

SHELTERED BUILDING CONSTRUCTION METHOD

Field of the Invention

This invention relates to a method for constructing a building under a temporary shelter, in particular a temporary shelter for protection from weather, for example rain, hail, snow, sun and the like.

Background of the Invention

It is known to provide a temporary shelter over a building site to protect the building site from weather such as rain, hail, snow and sun to prevent such weather from impeding construction. With reference to Figures 12a and 12b of the accompanying drawings, previously known methods for constructing a building 10 under a temporary shelter 12 employ overhead cranes 14 attached to the underside of a temporary roof 16. The overhead cranes 14 are able to move horizontally with respect to the temporary roof 16 for horizontal transportation of building materials. A cargo lift 18 or a rafter jib crane 20 mounted atop the temporary roof 16 is used for vertical transportation of building materials. The rafter jib crane 20 is also used for the installation and/or height adjustment of masts 22 which support the temporary roof 16.

It is necessary for the temporary roof 16 to be made with relatively heavy structural members as it must be sufficiently strong to support the overhead cranes 14 and the rafter jib crane 20.

In another previously known arrangement, the temporary roof is suspended on horizontal jib cranes. This arrangement has the disadvantage of requiring additional cranes to dismantle the temporary roof.

The applicant has determined that it would be beneficial for there to be provided a method of constructing a building under a temporary shelter which does not require such heavy structural members in the temporary roof, and which does not require additional cranes to dismantle the temporary roof.

Summary of the Invention

In accordance with one aspect of the present invention, there is provided a method of constructing a structure at a construction site, said method including the steps of supporting a roof of a shelter above the construction site, constructing the structure beneath said roof using a jib crane, raising a jib of the jib crane relative to the roof such that the jib is above the roof, and using said jib crane to dismantle said roof.

Preferably, said jib crane is arranged such that the jib is able to rotate horizontally.

Preferably, the roof is supported on at least one mast which is height adjustable. More preferably, the height of the at least one mast is increased by inserting at least one additional length of mast therein.

Preferably, prior to or during the step of raising the jib, the jib is rotated about a substantially vertical axis from a first position in which the jib is at least partially beneath the roof to a second position in which the jib is capable of being raised without being obstructed by the roof.

Alternatively, prior to or during the step of raising the jib, at least a portion of the roof is rearranged from a first configuration in which the jib is at least partially beneath the roof to a second configuration in which the jib is no longer beneath the roof. Preferably, the roof has a movable flap which is substantially horizontal in said first configuration and is substantially vertical in said second configuration.

Preferably, the jib crane has a roof support above the level of the jib, and the roof is supported on said roof support. More preferably, the jib crane includes a bearing unit which enables the jib to rotate without rotating the roof support. Preferably, said roof support is in the form of a crane mast extension.

Preferably, the jib crane is provided with connecting means for connecting the jib crane to the roof, and the connecting means is able to be operated to disconnect the crane from the

roof.

Preferably, the roof is supported on at least one mast located outside of a space which is able to be reached by a hoist of the jib crane, so that the mast does not obstruct rotation of the jib.

Preferably, the jib of the jib crane is extendable and/or retractable.

Preferably, the roof is used as a working platform for accessing space outside of the space which is able to be reached by a hoist of the jib crane. More preferably, the roof is provided with an overhead crane for accessing space outside of the space which is able to be reached by the hoist of the jib crane.

Preferably, the roof is made from the same material or materials as a roof of the building. More preferably, the structure is a building and the roof is arranged to form a roof of the building upon completion of the construction.

In a preferred embodiment of the invention, the roof is supported by a plurality of masts, and scaffolding is mounted to said plurality of masts for accessing the building. Preferably, the scaffolding is mounted to lifting elements of the masts such that the scaffolding may be raised or lowered. More preferably, scaffolding supports are provided between the scaffolding and the building. Preferably, said scaffolding supports are in the form of removable and/or relocatable ties.

Preferably, support means are provided between said at least one mast and the building. Preferably, said support means is in the form of at least one tie between said at least one mast and the building.

Preferably, there is provided a plurality of jib cranes for constructing the building.

Preferably, the jib crane(s) is/are arranged such that the entire area below the roof is able

to be reached by a hoist of the jib crane.

Preferably, the roof is supported by a plurality of masts and/or a plurality of jib cranes. More preferably, horizontal beams are provided between the plurality of masts and/or the plurality of jib cranes for supporting the roof.

Preferably, at least one mast has mounted thereon an additional jib.

In accordance with another aspect of the present invention there is provided an apparatus for constructing a structure on a construction site, including a shelter having a roof for sheltering the construction site and a jib crane for constructing the structure beneath the roof, wherein the jib crane and the roof are arranged such that a jib of the jib crane is capable of being raised above the roof for dismantling the roof upon completion of said construction.

Preferably, said jib crane is a horizontal jib crane.

Preferably, the roof is supported on at least one mast which is height adjustable. More preferably, the height of the at least one mast is increased by inserting at least one additional length of mast therein.

Preferably, the jib crane is located such that a mast of the crane is able to be extended to a height above the roof without being obstructed by the roof.

Alternatively, the roof has a flap which is movable from a first configuration in which the flap shelters the jib crane to a second configuration in which the flap is arranged to enable the jib of the crane to be raised above the roof.

Preferably, the jib crane has a roof support above the level of the jib, and the roof is supported on said roof support. More preferably, the jib crane includes a bearing unit which enables the jib to rotate without rotating the roof support. Preferably, said roof support is in the form of a crane mast extension.

Preferably, the jib crane is provided with connecting means for connecting the jib crane to the roof, and the connecting means is able to be operated to disconnect the crane from the roof.

Preferably, the roof is supported on at least one mast located outside of a space which is able to be reached by a hoist of the jib crane, so that the mast does not obstruct rotation of the jib.

Preferably, the jib of the jib crane is extendable and/or retractable.

Preferably, the roof is provided with an overhead crane for accessing space outside of the space which is able to be reached by a hoist of the jib crane.

Preferably, the roof is made from the same material or materials as a roof of the building. More preferably, the structure is a building and the roof is arranged to form a roof of the building upon completion of the construction.

It is preferred that the roof is supported by a plurality of masts, and scaffolding is mounted to said plurality of masts for accessing the building. Preferably, the scaffolding is mounted to lifting elements of the masts such that the scaffolding may be raised or lowered. Preferably, scaffolding supports are provided between the scaffolding and the building. More preferably, said scaffolding supports are in the form of removable and/or relocatable ties.

Preferably, support means are provided between said at least one mast and the building. More preferably, said support means is in the form of at least one tie between said at least one mast and the building.

Preferably, there is provided a plurality of jib cranes for constructing the building.

Preferably, the jib crane(s) is/are arranged such that the entire area below the roof is able

to be reached by a hoist of the jib crane.

Preferably, the roof is supported by a plurality of masts and/or a plurality of jib cranes. Preferably, horizontal beams are provided between the plurality of masts and/or the plurality of jib cranes for supporting the roof.

Preferably, at least one mast has mounted thereon an additional jib.

In accordance with yet another aspect of the present invention, there is provided a jib crane for use in the method of constructing a structure as claimed herein, wherein the jib crane includes a jib and a roof support for supporting the roof of the shelter.

Preferably, the jib crane includes a bearing unit for enabling the jib to rotate without rotating the roof support.

More preferably, the jib crane includes a height adjustable mast.

Brief Description of the Drawings

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figures 1a to 1f are a series of top views of a building and a temporary shelter, including two horizontal jib cranes and two masts, showing a method of constructing a structure in accordance with the present invention.

Figures 2a to 2d are a series of side views of a temporary shelter, including a single mast, showing a method of constructing a structure in accordance with the present invention.

Figures 3a to 3c are a series of side views of a temporary shelter, including a single mast and a temporary roof having a movable flap, showing a method of constructing a structure in accordance with the present invention.

Figures 4a to 4d are a series of side views of a temporary shelter, including a single mast and a single horizontal jib crane with a bearing element and a support beam, showing a method of constructing a structure in accordance with the present invention.

Figures 5a to 5f are a series of side views of a mast having an automatic lengthening means, showing the insertion of an additional mast length for lengthening the mast.

Figures 6a to 6f are top views of various embodiments of temporary shelters for use in methods of constructing a structure in accordance with the present invention.

Figures 7a to 7f are top views of various embodiments of temporary shelters for use in methods of constructing a structure in accordance with the present invention.

Figures 8a and 8b are side views of a horizontal jib crane with an extendable jib.

Figures 9a and 9b are side views of a temporary roof supported by a horizontal jib crane, the horizontal jib crane having an extendable mast through the rotating and sliding units.

Figures 10a to 10d are side views of temporary shelter and a building, the temporary shelter having a temporary roof component which is also the roof of the building, showing a method of constructing a structure in accordance with the present invention.

Figures 11a and 11b are side views of a temporary shelter with framework mounted to lift elements of a mast and a horizontal jib crane.

Figure 11c is a top view of the temporary shelter shown in Figures 11a and 11b.

Figure 12a is a side view of a temporary shelter including overhead cranes attached to the underside of the temporary roof, and a rafter jib crane, showing a previously known method of constructing a building beneath a temporary shelter.

Figure 12b is a side view of a temporary shelter including overhead cranes attached to the underside of the temporary roof, and a rafter jib crane, showing a previously known method of constructing a building beneath a temporary shelter.

Detailed Description of the Drawings

With reference to Figure 1a, there is shown a shelter 24 having a roof 26 (indicated by dotted lines), the roof 26 being supported by horizontal beams 28, which in turn are supported by four masts 30, 32, 34, 36, with masts 32, 36 being part of horizontal jib cranes 38, 40. As can be seen by the swept area 42, 44 of the cranes 38, 40, the entire area below the roof 26 is able to be reached by at least one hoist 46 of the jib cranes 38, 40.

In Figure 2a, a jib 48 of the jib crane 50 is shown in a first position in which the jib 48 is partially beneath the roof 26. A structure 52 is then constructed on a construction site beneath the roof 26, the construction site being sheltered by the roof 26 such that the effect from adverse weather on progress of the construction is minimised. As the structure 52 is constructed, height adjustable masts 54, 56 which support the roof can be raised to keep up with the height of the structure 52 (see Figures 2b and 2c). Detail of a suitable height-adjustment mechanism 60 is shown in Figures 5a to 5f. Note also that support means in the form of ties 62 between the masts 54, 56 and the structure 52 are provided for stabilising the structure 52.

Height of the mast 54 is increased by jacking up an outer frame 64 of the mast 54 by way of a hydraulic jack 66. Movement of the outer frame 64 along the mast 54 is guided by guide rollers 68 located between the outer frame 64 and the mast 54. Once the outer frame 64 is raised sufficiently for there to be a suitable space 70 within the mast 54, lock pins 72 are engaged to lock the position of the outer frame 64 in relation to the mast 54. A winch 74 located near the top of the mast 54 is used to lift an additional length of mast 76 and to insert the additional length of mast 76 into the space 70. A base 78 of the hydraulic jack 66 may then be moved upwards within the mast 54 for further increasing the height of the mast 54.

Once construction of the structure 52 beneath the roof 26 is completed, as shown in Figure 2c, the jib 48 of the crane 50 is rotated from underneath the roof 26 so that as the mast 56 of the crane 50 is raised, the jib 48 is raised past the roof 26 without being obstructed by the roof 26. Such rotation to clear the roof 26 is best seen in Figure 10b. Although the orientation of the jib 48 in that drawing is substantially parallel to a side 80 of the roof 26, depending on the arrangement of the crane 50 in relation to the roof 26 other orientations of the jib 48 may also be possible for clearing the roof 26. See for example Figure 1b in which jibs 82, 84 of the jib cranes 38, 40 are not parallel to sides of the roof 26 but may still be raised above the roof 26 without being obstructed by the roof 26.

Once above the roof 26, the jibs 82, 84 are then rotated to extend above the roof 26, as shown in Figure 1d, and the cranes 38, 40 are then used to dismantle the roof 26. The cranes 38, 40 may also be used to lower themselves and/or to dismantle other masts 30, 34 as shown in Figures 1e and 1f, the latter drawing showing the completed structure 52 after the roof 26, masts 30, 34 and cranes 38, 40 have been dismantled.

Note that in Figure 1b, the horizontal beams 28 are cut at locations 86, 88 near the masts 32, 36 of the jib cranes 38, 40 to enable the masts 32, 36 of the jib cranes 38, 40 to be raised relative to the roof 26. To compensate for the loss of support resulting from the cutting of the horizontal beams 28, temporary supports 90 are inserted below the beams 28.

An alternative arrangement is shown in Figures 3a to 3c in which the roof 26 is provided with a flap 27 which is movable from a first substantially horizontal configuration (see Figure 3a), in which the flap 27 shelters the jib crane 50, to a second substantially vertical configuration (see Figures 3b and 3c), in which the flap 27 is retracted to enable the jib 48 of the crane 50 to be raised above the roof 26 without being obstructed by the roof 26.

As opposed to Figures 2a to 2d and Figures 3a to 3c which show a roof 26 supported at only one end in a cantilever arrangement, Figures 4a to 4c show an arrangement in which the roof 26 is supported at one end by a mast 92 and at the opposite end by the horizontal jib crane 94 which is provided with a roof support in the form of a crane mast extension 96 above the

level of a jib 98 of the crane 94. A connection beam 100 is supported on top of the crane mast extension 96 and connects the jib crane 94 to the roof 26 such that the roof 26 is supported by the jib crane 94. At a location between the jib 98 and the roof support 96, the jib crane 94 is provided with a bearing unit 102 which enables the jib 98 to rotate without rotating the roof support 96.

Once construction of the structure 52 is completed, as shown in Figure 4c, a temporary support 104 is inserted between the structure 52 and the connecting beam 100, and the connecting beam 100 is cut at a location 106 near a mast 108 of the jib crane so that the jib 98 of the jib crane 94 is able to be raised above the roof 26 for dismantling the roof 26.

Examples of suitable arrangements for constructing a structure in accordance with the present invention are shown in Figures 6a to 6f and Figures 7a to 7f, wherein the structure 52 is shown in thick lines, and the roof 26 is shown in dotted lines. It can be seen that the size of the roof 26 required will depend on the size of the structure 52, the placement of masts 110, the use of horizontal beams 28 between the masts 110, and the use of an extendable jib 112. More particularly, Figures 6a to 6c all relate to a similar rectangular structure 52, however the size of the roof 26 required in Figure 6a, in which horizontal beams 28 are used, is significantly smaller than the size of the roof 26 required in Figure 6b, in which horizontal beams are not used, as the masts 110 must be placed outside of a space 114 which is able to be reached by hoists 116, 118 of the cranes 120, 122 so that jibs 124, 126 of the jib cranes 120, 122 can be rotated freely. In the embodiment shown in Figure 6c, there are provided jib cranes 120, 122 which have extendable jibs 112 such that the jibs 112 can be rotated past masts 110 by moving the jibs 112 to a retracted configuration.

Detail of a jib crane 128 with an extendable jib 130 is shown in Figure 8a with the jib 130 in a retracted configuration, and in Figure 8b with the jib 130 in an extended configuration.

Figures 9a and 9b show a jib crane 132 having a height adjustable mast 134. In Figure 9a, a space 136 for inserting an additional length of mast 76 is below a jib 138 of the crane 132, whereas in Figure 9b the space 136 for inserting an additional length of mast 76 is above the jib

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138. The jib crane 132 shown in Figure 9b also has a winch 140 for raising the additional length of mast 76, mounted at the top of the mast 134.

The embodiment shown in Figures 10a to 10d includes a mast 54 supporting a roof 26, a structure 52 in the form of a building constructed beneath the roof 26, and a jib crane 50 for constructing the building 52, wherein the roof 26 of the shelter also serves as the roof 26 of the building 52 once construction is complete (see Figure 10d). By doing this, savings in materials and cost can be achieved.

In Figures 11a to 11c there is shown an embodiment in which there is provided a roof 26 supported on a height-adjustable mast 142, a horizontal jib crane 144 with a height-adjustable mast 146 for constructing a structure 52 beneath the roof 26, and scaffolding 148 mounted to lifting elements 150 in the form of outer frames of the masts 142, 146 such that the scaffolding 148 may be raised or lowered. The scaffolding 148 is used for gaining access to the structure 52, for example for the purpose of finishing the exterior of the structure 52. In the embodiment shown, there are also provided scaffolding supports in the form of relocatable ties 152 between the structure 52 and the scaffolding 148. The ties 152 are relocatable such that they can be relocated to different locations on the structure 52 when the scaffolding 148 is raised and/or lowered in relation to the structure 52.

The preferred embodiments have been described by way of example only and modifications are possible within the scope of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method of constructing a structure at a construction site, said method including the steps of:
 - supporting a roof of a shelter above the construction site;
 - constructing the structure beneath said roof using a jib crane;
 - raising a jib of the jib crane relative to the roof such that the jib is above the roof;
 - and
 - using said jib crane to dismantle said roof.
2. A method of constructing a structure as claimed in claim 1, wherein said jib crane is arranged such that the jib is able to rotate horizontally.
3. A method of constructing a structure as claimed in either claim 1 or claim 2, wherein the roof is supported on at least one mast which is height adjustable.
4. A method of constructing a structure as claimed in claim 3, wherein the height of the at least one mast is increased by inserting at least one additional length of mast therein.
5. A method of constructing a structure as claimed in any one of the preceding claims wherein, prior to or during the step of raising the jib, the jib is rotated about a substantially vertical axis from a first position in which the jib is at least partially beneath the roof to a second position in which the jib is capable of being raised without being obstructed by the roof.
6. A method of constructing a structure as claimed in any one of claims 1 to 4 wherein, prior to or during the step of raising the jib, at least a portion of the roof is rearranged from a first configuration in which the jib is at least partially beneath the roof to a second configuration in which the jib is no longer beneath the roof.
7. A method of constructing a structure as claimed in claim 6 wherein the roof has a

movable flap which is substantially horizontal in said first configuration and is substantially vertical in said second configuration.

8. A method of constructing a structure as claimed in any one of the preceding claims, wherein the jib crane has a roof support above the level of the jib, and the roof is supported on said roof support.
9. A method of constructing a structure as claimed in claim 8, wherein the jib crane includes a bearing unit which enables the jib to rotate without rotating the roof support.
10. A method of constructing a structure as claimed in either claim 8 or claim 9, wherein said roof support is in the form of a crane mast extension.
11. A method of constructing a structure as claimed in any one of the preceding claims, wherein the jib crane is provided with connecting means for connecting the jib crane to the temporary roof, and the connecting means is able to be operated to disconnect the crane from the roof.
12. A method of constructing a structure as claimed in any one of the preceding claims wherein the roof is supported on at least one mast located outside of a space which is able to be reached by a hoist of the jib crane, so that the mast does not obstruct rotation of the jib.
13. A method of constructing a structure as claimed in any one of the preceding claims, wherein the jib of the jib crane is extendable and/or retractable.
14. A method of constructing a structure as claimed in any one of the preceding claims, wherein the roof is used as a working platform for accessing space outside of the space which is able to be reached by a hoist of the jib crane.
15. A method of constructing a structure as claimed in claim 14, wherein the roof is

provided with an overhead crane for accessing space outside of the space which is able to be reached by the hoist of the jib crane.

16. A method of constructing a structure as claimed in any one of the preceding claims, wherein the roof is made from the same material or materials as a roof of the building.
17. A method of constructing a structure as claimed in claim 16, wherein the structure is a building and the roof is arranged to form a roof of the building upon completion of the construction.
18. A method of constructing a structure as claimed in any one of the preceding claims, wherein the roof is supported by a plurality of masts, and scaffolding is mounted to said plurality of masts for accessing the structure.
19. A method of constructing a structure as claimed in claim 18, wherein the scaffolding is mounted to lifting elements of the masts such that the scaffolding may be raised or lowered.
20. A method of constructing a structure as claimed in either claim 18 or claim 19, wherein scaffolding supports are provided between the scaffolding and the building.
21. A method of constructing a structure as claimed in claim 20, wherein said scaffolding supports are in the form of removable and/or relocatable ties.
22. A method of constructing a structure as claimed in any one of the preceding claims, wherein support means are provided between said at least one mast and the building.
23. A method of constructing a structure as claimed in claim 22, wherein said support means is in the form of at least one tie between said at least one mast and the building.
24. A method of constructing a structure as claimed in any one of the preceding claims,

wherein there is provided a plurality of jib cranes for constructing the building.

25. A method of constructing a structure as claimed in any one of the preceding claims, wherein the jib crane(s) is/are arranged such that the entire area below the roof is able to be reached by a hoist of at least one or more of the jib crane(s).
26. A method of constructing a structure as claimed in any one of the preceding claims, wherein the roof is supported by a plurality of masts and/or a plurality of jib cranes.
27. A method of constructing a structure as claimed in claim 26, wherein horizontal beams are provided between the plurality of masts and/or the plurality of jib cranes for supporting the roof.
28. A method of constructing a structure as claimed in any one of the preceding claims wherein at least one mast has mounted thereon an additional jib.
29. An apparatus for constructing a structure on a construction site, including a shelter having a roof for sheltering the construction site and a jib crane for constructing the structure beneath the roof, wherein the jib crane and the roof are arranged such that a jib of the jib crane is capable of being raised above the roof for dismantling the roof upon completion of said construction.
30. An apparatus for constructing a structure as claimed in claim 29, wherein said jib crane is a horizontal jib crane.
31. An apparatus for constructing a structure as claimed in either claim 29 or claim 30, wherein the roof is supported on at least one mast which is height adjustable.
32. An apparatus for constructing a structure as claimed in claim 31, wherein the height of the at least one mast is increased by inserting at least one additional length of mast therein.

33. An apparatus for constructing a structure as claimed in any one of claims 29 to 30, wherein the jib crane is located such that a mast of the crane is able to be extended to a height above the roof without being obstructed by the roof.
34. An apparatus for constructing a structure as claimed in any one of claims 29 to 30, wherein the roof has a flap which is movable from a first configuration in which the flap shelters the jib crane to a second configuration in which the flap is arranged to enable the jib of the crane to be raised above the roof.
35. An apparatus for constructing a structure as claimed in any one of claims 29 to 34, wherein the jib crane has a roof support above the level of the jib, and the roof is supported on said roof support.
36. An apparatus for constructing a structure as claimed in claim 35, wherein the jib crane includes a bearing unit which enables the jib to rotate without rotating the roof support.
37. An apparatus for constructing a structure as claimed in either claim 35 or claim 36, wherein said roof support is in the form of a crane mast extension.
38. An apparatus for constructing a structure as claimed in any one of claims 29 to 37, wherein the jib crane is provided with connecting means for connecting the jib crane to the roof, and the connecting means is able to be operated to disconnect the crane from the roof.
39. An apparatus for constructing a structure as claimed in any one of claims 29 to 38, wherein the roof is supported on at least one mast located outside of a space which is able to be reached by a hoist of the jib crane, so that the mast does not obstruct rotation of the jib.
40. An apparatus for constructing a structure as claimed in any one of claims 29 to 39,

wherein the jib of the jib crane is extendable and/or retractable.

41. An apparatus for constructing a structure as claimed in any one of claims 29 to 40, wherein the roof is provided with an overhead crane for accessing space outside of the space which is able to be reached by a hoist of the jib crane.
42. An apparatus for constructing a structure as claimed in any one of claims 29 to 41, wherein the roof is made from the same material or materials as a roof of the building.
43. An apparatus for constructing a structure as claimed in claim 42, wherein the structure is a building and the roof is arranged to form a roof of the building upon completion of the construction.
44. An apparatus for constructing a structure as claimed in any one of claims 29 to 43, wherein the roof is supported by a plurality of masts, and scaffolding is mounted to said plurality of masts for accessing the building.
45. An apparatus for constructing a structure as claimed in claim 44, wherein the scaffolding is mounted to lifting elements of the masts such that the scaffolding is capable of being raised or lowered.
46. An apparatus for constructing a structure as claimed in either claim 44 or claim 45, wherein scaffolding supports are provided between the scaffolding and the building.
47. An apparatus for constructing a structure as claimed in claim 46, wherein said scaffolding supports are in the form of removable and/or relocatable ties.
48. An apparatus for constructing a structure as claimed in any one of claims 29 to 47, wherein support means are provided between said at least one mast and the building.
49. An apparatus for constructing a structure as claimed in claim 48, wherein said support

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means is in the form of at least one tie between said at least one mast and the building.

50. An apparatus for constructing a structure as claimed in any one of claims 29 to 49, wherein there is provided a plurality of jib cranes for constructing the building.

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51. An apparatus for constructing a structure as claimed in any one of claims 29 to 50, wherein the jib crane(s) is/are arranged such that the entire area below the roof is able to be reached by a hoist of at least one or more of the jib crane(s).

- 10 52. An apparatus for constructing a structure as claimed in any one of claims 29 to 51, wherein the roof is supported by a plurality of masts and/or a plurality of jib cranes.

53. An apparatus for constructing a structure as claimed in claim 52, wherein horizontal beams are provided between the plurality of masts and/or the plurality of jib cranes for supporting the roof.

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54. An apparatus for constructing a structure as claimed in any one of claims 29 to 53, wherein at least one mast has mounted thereon an additional jib.

- 20 55. A jib crane for use in a method of constructing a structure as claimed in any one of claims 1 to 28, the jib crane including a jib and a roof support for supporting the roof of the shelter above the construction site during the step of constructing the structure beneath the roof using the jib crane.

- 25 56. A jib crane as claimed in claim 55, wherein the jib crane includes a bearing unit for enabling the jib to rotate without rotating the roof support.

57. A jib crane as claimed in either claim 55 or 56, wherein the jib crane includes a height adjustable mast and a slide-type jib rotating unit.

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