

WORKING PLATFORM USED IN HIGH-RISE BUILDING CONSTRUCTION AND CONSTRUCTION METHOD THEREOF

5 Field of the Invention

The present invention relates to a support structure used in building construction and a construction method thereof, and in particular, to a working platform structure useful in building construction and a construction method using the working platform.

10 The present invention is especially applicable in high-rise building construction with a limited construction site on the ground.

Background of the Invention

15 In the prior art, large iron formwork is generally used in building construction in countries and regions like Singapore and Hong Kong. Typically, a face-plate made of a 4-milimeter-thick steel plate, and additional profiles such as angle iron and channel steel as a skeleton for bearing forces are welded to form into one piece, and thus constitute a relatively large-sized template, i.e., the large iron formwork, which can be
20 used in construction of cast-in-situ concrete structural or non-structural walls of a floor. Iron formwork, obviously superior to aluminum templates and wooden templates, can be used to largely enhance construction speed and remarkably improve quality of cast-in-situ concrete in construction, thereby saving construction costs.

25 Because the iron formwork, during use thereof in construction, is required to be mounted to an external wall of a building, it is necessary to use a working platform for supporting the iron formwork and offering a passage for constructors. Usually, the working platform is also formed through welding of profiles such as steel plates, angle iron, channel steel, and joist steel, and hung, via screws or other connecting
30 means, over a facade of the external wall of the building during construction. The working platform should be basically capable of, in terms of function, supporting the iron formwork in pouring of wall concrete, and meanwhile offering working positions for the constructors to operate the iron formwork, and guaranteeing the constructors' personal security.

Generally, the working platform is configured to have two layers, of which, an upper layer is used for supporting the iron formwork and for construction of the floor, while a lower layer is used during repairs of connecting positions between the formwork and the concrete wall. In special circumstances, the working platform can also be configured to have three or four layers as per construction requirements.

During construction of the iron formwork, one floor is typically divided into two parts including a left part and a right part, of which, one part is first constructed before the other part. For example, while a concrete wall is poured in the left part, a next floor may be constructed or other procedures may be performed in the right part. After construction of the wall in the left part is completed, the large iron formwork used by the left part wall can be transported to the right part by means of a crane tower, for construction of the wall in the right part. The procedure for transporting the formwork is termed formwork flying. At the same time, due to factors such as building shapes, some formwork, termed depositing formwork, is unsuitable to be transported into the other part. Generally, the depositing formwork will, by means of the crane tower, be transported to the ground to be deposited, and lifted to a corresponding floor therefrom when to be used in construction.

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Therefore, according to the existing working platform and construction method, it is necessary to provide relatively large spaces on the ground for storage of the formwork. This is especially unfavorable in high-rise construction sites having relatively small construction spaces. In addition, the formwork has to be repeatedly lifted and put down by the crane tower, which takes a great deal of time. This not only consumes labor and time, but also increases construction costs.

Summary of the Invention

Directed against the defects in the prior art, a working platform used in high-rise building construction capable for storage of temporarily unused formwork, and a construction method with use of the working platform are provided.

The technical solution of the present invention includes a working platform used

in high-rise building construction, comprising: a support frame conveniently removable from or fixable to a building; and a construction platform fixed to an upper portion of the support frame, wherein a railing is fixedly arranged outside of the construction platform; wherein the working platform further includes a formwork depository, which is arranged outside of the support frame below the construction platform, and protrudes from the construction platform along a horizontal direction, thereby forming a recess that can accommodate a formwork, wherein more than two columns are fixedly arranged outside of the formwork depository, so as to prevent the formwork from falling off.

A top of the column bends outwardly.

The formwork depository has an inclined bottom surface, which gets lower as extending inward.

The working platform of the present invention further comprises a second platform fixed to a bottom of the support frame, wherein the formwork depository is located outside of the second platform.

A bottom of the formwork depository is supported by a base, which has a top surface 1.2 to 1.5 meters from a top surface of the construction platform, and a top of the railing is 1.1 to 1.3 meters higher than the top surface of the construction platform.

The working platform of the present invention further comprises an underlying platform, which is fixedly arranged below the second platform, and has a height in the range from 1.7 to 1.8 m.

A horizontal distance from an outer side of the railing of the construction platform to an inner side of the column of the formwork depository is in the range from 25 to 35 cm.

A distance between two adjacent columns of the formwork depository is in the range from 1.3 to 1.5 m.

The support frame is formed by straight rods and oblique rods connected to each other, and fixed to the building by means of a bolt.

5 The present invention further provides a construction method with use of the above working platform, comprising:

step a): accomplishing pouring of a concrete wall in a part of a building with assistance of inner formwork and outer formwork, and then, disassembling applicable formwork and hoisting it to another part of the building, and disassembling remaining un-applicable formwork and hoisting it into the formwork depository of the working platform in a present layer;

step b): accomplishing construction of an Nth floor on a top of the wall which has been completed in step a); and

step c): binding wall reinforcement bars of an Nth layer, hoisting required inner and outer formwork respectively from other parts of the building and the formwork depository to positions of a wall corresponding to the Nth layer and having them assembled, and pouring concrete to complete construction of an Nth wall.

After step a) and before step b), the working platform and the formwork deposited thereon are hoisted together to an upper layer and fixed to the completed wall.

Compared with the prior art, the working platform used in high-rise building construction of the present invention has the following beneficial effects. The depositing or flying formwork, while not being used in construction, can be directly deposited in the formwork depository of a corresponding working platform, thereby remarkably cutting down hoisting time and distance of the crane tower during construction, and saving depository spaces on the ground of the construction sites. This enables the construction to be more convenient and efficient.

30 **Brief Description of the Drawings**

Fig. 1 schematically shows the structure of a working platform used in high-rise building construction according to the present invention;

Fig. 2 schematically shows a floor right after being constructed;

Fig. 3 schematically shows wall reinforcement bars being bond;

5 Fig. 4 schematically shows formwork being hoisted;

Fig. 5 schematically shows the formwork being assembled;

Fig. 6 schematically shows pouring of wall concrete;

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Fig. 7 schematically shows the formwork being disassembled and hoisted; and

Fig. 8 schematically shows the working platform being hoisted.

15 **Detailed Description of the Embodiments**

The present invention will be further explained with reference to the accompanying drawings and embodiments.

20 As shown in Fig. 1, a working platform used in high-rise building construction according to the present invention mainly comprises a construction platform 1, a support frame 2 for supporting and fixing the construction platform 1, a formwork depository 3, and a second platform 5. The construction platform 1 is located on an uppermost layer, for operators to walk thereon so as to perform construction
25 operations, etc., and a railing 11 is fixedly arranged on an outer side of the construction platform 1. The support frame 2, formed by a plurality of straight rods and oblique rods connected to each other, is arranged below the construction platform 1, and fixed, by means of bolts, to a concrete wall that can bear stress conditions. This can facilitate disassembling and assembling thereof. The structure of the support
30 frame 2 is selected with consideration of such factors as gravity of deposited formwork, weight of the support frame per se, live load, wind power in high construction, and live load during workers' construction operations, thereby guaranteeing requirements for normative safety factors and conforming to construction specifications in all regions. The second platform 5 is fixed to a bottom

of the support frame 2, and the formwork depository 3 is located outside of the second platform 5, and protrudes from the construction platform 1 along a horizontal direction. A horizontal distance from an outer side of the railing 11 of the construction platform 1 to an inner side of a column 31 of the formwork depository 3 is in the range from 25 to 35 cm, thereby forming a recess for accommodating the formwork. The horizontal distance can, of course, be properly adjusted according to sizes of the formwork. More than two columns 31 are fixedly arranged outside of the formwork depository 3, so as to prevent the formwork from falling off. A distance between two adjacent columns 31 is in the range from 1.3 to 1.5 m, and can be properly adjusted according to sizes of the formwork.

In order to facilitate introduction of the formwork during hoisting work, a top of the column 31 bends outwardly to form a bend portion 34. In addition, the formwork depository 3 is provided with an inclined bottom surface 32, which gets lower as extending inward. Thus, when formwork 71 is placed into the formwork depository 3, as indicated in Fig. 2, a bottom of the formwork 71 will slide inward. At such a moment, an upper portion of the formwork 71 can be fixed to the railing 11 of the construction platform 1, so as to allow the formwork 71 to be placed substantially along a vertical direction.

A bottom of the formwork depository 3 is supported by a base 33, which has a top surface 1.2 to 1.5 meters from a top surface of the construction platform 1, and a top of the railing 11 is 1.1 to 1.3 meters higher than the top surface of the construction platform 1. Such sizes enable, when the formwork 71 is placed in the formwork depository 3, the arm of an operator standing on the construction platform 1 to readily reach over the railing 11 and perform hoisting operations.

In addition, as connecting positions between a floor and a wall are relatively rough, they are necessary to be polished. To this end, an underlying platform 6 is further fixedly arranged below the second platform 5 of the working platform according to the present invention. The underlying platform 6 has a height in the range from 1.7 to 1.8 m, and therefore can cover the scope of the wall necessary to be polished.

A construction method with use of the above working platform according to the present invention comprises, but is not limited to, the following steps.

1) As indicated in Fig. 2, the construction platform 1 of the working platform is
5 used to accomplish pouring construction of an Nth floor 82 on top of a completed wall 81. During such a step, the formwork used in pouring the wall is partially placed in the formwork depository 3.

2) As Fig. 3 shows, the construction platform 1 of the working platform is used
10 in binding of wall reinforcement bars 83 of an Nth layer.

3) As shown in Fig. 4, an inner formwork 72 and an outer formwork 71 as
required in pouring of a wall are hoisted to respective positions of the wall
corresponding to the Nth layer, from other parts of the building where the walls are
15 constructed, and from the formwork depository 3, respectively.

4) As shown in Fig. 5, the inner formwork 72 and the outer formwork 71 are
assembled to form a template of an Nth wall.

20 5) As shown in Fig. 6, a platform 73 arranged on the inner formwork 72 and the
outer formwork 71 is used for pouring of concrete into the template of the wall, so as
to complete construction of the Nth wall 81.

6) As shown in Fig. 7, the formwork of the Nth wall 81 is dissembled, after which,
25 the formwork 72 which is applicable is hoisted to another part of the building for use,
while the remaining formwork 71 which is un-applicable is hoisted and fixed into the
formwork depository 3 of the working platform in a present layer.

7) As shown in Fig. 8, the working platform and the formwork 71 deposited
30 thereon are hoisted together to an upper layer and fixed to the Nth wall.

The above steps can be repeated to complete pouring construction of the walls
and floors of the building.

As can be seen, the working platform of the present invention can be used to facilitate convenient storage of the formwork 71 temporarily unused, rendering it unnecessary to occupy any storage spaces on the ground. On the other hand, the site area on the construction ground is such a significant factor in construction that capacity of saving construction spaces typically not only contributes to progress of urgent construction in a considerable manner, but also largely reduces time allocated to the crane tower. Therefore, the working platform of the present invention is favorable in saving both labor and time.

The above description merely constitutes the preferred embodiments of the present invention, but should not be construed as limitations of the present invention. Many alterations and variations of the present invention will be apparent to those of ordinary skill in the art. Any amendments, equivalent replacements, improvements, and the like, that are made to the present invention, as long as not departing from the spirit and principle of the present invention, are intended to be within the scope of the present invention.

Claims

1. A working platform used in high-rise building construction, comprising:
a support frame (2) conveniently removable from or fixable to a building; and
5 a construction platform (1) fixed to an upper portion of the support frame (2),
wherein a railing (11) is fixedly arranged outside of the construction platform (1);
wherein the working platform further includes a formwork depository (3), which
is arranged outside of the support frame (2) below the construction platform (1), and
protrudes from the construction platform (1) along a horizontal direction, thereby
10 forming a recess that can accommodate a formwork, wherein more than two columns
(31) are fixedly arranged outside of the formwork depository (3), so as to prevent the
formwork from falling off.

2. The working platform used in high-rise building construction according to
15 claim 1, wherein a top of the column (31) bends outwardly.

3. The working platform used in high-rise building construction according to
claim 1, wherein the formwork depository (3) has an inclined bottom surface, which
gets lower as extending inward.

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4. The working platform used in high-rise building construction according to any
one of claims 1-3, further comprising a second platform (5) fixed to a bottom of the
support frame (2), wherein the formwork depository (3) is located outside of the
second platform (5).

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5. The working platform used in high-rise building construction according to
claim 4, wherein a bottom of the formwork depository (3) is supported by a base (33),
which has a top surface 1.2 to 1.5 meters from a top surface of the construction
platform (1), and

30 wherein a top of the railing (11) is 1.1 to 1.3 meters higher than the top surface of
the construction platform (1).

6. The working platform used in high-rise building construction according to
claim 4, further comprising an underlying platform (6), which is fixedly arranged

below the second platform (5), and has a height in the range from 1.7 to 1.8 m.

7. The working platform used in high-rise building construction according to claim 4, wherein a horizontal distance from an outer side of the railing (11) of the construction platform (1) to an inner side of the column (31) of the formwork depository (3) is in the range from 25 to 35 cm.

8. The working platform used in high-rise building construction according to claim 4, wherein a distance between two adjacent columns (31) of the formwork depository (3) is in the range from 1.3 to 1.5 m.

9. The working platform used in high-rise building construction according to claim 4, wherein the support frame (2) is formed by straight rods and oblique rods connected to each other, and fixed to the building by means of a bolt.

10. A construction method with use of the working platform according to any one of claims 1-9, comprising:

step a): accomplishing pouring of a concrete wall in a part of a building with assistance of inner formwork and outer formwork, and then, disassembling applicable formwork and hoisting it to another part of the building, and disassembling remaining un-applicable formwork and hoisting it into the formwork depository (3) of the working platform in a present layer;

step b): accomplishing construction of an N^{th} floor on a top of the wall which has been completed in step a); and

step c): binding wall reinforcement bars of an N^{th} layer, hoisting required inner and outer formwork respectively from other parts of the building and the formwork depository to positions of a wall corresponding to the N^{th} layer and having them assembled, and pouring concrete to complete construction of an N^{th} wall.

11. The construction method according to claim 10, further comprising, after step a) and before step b), hoisting the working platform and the formwork deposited thereon together to an upper layer and fixing them to the completed wall.