020]

According to the manufacturing method for the deck plate in the fifth aspect of the present invention, an effect similar to that of the third aspect of the present invention is obtained. Further, since the elongated member is fixed by the folding part, there is no possibility that the elongated member is carelessly removed from the first square pipe or the second square pipe during manufacturing of the deck plate or after manufacturing of the deck plate. In other words, the safe deck plate can be easily manufactured according to the manufacturing method of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1(a) is a side view of a deck plate according to an embodiment of the present invention; and FIGS. 1(b) and 1(c) are plan views of two types of form members configuring the deck plate shown in FIG. 1(a).

FIG. 2(a) is a perspective view of an external appearance of the form members configuring the deck plate shown in FIGS. 1; and FIGS. 2(b) and 2(c) are views in a direction of an arrow B and in a direction of an arrow C in FIG. 2(a), respectively.

FIG. 3(a) is a view in a direction of an arrow D in FIG. 2(a); and FIG. 3(b) is a sectional view taken along a line E-E in FIG. 2(a).

FIG. 4 is a process chart showing a manufacturing method for the deck plate

according to the embodiment of the present invention.

FIGS. 5(a) and 5(b) are views for explaining the manufacturing method for the deck plate along the process chart in FIG. 4.

FIGS. 6(a) to 6(d) are views for explaining a using state of the deck plate according to the embodiment of the present invention.

EMBODIMENTS OF THE INVENTION

[0022]

A deck plate and a manufacturing method for the same of the present invention will be concretely described by referring to FIGS. 1 to FIGS. 5.

Further, using a case where the deck plate is installed on an upper side flange of an H-steel to be used as a beam of a building as an example, usage of the deck plate of the present invention will be described by referring to FIGS. 6.

EMBODIMENT

[0023]

A structure of a deck plate of the present embodiment will be described by using FIGS. 1 to FIGS. 3 (particularly, corresponding to claim 1 to claim 3).

FIG. 1(a) is a side view of the deck plate of the present embodiment, and FIG. 1(b) and FIG. 1(c) are plan views of two types of form members configuring the deck plate shown in FIG. 1(a). Further, FIG. 2(a) is a perspective view of an external appearance of the form members configuring the deck plate shown in FIGS. 1, and FIG. 2(b) and FIG. 2(c) are views in a direction of an arrow B and in a direction of an arrow C in FIG. 2(a), respectively. FIG. 3(a) is a view in a direction of an arrow D in FIG. 2(a), and FIG. 3(b) is a sectional view taken along a line E-E in FIG. 2(a).

Note that FIG. 1(b) and FIG. 1(c) correspond to views showing a state in which a deck plate 1, when viewed in a direction indicated by an arrow A in FIG. 1(a), is disassembled into form members 2, 3.

[0024]

As shown in FIG 1(a) to FIG. 1(c), the deck plate 1 is formed of steel plate form members 2, 3 with a thickness of approximately 0.8 mm. The form members 2, 3 are configured by flat plates 4, 5 and square pipes 6, 7. Top faces 4a, 5a of the flat plates 4, 5 serve as molding faces when concrete is placed, and the square pipes 6, 7 are joined to bottom faces 4b, 5b of the flat plates 4, 5 by welding.

One ends of both square pipes 6, 7 are pressed and deformed into a flat shape. A steel plate elongated member 8 (see FIGS. 2) is inserted into an interior of the square pipes 6, 7 so as to close these end parts (hereinafter referred to as flat ends 6b, 7b). Moreover, an outer diameter of the square pipe 6 is smaller than an outer diameter of the square pipe 7, and an open end 6a is formed so as to be insertable into an open end 7a.

Note that a method of joining the square pipes 6, 7 to the flat plates 4, 5 is not limited to the welding, and other methods, such as adhesion or fixing by a rivet or a screw, can be used. Further, the flat plates 4, 5, the square pipes 6, 7, and the elongated member 8 are not limited to be made of the steel plate, and may be made of metal, such as aluminum, or a molded product, such as a fiber reinforced resin.

[0025]

A top face 6c of the square pipe 6 (see FIG. 2(a)) is spot-welded to the flat plate 4 at two places, i.e., a vicinity of a center in a longitudinal direction and a vicinity of the flat end 6b. A top face 7c of the square pipe 7 (see FIG. 2(a)) is spot-welded to the flat plate 5 at three places, i.e., a vicinity of a center in a longitudinal direction and

vicinities of both ends. In other words, in the form member 2, the flat plate 5 can be inserted between the bottom face 4b of the flat plate 4 and the top face 6c of the square pipe 6 by a certain length by inserting the square pipe 7 of the form member 3 into the square pipe 6.

Note that the places of the square pipes 6, 7 joined to the flat plates 4, 5 are not limited to those described in the present embodiment. In other words, the square pipe 6 may be joined to the bottom face 4b of the flat plate 4 except a predetermined range along the longitudinal direction from the open end 6a.

[0026]

In this way, the form member 2 is connected to the form member 3 by inserting the open end 6a of the square pipe 6 into an interior of the open end 7a of the square pipe 7, and the form members 2, 3 are slid each other as indicated by an arrow X in FIG. 1(a). Accordingly, an overall length of the deck plate 1 can be easily adjusted. In other words, it can be said that the deck plate 1 is widely used after being separated and recovered from a concrete slab and has a structure most suitable for reuse.

Note that the flat plates 4, 5 are thin and have a thickness of approximately 0.8 mm. Accordingly, even when concrete is placed on the top faces 4a, 5a after the flat plate 5 is inserted between the bottom face 4b of the flat plate 4 and the top face 6c of the square pipe 6 and portions of the flat plates 4, 5 are overlapped, there is no possibility that the concrete enters between the bottom face 4b of the flat plate 4 and the top face 5a of the flat plate 5.

[0027]

As shown in FIGS. 2 and FIGS. 3, bottom faces 6d, 7d of the square pipes 6, 7 have two flat parts 9a, 9b parallel to the top faces 6c, 7c. A distance between the flat part 9a on the flat ends 6b, 7b side and the top faces 6c, 7c is shorter than a distance

between the flat part 9a on the open ends 6a, 7a side and the top faces 6a, 7a. Therefore, an inclined part 9c is formed between the flat parts 9a and 9b.

Further, side faces 6e, 6e and side faces 7e, 7e connect the top faces 6c, 7c and the bottom faces 6d, 7d of the square pipes 6, 7. Bellows-shaped folding parts 10a, 10b are respectively formed on the side faces 6e, 6e and the side faces 7e, 7e so as to reach the inclined part 9c over the flat part 9a.

Note that the elongated member 8 is installed so that one end closes the flat ends 6b, 7b and another end reaches the inclined part 9c over the flat part 9a. The elongated member 8 is fixed by the folding parts 10a, 10a and the top faces 6c, 7c so as to be held from above and below.

[0028]

In a case where the projection part in the invention described in the aforementioned Patent Document 1 is used instead of the square pipes 6, 7, a section of the projection part is V-shaped and a top part is opened. Accordingly, stiffness of the projection part against torsional deformation is low, and deformation easily occurs at a part of the projection part which is not joined to the flat plate parts 4, 5. Further, when the deck plate 1 is recovered and the projection part is separated from the flat plate parts 4, 5, a sectional shape of the projection part is easily deformed, and it is highly possible that reuse of the projection part becomes difficult. Further, when the concrete is placed on the top faces 4a, 5a of the flat plates 4, 5, lime wash (a state in which cement is kneaded with water only) leaked from a gap between the bottom face 4b of the flat plate 4 and the top face 5a of the flat plate 5 flows from the opened top part into an interior of the projection part along the bottom faces 4b, 5b of the flat plates 4, 5. This lime wash is solidified in a state of being attached to an inner wall of the projection part and becomes an obstacle when the other projection part is inserted. Therefore, there

are cases where the deck plate 1 cannot be reused even when it is recovered.

[0029]

On the other hand, stiffness of the square pipes 6, 7 against torsional deformation is remarkably high compared with the aforementioned projection part, and deformation hardly occurs even at the place of the square pipes 6, 7 which is not joined to the flat plates 4, 5. In other words, in the deck plate 1 having the above-described structure, the square pipe 6 is not joined to the flat plate 4 in the predetermined range along the longitudinal direction from the open end 6a. However, even when the square pipe 6 in a state of being inserted into the square pipe 7 is slid, there is no possibility that deformation occurs in the section of that place of the square pipe 6. Therefore, work of adjusting the overall length of the deck plate 1 can be performed repeatedly and safely. Further, even when the deck plate 1 is recovered and the square pipes 6, 7 are separated from the flat plates 4, 5, sectional shapes thereof are hardly distorted. Accordingly, the separated square pipes 6, 7 can be reused.

[0030]

Further, top parts of the square pipes 6, 7 are not opened. Consequently, a situation where operation of adjusting the length of the deck plate 1 by sliding the square pipe 6 inserted into the square pipe 7 is prevented by the flow and solidification of the aforementioned lime wash in the interior of the square pipes 6, 7 along the bottom faces 4b, 5b of the flat plates 4, 5 does not occur. Therefore, the recovered deck plate 1 or square pipes 6, 7 can be effectively reused.

[0031]

Next, a manufacturing method for the deck plate 1 will be described by using FIG. 4 while appropriately referring to FIGS. 5 (particularly, corresponding to claim 4 and claim 5)

FIG. 4 is a process chart showing the manufacturing method for the deck plate 1, and FIG. 5(a) and FIG. 5(b) are views for explaining the manufacturing method for the deck plate 1. Note that the components shown in FIGS. 1 to FIGS. 3 are denoted by identical signs and descriptions thereof are omitted.

[0032]

As shown in FIG. 4, first, in step S1, a steel square pipe 11 having a rectangular section and a steel square pipe 12 similarly having a rectangular section and formed so as to be able to insert the steel square pipe 11 into an interior thereof are respectively installed in an interior of a recessed groove 16a of a press mold 16. Then, a punch 14a and a die 14b having W-shaped cross sections are respectively pressed into contact with side faces 13a, 13a configuring a pair of long sides of the rectangle, and a core 14c is inserted into an interior of the steel square pipes 11, 12. After that, the punch 14a is moved in a direction orthogonal to the side face 13a. Two V-shaped grooves 15a, 15b with a predetermined length along a longitudinal direction of the steel square pipes 11, 12 from one end parts are formed on the side faces 13a, 13a (see FIG. 5(a)).

In step S2, the steel plate elongated member 8 is inserted into the interior of the steel square pipes 11, 12 through open ends 11a, 12a and installed so that one side of the elongated member 8 is in contact with an inner side of a side face 13b (see FIG. 5(b)). Note that a width of the elongated member 8 is slightly narrower than that of inner diameters of the side faces 13a, 13a of the steel square pipes 11, 12. When the elongated member 8 is installed in the interior of the steel square pipes 11, 12 in a state in which one end is matched with the open ends 11a, 12a, the elongated member 8 has a sufficient length so that another end goes over the flat part 9a.

[0033]

In step S3, the steel square pipes 11, 12 are pressed and deformed by using the press mold 16 over a predetermined length from the one end parts, thereby forming the square pipes 6, 7. Specifically, as illustrated in FIG. 5(b), after the aforementioned steel square pipes 11, 12 are installed in the interior of the recessed groove 16a of the press mold 16, a punch 17 forming a trapezoid when viewed from a side face is pressed into contact with the side face 13c. After that, the punch 17 is moved in a direction orthogonal to the side face 13c and crushes the steel square pipes 11, 12 into a flat shape along the longitudinal direction over the predetermined length from the one end parts. Accordingly, the flat part 9a and the inclined part 9c connecting this flat part 9a and the flat part 9b (see FIGS. 3) are formed. With this configuration, the steel square pipes 11, 12 which respectively have the open end and the flat end and into which the elongated member 8 is inserted on the flat end side are formed. In other words, according to this manufacturing method, the side face 13c is reasonably deformed without occurring a crack or the like at the pressed places of the steel square pipes 11, 12. Therefore, the square pipes 6, 7 can be easily manufactured.

[0034]

Moreover, since outward deformation of the side faces 13a, 13a is constrained by an inner wall face of the recessed groove 16a of the press mold 16, the side faces 13a, 13a are deformed so as to be folded in the bellows shape according to the two V-shaped grooves 15a, 15b. Consequently, the folding parts 10a, 10b are formed. At this time, the folding part 10a, of the folding parts 10a, 10b, in contact with the one side of the elongated member 8 acts so as to hold and fix the elongated member 8 from above and below together with the side face 13b of the steel square pipes 11, 12. Therefore, there is no possibility that the elongated member 8 is carelessly removed from the steel square pipes 11, 12 during manufacturing of the deck plate 1. Further, the elongated

member 8 is immune from coming off from the square pipes 6, 7 after the manufacturing of the deck plate 1 as well. In other words, according to the above-described manufacturing method, the deck plate 1 that is excellent in safety can be manufactured.

[0035]

In step S4, the square pipes 6, 7 formed of the steel square pipes 11, 12 in step S1 to step S3 are firmly fixed to the flat plates 4, 5, respectively. Specifically, the top face 6c of the square pipe 6 is spot-welded to the bottom face 4b of the flat plate 4 at two places, i.e., the vicinity of the center in the longitudinal direction and the vicinity of the flat end 6b, and the top face 7c of the square pipe 7 is spot-welded to the bottom face 5b of the flat plate 5 at three places, i.e., the vicinity of the center in the longitudinal direction and the vicinities of both ends. With this configuration, the form members 2, 3 are formed.

[0036]

Next, usage of the deck plate 1 will be described by referring to FIGS. 6.

FIG. 6(a) to FIG. 6(d) are views for explaining a using state of the deck plate 1. Note that the components shown in FIGS. 1 to FIGS. 3 are denoted by identical signs and descriptions thereof are omitted.

The deck plate 1 is, for example, mounted to an H-steel 19 via a deck plate support 18 formed of a placing hardware 20, a square timber 21, and a rotation preventing member 24. The placing hardware 20 is installed so as to hold a flange 19a from above and below by holding parts 20a, 20b. After that, a bolt 22a screwed into a screw hole 22c is tightened, and a top face of the flange 19a is pressed by a lower end of the bolt 22a. Accordingly, the placing hardware 20 is fixed to the H-steel 19 (see FIG. 6(a)).

[0037]

The square timber 21 causes a through-hole 22e and a long hole (not shown) of the rotation preventing member 24 to communicate with a screw hole 22d of the holding part 20b, causes a side face 21a to be in contact with a bottom face of the holding part 20b, and causes a plane part (not shown) of the rotation preventing member 24 to be in contact with a side face 21c of the square timber 21. In this state, a bolt 22b is inserted into the long hole of the rotation preventing member 24 and the through-hole 22e from below and fastened in the screw hole 22d. Accordingly, the square timber 21 is fixed to the placing hardware 20 (see FIG. 6(b)).

The deck plate 1 is adjusted to have an appropriate length by sliding the form members 2, 3. After that, the flat part 9a is mounted on a deck plate mounting face 21b of the square timber 21 (see FIG. 6(c)).

[0038]

Concrete which has been kneaded beforehand is poured into the top faces 4a, 5a of the flat plates 4, 5 configuring the deck plate 1 and a top face of the flange 19a of the H-steel 19. When this concrete is solidified, a concrete slab 23 is formed (see FIG. 6(d)). After that, a top part of the placing hardware 22 and the bolt 22a are left inside the concrete slab 23 with the solidification of the concrete.

In this way, when the concrete is placed on the top faces 4a, 5a of the flat plates 4, 5, stress concentration easily occurs at a boundary between the flat part 9a and the inclined part 9c on the bottom faces 6d, 7d of the square pipes 6, 7. However, in the deck plate 1 of the present invention, since the bellows-shaped folding parts 10a, 10b and the elongated member 8 act so as to enhance stiffness at the boundary between the flat part 9a and the inclined part 9c, breakage or deformation hardly occurs in the square pipes 6, 7.

[0039]

Note that the bolt 22b fastened to the holding part 20b of the placing hardware 20 is loosened and pulled out from the screw hole 22d, the through-hole 22e, and the long hole of the rotation preventing member 24. The rotation preventing member 24 and the square timber 21 are removed from the placing hardware 20. At this time, since restraint of the deck plate 1 against downward movement is released, the deck plate 1 can be easily separated from the concrete slab 23. Moreover, as described above, since breakage or deformation hardly occurs in the square pipes 6, 7, the recovered deck plate 1 can be repeatedly used a plurality of times.

INDUSTRIAL APPLICABILITY

[0040]

The invention according to claim 1 to claim 5 is applicable to a case where a concrete slab is constructed on a floor, a ceiling, or the like of a multistory building.

DESCRIPTION OF REFERENCE SIGNS

[0041]

- 1: Deck plate
- 2: Form member
- 3: Form member
- 4: Flat plate
- 4a: Top face
- 4b: Bottom face
- 5: Flat plate
- 5a: Top face

5b: Bottom face

6: Square pipe

6a: Open end

6b: Flat end

6c: Top face

6d: Bottom face

6e: Side face

7: Square pipe

7a: Open end

7b: Flat end

7c: Top face

7d: Bottom face

7e: Side face

8: Elongated member

9a: Flat part

9b: Flat part

9c: Inclined part

10a: Folding part

10b: Folding part

11: Steel square pipe

11a: Open end

12: Steel square pipe

12a: Open end

13a: Side face

13b: Side face

13c: Side face

14a: Punch

14a: Die

14c: Core

15a: V-shaped groove

15b: V-shaped groove

16: Press mold

16a: Recessed groove

17: Punch

18: Deck plate support

19: H-steel

19a: Flange

20: Placing hardware

20a: Holding part

20b: Holding part

21: Square timber

21a: Side face

21b: Deck plate mounting face

21c: Side face

22a: Bolt

22b: Bolt

22c: Screw hole

22d: Screw hole

22e: Through-hole

23: Concrete slab

24: Rotation preventing member

CLAIMS

1. A deck plate (1) used as a form when a concrete slab is formed on a floor or the like of a building, comprising:

a first square pipe (6) and a second square pipe (7) crushed into a flat shape over a predetermined length from one ends (6b, 7b) and respectively formed with a flat part (9a);

a first flat plate in which a top face (6c) of the first square pipe (6) is joined to a bottom face (4b) except a range of a predetermined length from another end (6a); and

a second flat plate (5) in which a top face (7c) of the second square pipe (7) is joined to a bottom face (5b), wherein

the first square pipe (6) is formed so as to be insertable into the second square pipe (7), and

the first square pipe (6) and the second square pipe (7) are respectively joined to the first flat plate (4) and the second flat plate (5) so that respective opened other ends can be inserted each other.

2. The deck plate (1) according to claim 1, wherein bellows-shaped folding parts (10a, 10b) are respectively formed on side faces (6e, 7e) of the first square pipe (6) and the second square pipe (7) along a longitudinal direction from the one ends (6b, 7b) so as to at least go over the flat part (9a).

3. The deck plate (1) according to claim 2, further comprising:

an elongated member (8) installed in an interior of the first square pipe (6) and the second square pipe (7), respectively, along the longitudinal direction from vicinities of the respective one ends (6b, 7b) so as to at least go over the flat part (9a).

4. A manufacturing method for a deck plate (1) used as a form when a concrete slab is formed on a floor or the like of a building, comprising:

with respect to a first square pipe (6) and a second square pipe (7) formed so as to be able to insert the first square pipe (6) into an interior of the second square pipe (7), respectively forming V-shaped grooves (10a, 10b) with a predetermined length along a longitudinal direction of the first square pipe (6) and the second square pipe (7) from one ends (6b, 7b) on a pair of facing side faces (6e, 7e);

with respect to bottom faces (6d, 7d) orthogonal to the pair of side faces (6e, 7e) of the first square pipe (6) and the second square pipe (7), pressing and deforming into a flat shape in a range which does not go over places where the V-shaped grooves (10a, 10b) are respectively formed along the longitudinal direction from the one ends (6b, 7b);

joining a top face (6c) of the first square pipe (6) to a bottom face (4b) of a first flat plate (4) except a predetermined range along the longitudinal direction from another end (6a); and

joining a top face (7c) of the second square pipe (7) to a bottom face (5b) of a second flat plate (5).

5. The manufacturing method for the deck plate (1) according to claim 4, further comprising:

followed by the formation of the V-shaped grooves (10a, 10b), installing an elongated member (8) in the interior of the first square pipe (6) and the second square pipe (7) from vicinities of the one ends (6b, 7b) so as to at least go over places crushed into a flat shape.