

SPECIFICATION

TEMPORARY FRAME SYSTEM FOR CONSTRUCTION

5

FIELD OF THE INVENTION

The present invention relates to a all-weather type temporary frame system for construction which permits to perform constructional work even under bad weather.

BACKGROUND ART

10

There has been proposed an all-weather type temporary frame as a temporary foothold for construction of a high-rise building of RC construction. Such temporary frame includes a plurality of temporary support frames vertically provided around a planed building to be constructed, and a canopy frame supported at the upper portion between respective temporary support frames and shaped sufficient for covering entire upper surface of the planed building. According to increasing of height of the constructed building, the temporary support frames are added upwardly to elevate the canopy frame so that constructional work can be performed without being affected by the weather.

15

20

On the other hand, an overhead travelling crane is arranged on the lower surface of the canopy frame.

25 Building materials lifted by a lifting equipment, such as a cargo lift, a man/cargo elevator or so forth are

transported to various portions by the overhead traveling crane for performing assembling work.

The overhead traveling crane includes a main girder reciprocally movable along a main rail, a subsidiary girder reciprocally movable along a subsidiary rail arranged at the side of the main rail in parallel to the latter, and a hoist movably movable along the main girder and the subsidiary girder and transit between respective girders at the condition where both girders are matched in alignment. Generally, two hoists are provided in the overhead traveling crane. At a condition where one of the hoists is moved on the main girder, the building material is lifted into the intended floor for execution by the lifting equipment. At this condition, the main girder is moved along the main rail to transfer the hoist to one of the subsidiary girder which is placed in alignment with the main rail. The subsidiary girder, to which the hoist is transferred from the main rail, is moved along the subsidiary rail for transporting the building material to the destined position.

In the meanwhile, in such temporary frame system, in order to constantly arrange the canopy frame immediately above the floor for executing the constructional work, it becomes necessary to sequentially rise depending upon progress of constructional work. Conventionally, in Japanese Unexamined Patent Publication (Kokai) No. Heisei

4-221172, for example, a method to lift up the temporary support frames by a lifting means arranged around the temporary support frame (temporary tower) on the ground and to add new supporting material at the lower side.

5           On the other hand, in Japanese Unexamined Patent Publication No. Heisei 5-59817, for example, there has been proposed a method, in which the temporary support frame is constructed with a plurality of telescopic long posts each of which is expandable, and a work station is arranged at  
10   the upper portion of the long posts, and by expanding the long post sequentially, the work station is elevated.

          However, the former invention increased weight of the added temporary supporting materials is increased according to rising the temporary frame. Accordingly, load  
15   on the lifting means is sequentially increased. The lifting means is required a large driving force to be preliminarily set with taking the final weight to be lifted into account.

          On the other hand, the latter invention is required  
20   a large driving force since overall load is exerted on the long post from initiation of lifting. Furthermore, extracting length of the long post is increased at every occasion of expansion of the post to cause instability of supporting moment at joint portions of the post.

25           Furthermore, in either invention, since the temporary support per se is moved and support therefore

cannot be provided by the building under construction, self-standing of the individual support frame can become more unstable at taller building. In order to solve the problem of instability of self-standing, it is considered  
5 to provide reinforcement members between the temporary support frames as braces. However, installation of brace is not only cumbersome but also causes further increase of the load to require greater power for lifting.

Thus, the conventional all-weather type temporary  
10 frame was in appropriate as the temporary frame for constructing a building having large number of floors, such as skyscraper or so forth.

Furthermore, in the hoist provided in the conventional overhead traveling crane, since only one main  
15 girder is provided, even when the building material is lifted by the lifting equipment, the lifting equipment is inherently wait until the empty hoist which completed former transportation operation, is transferred to the main girder and reaches the lifting equipment, and lifts the  
20 building material. Accordingly, efficiency of the transporting operation of the building material is lowered to cause extension of the construction work.

It is the first object of the present invention is to make it possible to effectively use the existing system,  
25 to require driving force for elevating the canopy frame small and always constant, to provide support for the

temporary support frames from the building, to restrict deflection upon elevation of the canopy frame, and to permit execution of addition of the temporary support frame at the higher most position without interfering with construction work.

The second object of the present invention is to make transfer of the building materials quicker by providing double type main girder and by maintaining at least one of the main girder empty, and whereby to improve efficiency of transportation.

#### DISCLOSURE OF THE INVENTION

In order to accomplish the object, the present invention comprises:

one or more temporary support frames vertically provided in the vicinity of or within intended construction site of a building and to be added sequentially added to upper side depending upon increasing of a height of construction;

a climbing mechanism fitted on the periphery of the temporary frame via upper and lower guide rollers and being arranged a jerk for up and down motion; and

a canopy frame supported between upper and lower guide rollers of the climbing mechanism and covering entire upper surface of the building.

On the other hand, the present invention also comprises:



one or more temporary support frames vertically provided in the vicinity of or within intended construction site of a building and to be added sequentially added to upper side depending upon increasing of a height of construction;

a climbing mechanism fitted on the periphery of the temporary frame via upper and lower guide rollers and being arranged a jerk for up and down motion; and

a canopy frame supported below the climbing mechanism in handed condition and covering entire upper surface of the building.

In the inventions set forth above, the temporary support frame may be a mast of a tower crane. The temporary support frame may be supported on the building via a horizontal stay. It is also preferred to arrange an overhead crane on a surface of the canopy frame.

The present invention is characterized in that the overhead traveling crane includes a main girder reciprocally movable along a main rail and a subsidiary girder reciprocally movable along a subsidiary rail arranged at side portion of the main rail in parallel to the latter, and a hoist movable along the main girder and in that the subsidiary girder and can be transferred between respective girders in a condition where both girders are matched in alignment to each other, a building material being transferred to the hoist positioned in the



main girder, and the main girders is constructed as a dual type to include two girders arranged along extending direction of the main rail.

In the present invention, the dual type main girder  
5 may be integrally movable. It is preferred that a stationary girder for transferring is arranged between the main rail and the subsidiary rail and to be placed in alignment with respective of crane girders, and a transporting object is transported to a destined  
10 transporting position via respective crane girders and the stationary girder.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevation of one embodiment of a temporary frame system according to the present invention;

15 Fig. 2 is a front elevation thereof;

Fig. 3(a) is a section taken along line A - A of Fig. 1, (b) is a section taken along line B - B, and (c) is a section taken along line C - C;

Fig. 4 is a side elevation showing another  
20 embodiment of the temporary frame system according to the invention, which is shown in the initially assembled state;

Fig. 5 is a side elevation of the system under construction; and

Fig. 6 is a schematic plan view for explaining  
25 operation of an overhead traveling crane according to the invention.

BEST MODE FOR IMPLEMENTING THE INVENTION

In Figs. 1 and 2, a temporary frame system is arranged at outside of a building 1 planed for erecting and comprises four masts (only two are shown in the drawing) vertically extended on a foundation arranged on the ground, climbing mechanisms 3 mounted on respective masts for up and down movement, a canopy frame 4 fixed to respective climbing mechanisms at four corners and horizontally covering overall upper surface of the building 1, an overhead traveling crane 5 arranged on the lower surface of the canopy frame, a jib crane 7 arranged for movement along a guide rail 6 provided on the upper surface of the canopy frame 5 (the guide rail 6 is arranged at the center of the canopy frame 4, for example).

On the other hand, at the center on one side surface of the building 1, a lifting equipment, such as a cargo lift, man/cargo elevator or so forth (hereinafter simply referred to as lifting equipment) 8 is arranged. Building materials, such as pre-casted member or so forth, lifted by the lifting equipment 8 is transferred to a hoist 9 traveling along the canopy traveling crane 5 and thus supplied to respective portions of the building 1.

As the masts 2 and the climbing mechanisms 3, existing mechanisms to be employed in a tower crane is applied. The mast 2 can be selected not only to be a truss built-up column shaped configuration but also to be other

cylindrical column shaped configuration, and, as shown in Fig. 2, the height thereof can be increased by adding a mast member 2a listed by the jib crane 7 according to elevation of the working floor with maintaining self-standing stability by support provided by horizontal stays 10 which are appropriately fixed to the building 1 at one ends.

The climbing mechanism 3 includes a guide sleeve 3a fitted on the outer periphery of the mast 2, an upper frame 10 3b integrated with the guide sleeve 3a and surrounding the periphery of the mast 2, and an intermediate frame 3c. The corner of the canopy frame 4 is fixed by clamping between the lower surface of the guide sleeve 3a and the upper surface of the intermediate frame 3c. On the other hand, 15 at the lower portion of the intermediate frame 3c, a lower frame 3d which similarly surrounds the mast 2 is arranged. The frames 3c and 3d are connected by a plurality of lifting hydraulic jerks 3e.

At the inside of respective frames 3b, 3c and 3d, 20 a plurality of guide rollers 11 which contact with outer side portion of the mast 2 to rotate for guiding respective frames 3b and 3c for up and down movement. On the other hand, on the intermediate frame 3c and the lower frame 3d, a pair of puns 12 for bearing vertical load are releasably 25 inserted to the mast 2 for fixedly supporting the climbing mechanism 3 on the periphery of the mast 2, as shown in

Figs. 3(b) and (c).

In the construction set forth above, at the resting condition of the climbing mechanism 3, a hydraulic jerk 3e is contracted and the climbing mechanism 3 is supported at the predetermined position on the mast 2 by respective pins 12.

For elevating, the pins 12 of the intermediate frame is released and the hydraulic jerk 3e is expanded. Then, the portion located higher than the intermediate frame is elevated at a magnitude corresponding to the jerk stroke. Subsequently, after supporting on the mast 2 in the vertical direction by inserting the pins 12 into the intermediate frame 3c, the pins 12 engaging with the lower frame 3d is released and the hydraulic jerk 3e are contracted. Thus, the lower frame 3d is also elevated, Thereafter, by inserting the pin 12, the lower frame 3d is supported on the mast 2 in the vertical direction, and then, the elevating operation is completed.

Thus, since the masts are sequentially added upwardly, the existing masts 2 are fixed in place. Therefore, support for the mast 2 can be provided by the building by means of the horizontal stays 10. On the other hand, since the climbing mechanisms 3 are elevated with bearing only weight of the canopy frame 4 upon elevating operation, the driving force for elevating the canopy frame 4 can be made smaller and always constant. Furthermore,

since the mast is provided self-standing stability by the horizontal stays, it becomes possible to reduce or eliminate the brace for connecting between the masts 2 to achieve an effect of reduction of weight.

5           The foregoing elevation of the canopy frame 4 by means of the climbing mechanisms 3 is performed in the step not requiring transporting operation of the building material and by simultaneously operating four climbing mechanisms 3 for elevating operation.

10           At this time, a force to cause distortion of the canopy frame 4 is generated due to excessively small elevation speed at respective portion. However, since the canopy mechanism 4 is clamped between the sleeves 3a and the guide rollers 11 of the upper frame 3b and the  
15   intermediate frame 3c act as reaction roller in the opposite direction to the tilting direction of the canopy frame, and also since the distance between the guide rollers 11 located upper and lower positions becomes longer, distortion of the canopy mechanism 4 can be  
20   successfully restricted. The force to cause distortion of the canopy frame is also caused when the overhead traveling crane 5 to perform transporting the building material. However, since the guide rollers 11 act as reaction rollers, distortion of the canopy frame can be restricted.

25           After elevation, by exerting the load on the masts 2, the four corners of the canopy frame 4 can be positioned

at the height of the masts 2. Thereafter, transporting operation of the building materials can be resumed.

As set forth, infeeding of the material necessary for construction and installation are performed by the overhead traveling crane. Therefore, the jib crane 7 exclusively perform lifting of the masts 2 and sequentially adding the mast upwardly. Thus, installation of more mast and constructing work are not interfere to each other.

After completion of construction of the building, the canopy frame 4 is disassembled except for the frame portion extending between the overhead traveling frame 3 and the climbing mechanisms 3, and disassembled components are taken out vt the jib crane 7 left on a rooftop of the building 1 so as not to interfere with the building 1. Thereafter, by reverse climbing the climbing mechanism 3, the frame portion extended therebetween are lowered. At this time, the masts 2 are taken out in order from the upper portion by the jib crane. Finally, the jib crane is disassembled and taken out with relatively small crane. Then, the small crane is lowered by the elevator or so forth of the building 1. Thus, overall temporary frame system can be removed.

It should be noted that while discussion is given in the case where the masts 2 are arranged at four positions outside of the building 1 since the building 1 is of rectangular cross section in the foregoing

embodiment, it is possible to arrange one to three masts depending upon area of the floor of the building, and the canopy frame is covered at the upper portion. When the area of the floor is large, greater number of masts can be provided as a matter of course.

Next, with reference to Figs. 4 and 5, other aspects will be discussed.

In this aspect, the canopy frame 4 is supported in the condition hanged at four corners at the lower portion of the climbing mechanisms 3. Concretely, the climbing mechanism 3 includes the guide sleeve 3a fitted on the outer periphery of the mast 2, the upper frame 3b integrated at the lower portion of the guide sleeve 3a, the lower frame 3c arranged at the lower portion of the upper frame 3b, and a plurality of the elevating hydraulic jerks 3e connected between the upper and lower frames 3b and 3c. On the lower surface side of the lower frame 3c, the canopy frame 4 is supported in the hanged condition with extending the masts 2 therethrough. At the lower surface side of the canopy frame 4, a support frame 3f is fixed on the outer periphery of the mast 2. As the jib crane 7, a fixed type crane is employed. It should be noted that illustrated by respective lines of A - A, B - B and C - C of Fig. 5 correspond to respective embodiments of Figs. 3(a), 3(b) and 3(c).

Therefore, assembling of the canopy frame 4 and

installation of the jib frame 7, as shown in Fig. 5, can be performed right above the foundation of the masts 2. Therefore, working height from the ground is low and work efficiency and security becomes high. After assembling the climbing mechanisms 3 to upper portions of the four corners, these climbing mechanisms 3 are driven to elevate. Thereafter, the overhead traveling crane 5, the hoist 9 and so forth are assembled to complete assembling operation. Subsequently, with elevating the canopy frame 4, construction work of the building 1 is performed.

Thus, assembling of the canopy frame 4 can be performed near the ground or in the landed condition. Thus, workability in assembling is high and high accuracy can be obtained. Also, since ground level of the canopy frame 4 upon assembling can be made lower, work can be done safely.

The overhead traveling crane 5 employed in two embodiments are in the form illustrated in Figs. 6.

The overhead traveling crane 5 includes a main rail 20 positioned at the center portion of the lower surface of the canopy frame 4 corresponding to the lifting equipment 8, and subsidiary rails 22 and 22a located at both sides of the main rail 20 and in parallel to the main rail 20. On the main rail 20, a transporting girder 24 as a main girder is movably supported. On the subsidiary rails 22 and 22a, building-up girders 26 and 26a as subsidiary girders are

movably supported.

In the shown embodiment, three, first, second and third hoists 9a, 9b and 9c are provided on the overhead traveling crane 5. The first hoist 9a is positioned on the transporting guarder 24. Also, the second and third hoists 9b and 9c are positioned on the building-up girders 26 and 26a at both sides.

Here, in the shown embodiment, the transporting girder 24 is constructed as dual type arranged in parallel in extending direction of the main rail 20 (in the drawings, dual main girders are integrated), and two, first and second girders 24a and 24b are provided. The first and second girders 24a and 24b are mutually connected via connecting portions 28, 28 to be integrated for movement along the main rail 20.

At least one of the first and second girders 24a and 24b forming the dual type girder, empty one of respective hoists 9a, 9b and 9c is positioned to constantly place in a condition for receiving the material lifted by the lifting equipment.

Accordingly, a transition type hoist provided on the shown embodiment of the overhead traveling crane includes the transporting girder 24 with the first and second girders 24a and 24b. Therefore, at least one of the first and second girders 24a and 24b can be empty, namely, the hoist is not moved thereto. Therefore, the material

lifted by the lifting equipment 8 is received by the hoist positioned on one of the first and second girders 24a and 24b to move into the main rail 20. Even in the case to transfer to one of the building-up girders 26 and 26a, and  
5 even if the hoists are positioned on these building-up girders 26 and 26a, the load carrying hoist on the first or second girder 24a or 24b can be transferred to the building-up girder 26 or 26a after moving the hoist of the building-up girder 26 or 26a to the empty side of the first  
10 and second girders 24a and 24b. Then, after moving the hoisted load is transferred to the building-up girder 26 or 26a, one of the first and second girders 24a and 24b together with the empty hoist toward the lifting equipment 8 so that the material lifted by the lifting equipment 8  
15 can be instantly load on the empty hoist.

Hereinafter, an example of basic control of the shown embodiment of the transporting method will be discussed. Namely, the shown embodiment of the overhead traveling crane 5 is provided with three, first, second and  
20 third hoists 9a, 9b and 9c. During operation of the second and third hoists 9b and 9c positioned on the building-up girders 26 and 26a, the lifting equipment 8 lifts up the material to the first hoist 9a positioned on the first girder 2a of the transporting girder.

25 Next, among the second and third hoists 9b and 9c, assuming that the second hoists completes operation and can

perform next operation, the transporting girder 24 is moved to arrange the second girder 24b in alignment with one of the building-up girder 26. Then, the second hoist 9b positioned on the building-up girder 26 is transferred to the second girder 24b. Next, the first girder 24a, on which the first hoist 9a hoisting the load is placed in matching with the building-up girder 26 to transfer the first hoist 9a to the building-up girder 26. At this condition, the first hoist 9a is moved along the building-up girder 26, and in conjunction therewith, the building-up girder 26 moved along the subsidiary rail 22 to move the hoist 9a at arbitrary position within a left half region in the drawing relative to the main rail 20 to unload thereon.

Accordingly, at such condition, on the transporting girder 24, the empty second hoist 9b is positioned so that the next material lifted by the lifting equipment 8 can be hanged on the second hoist 9b, immediately. It should be noted, it is the matter of course to transfer the first hoist 9a to the other building-up girder 26a. Also, even by positioning the load hoisting first hoist 9a on the second girder 24b of the transporting girder 24, and in conjunction therewith, by transferring the second or third hoist 9b or 9c which becomes empty, of the building-up girder 26 or 26a to the first girder 24a, exchange of the first hoist 9a and second or third hoist 9b or 9c between the transporting girder 24 and the building-up girder 26 or

26a can be performed smoothly.

Thus, even when the hoists are positioned on the building-up girders 26 and 26a reciprocally moving along the subsidiary rail 22 and 22a, it becomes possible to position the hoist on at least one of the dual type main girder 24. Therefore, when the material is lifted by the lifting equipment, it becomes possible to receive the material by the hoist positioned at one of the dual type main girder 24 without waiting for completion of work in the hoist positioned on the building-up girders 22 and 22a. Then, when the hoist 9 in load hoisting condition is transferred from the transporting girder 24 in the condition receiving the material to the building-up girder 26 or 26a, exchanging of the load hoisting hoist and the empty hoise can be smoothly performed by transferring the empty hoist 9 to other of the transporting girder 24 from the building-up girders 26 and 26a, at first. Accordingly, reception of the material lifted by the lifting equipment 8 can be quickly performed to significantly improve material transporting efficiency.

It should be noted that the foregoing embodiments have been discussed for the case where the hoist is positioned on one of the first and second girders 24a and 24b which form the transporting girder. By such construction, only one driving source is required to significantly facilitate control in comparison the case

where two transporting girders are controlled independently to make the driving means simple and thus to contribute for simplification of the overall system. However, the present invention should not be limited to the shown construction  
5 and can be constructed to position empty hoists on both of the first and second girders 24a and 24b and to return them to the lifting equipment 8 to hang the materials on the hoists 9.

On the other hand, the transporting girder is  
10 constructed by connecting the first and second girders 24a and 24b to move integrally to each other. However, it is possible to construct the transporting girder without integrating for separating first and second girders, and to enable respective girders to move independently by  
15 assembling the traveling control systems for respective girders to improve freedom of transportation depending upon building-up condition of the hoisted load of the hoist 9 positioned on the building-up girders 26 and 26a or lifting condition of the load by the lifting equipment 8.

20 Furthermore, while there is disclosed the system, in which the lifting equipment is provided at only one side (lower side in Fig. 6) of the transporting girder, the amount of the materials to be lifted should be large when the floor area of the building 1 is large. Therefore, it  
25 is desirable to provide the lifting equipments 8 at both sides (even in upper side in Fig. 6) of the transporting

rail. In this case, the materials are lifted by two lifting equipments. However, since two girders are arranged in the transporting girder, the materials can be transported efficiently. Thus, as a whole transporting efficiency of the material transporting efficiency to contribute for shortening working period. Also, in this case, it is possible to provide two transporting rails and associating therewith to provide four building-up rail, in total, and is further possible to provide three or more transporting rails and to correspondingly increase number of the building-up rails. Furthermore, it is not always required to provide the building-up rails at both sides of the transporting rail, but is possible to provide only one building-up rail for one transporting rail.

15 In addition, in a construction site, when a pillar is present at the predetermined position in the building, and as a result, both ends of respective crane girders cannot be matched in alignment as interfered by the pillar, it is possible to provide a stationary girder between the pillars at an orientation perpendicular to main rail 20 and the subsidiary rails 22 and 22a so that the transporting girder 24 and the building-up girders 26 and 26a are matched in alignment via the stationary girder for transferring the hoists. On the other hand, in such case, 20 between the main rail 20 and the subsidiary rails 22 and 22a (in which the pillar is arranged), the hoist of the

transporting girder 24 and the building-up girders 26 and 26a cannot be reached. Therefore, it becomes possible to transport the material in hanging condition to any position on the building 1 by providing a sliding girder which can  
5 be slidably extracted in the same direction to the direction of extension of the girder, at the lower portion of the girders 24, 26 and 26a.

While the foregoing aspects are exemplary disclosed in the case where the building materials are transported,  
10 the present invention should not be specified to the foregoing embodiment, but can be applicable for transporting objects, such as waste material or product in refuse disposal station, parts and/or products in general factories or so forth, for example, for transporting in  
15 hanging condition. When the present invention is applied for the refuse disposal station, the stationary girder may be arranged at position shifted from the pillars vertically extended at appropriate positions of wide collection point (in other words, the pillars are arranged between the  
20 stationary girders.



- 22 -

CLAIMS

1. A temporary frame system for construction comprising:

one or more temporary support frames vertically  
5 provided in the vicinity of or within intended construction site of a building and to be added sequentially added to upper side depending upon increasing of a height of construction;

a climbing mechanism fitted on the periphery of  
10 said temporary frame via upper and lower guide rollers and being arranged a jerk for up and down motion; and

a canopy frame supported between upper and lower guide rollers of said climbing mechanism and covering entire upper surface of said building.

15

2. A temporary frame system for construction comprising:

one or more temporary support frames vertically provided in the vicinity of or within intended construction  
20 site of a building and to be added sequentially added to upper side depending upon increasing of a height of construction;

a climbing mechanism fitted on the periphery of said temporary frame via upper and lower guide rollers and  
25 being arranged a jerk for up and down motion; and

a canopy frame supported below said climbing

This Sheet Has Been Replaced





- 23 -

mechanism in handed condition and covering entire upper surface of said building.

3. A temporary frame system for construction as set forth in claim 1 or 2, wherein said temporary support frame is a mast of a tower crane.

4. A temporary frame system for construction as set forth in any one of claims 1 to 3, wherein a main girder reciprocally movable along a main rail and a subsidiary girder reciprocally movable along a subsidiary rail arranged at side portion of said main rail in parallel to the latter, and a hoist movable along said main girder and said subsidiary girder and can be transferred between respective girders in a condition where both girders are matched in alignment to each other, a building material being transferred to the hoist positioned in said main girder, and said main girders is constructed as a dual type to include two girders arranged along extending direction of said main rail.

5. A temporary frame system for construction as set forth in any one of claims 1 to 4, wherein said dual type main girder is integrally movable.

6. A temporary frame system for construction as set



- 24 -

forth in any one of claims 1 to 5, wherein a stationary  
girder for transferring is arranged between said main rail  
and said subsidiary rail and to be placed in alignment with  
respective of crane girders, and a transporting object is  
5 transported to a destined transporting position via  
respective crane girders and said stationary girder.