STACKING AND ELONGATING BUILDING STRUCTURE


Assignee: The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed: Sept. 24, 1973

Appl. No.: 400,490

U.S. Cl. 52/86; 52/122
Int. Cl. E04b 1/32
Field of Search 52/86, 88, 67, 122. 745

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ABSTRACT

A pair of beams are respectively attached to the opposite lower edges of an elongated building structure having an arched cross-sectional configuration and having no floor or end walls. Each beam is an elongated channel having flat upper and lower surfaces. A pair of lifting plates are attached to the side, within the channel, and near the ends of each beam. The ends of each beam include tie down sections for securing flexible joint covers for sealing the joints between abutting building structures. Each flexible joint cover includes a pair of openings that correspond with openings in abutting structures. A plurality of structures may be stacked on each other with the pairs of beams of sequential structures resting on each other. The entire stock of structures may be lifted by the lifting plates of the lowermost structure.

2 Claims, 9 Drawing Figures
STACKING AND ELONGATING BUILDING STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention.
The present invention relates to building structures and more particularly to building structures that may be stacked or positioned end to end.

2. Description of the Prior Art.
Open-ended and floorless buildings have previously been stacked by simply laying one on top of another so that the weight of the entire stack was borne by the bottom building. Lifting was accomplished by attaching cables to two lengths of angle iron bolted to the building near its top thus allowing one building to be lifted at a time and making it necessary for rigging personnel to climb on top of the building to attach the lifting cables.

SUMMARY OF THE INVENTION

Briefly, the present invention comprises a pair of beams being respectively attached to the opposite lower edges of an elongated building structure having an arched cross-sectional configuration and having no floor or end walls. Each beam is an elongated channel having flat upper and lower surfaces. A pair of lifting plates are attached to the side, within the channel, and near the ends of each beam. The ends of each beam includes tie down section for securing flexible joint covers for sealing the joints between abutting building structures. Each flexible joint cover includes a pair of openings that correspond with openings in abutting structures. A plurality of structures may be stacked on each other with the pairs of beams of sequential structures resting on each other. The entire stack of structures may be lifted by the lifting plates of the lowermost structure.

STATEMENT OF THE OBJECTS OF THE INVENTION

An object of the present invention is to provide means for stacking building structures.

Another object of the present invention is to provide means for stiffening building structures.

Still another object is to provide means for end to end connection of a plurality of building structures.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the building structure of the present invention;
FIG. 2 is a top elevation of the building structure of the present invention;
FIG. 3 is an end view illustrating the stacking of a plurality of building structures of the present invention;
FIG. 4 is a pictorial view of a plurality of building structures of the present invention placed end to end;
FIG. 5 is a sectional view taken at section 5–5 of FIG. 1;
FIG. 6 is an enlarged view of the tie down section taken at section 6–6 of FIG. 1;
FIG. 7 is a sectional view taken at section 7–7 of FIG. 6;
FIG. 8 is a side elevation of the joint cover of abutting building structures, and
FIG. 9 is a plan view of the joint cover of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIGS. 1 through 9 are illustrated to the building structure of the present invention. As best depicted in FIGS. 1 through 4 building structure 11 includes a corrugated structure 13 that is bottomless and has no ends. However, the bottomless, endless and corrugated aspects of structure 13 is not the subject matter of the present invention. The subject matter of the present invention relates to the following described stacking and connecting aspects of building structure 11.

Operatively connected to the respective bottom edges of corrugated structure 13 are a pair of elongated channel beams 15. Beams 15 are connected to the ridges of the corrugations by bolts 17, rivets, welding or the like. A pair of door openings 19 and 21 are provided at the opposite ends and on each side of corrugated structure 13.

As best depicted in FIGS. 1, 2, 6, and 7 each beam 15 is preferably U-shaped and includes a pair of lifting plates 23 and 25 connected near the opposite ends of each beam 15. Each lifting plate is preferably welded to the beam and includes an opening 27. Each lifting plate is offset at an angle of about 20°, for example. It should be noted that lifting plate 25 is offset at a positive angle and lifting plate 23 at a negative angle such that the extension of the planes of these plates would intersect at a line that is above the structure 11. The lifting plates are slanted in this manner so that, when the lifting cables are attached to the building at the bottom of the stack of buildings, the lifting cables will not hang up on the protruding plates of the above stacked buildings.

As best depicted in FIGS. 1, 2, 6, and 7 each beam 15 has a pair of tie down sections 29 and 31 that are at opposite ends of the beam. Tie down section 29, for example, includes an elongated rod 33 that is welded between the opposite short legs 35 and 37 of the U-beam. A section of vertical section 39 and leg 35 are removed to form an opening 41 and support member 43. Support member 43 includes 45 for connection to the lower part of the last corrugated ridge adjacent door opening 19. Referring to FIGS. 1, 2 and 8, attached to the lower section of the trough adjacent opening 19 is eye bolt 47.

In FIG. 3 it can be seen that the building structures 11 of the present invention can be stacked upon each other. It should be particularly noted that the height of H of the U-beam is selected so that there is a clearance C between adjacent buildings. Therefore, when the buildings are stacked the weight of all of the buildings will be transmitted through the U-beams directly to the ground and not from building to building in the stack. From the foregoing it can be seen that a building structure is provided that permits stacking of buildings without any interference between buildings, without transmitting the load of one building to the next and provides for stiffening of the bottom of the building. Moreover, with these lifting beams a crane can lift one, several, or all of the buildings simultaneously.

Another feature of the present invention is the provision for connecting the buildings, end to end, to form
a single long building. In FIG. 4 is illustrated three buildings, connected end to end, wherein a joint cover 49 covers the joint between adjacent buildings. The details of joint cover 49 are illustrated in FIGS. 8 and 9. Joint cover 49 is made of a flexible material, such as canvas, and includes a pair of roll up doors 51 having windows 53 and door ties 55. Positioned above the doors are rain gutters 57 which may be canvas covered ropes that are sewn into place. Ropes 59 and 61 extend within seams 63 and 65 respectively. Below each door 10 is a horizontal strip of material 67. Seams 69 and 71 are provided for additional strength. Grommets 73 are provided to have ropes 59 and 61 pull material 67 tight as hereinafter explained. The lower corners of joint cover 49 are cut at about 45° angles to provide for a snug cover fit at the corners.

In practice two buildings are abutted together preferably with a small gap 75 between buildings. Joint cover 49 is then positioned as shown. The width of the cover 49 is preferably selected to be less than the width between troughs 77 and 79 such that the ropes 59 and 61 will be on the slopes of the troughs. Rope 59, for example, is threaded through eye bolt 47, then through grommet 73 and is then tightened and tied to rod 33 of beam 15. Passing the rope through eye bolt 47 provides vertical tightening of the sides of the joint cover 49. Passing the rope through grommet 73 provides for tightening material 67 at the door bottom. From FIGS. 2 and 8 it can be seen that the 45° angle cut of the cover corners allows the canvas to lie tightly along the corrugation. Opening 41 of beam 15 also makes this tight fit possible.

What is claimed is:

1. A building structure comprising:
   a. an elongated structure having a ceiling and first 35 and second side walls but no floor or end walls;
   b. the first and second respective bottom edges of said first and second side walls extending outwardly further than the upper sections of said first and second side walls;
   c. a first elongated beam connected to the outward side along said first bottom edge of said first said wall;
   d. a second elongated beam connected to the outward side along said second bottom of said second side wall;
   e. each of said first and second elongated beams comprising a U-beam having a cross section including a vertical section and first and second short legs extending therefrom;
   f. said first and second short legs extending outwardly from the side walls of said elongated structure;
   g. the bottom surfaces of said second short legs of said first and second elongated beams extending below the first and second bottom edges of said first and second side walls;
   h. the width of the ceiling of said building structure being less than the distance between the upper and lower surfaces respectively of said first and second short legs of each of said first and second elongated beams;

i. first and second lifting plates connected near the opposite ends of each of said beams and rigidly positioned between said first and second short legs and extending outwardly from said beams and rigidly positioned at positive and negative angles;

j. each end of each of said first and second side walls of said building structure includes an opening forming half a door opening and the positioning of two of said structures end to end forms a full door opening;

k. a flexible joint cover for connecting the ends of said structures when they are positioned end to end and said flexible covering including a door that is co-extensive with said full door opening;

l. whereby at least two building structures may be stacked one upon the other wherein the beams of each of said at least two building structures rest against each other and maintain a separation between said at least two building structures.

2. The building structures of claim 1 wherein:
   a. each of the ends of each of said beams includes a tie down section for said cover; and
   b. each of said tie down sections includes a vertically extending support member forming the end of said tie down section and a vertically extending rod connected between said first and second short legs of said beams.

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