

PATENT SPECIFICATION

(11) 1223 064

DRAWINGS ATTACHED

- (21) Application No. 23816/69 (22) Filed 9 May 1969
 (31) Convention Application No. 741440 (32) Filed 1 July 1968 in
 (33) United States of America (US)
 (45) Complete Specification published 17 Feb. 1971
 (51) International Classification B 65 b 17/02
 (52) Index at acceptance
 B8C 12F 12G



(54) ASSEMBLY OF COLLAPSED BUILDINGS FOR SHIPPING

(71) I, FLOYD E. BIGELOW, JR., of Houston, Harris County, Texas, a citizen of the United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a system of shipping buildings.

In my U.S. patent Reissue 25,827, there is shown a collapsible building and a system for shipping the collapsed buildings stacked one upon the other. Reference is made to this patent for a complete disclosure of the details of construction of the building and the manner in which the building is collapsed and erected.

Sudden acceleration of the transporting means has sometimes resulted in shearing of the bolts utilized to bolt the skid of an upper building to the supporting post or stacking rack of a lower building. The problem is particularly acute when the buildings are shipped by rail when the train is "humped," as the starting of movement of the train is transmitted to each car as a sudden violent shock. The "humping" is sometimes so severe that the bolts securing the buildings together are sheared in two.

It is an object of this invention to provide a simple system for securing stacked, collapsed buildings together for shipping which will withstand sudden acceleration.

Another object is to provide a simple system of reducing shear forces on bolts which secure stacked buildings together during shipping.

Another object is to provide a simple system of translating relative horizontal movement of stacked buildings to vertical movement to place the bolts securing the stacked buildings together in tension, to thereby limit such vertical and horizontal movement and protect the bolts against shearing.

According to the present invention there is provided an assembly of buildings for shipping comprising a plurality of collapsed build-

ings each having a skid with the walls and roof of the building supported on the skid, a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof, said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building, each skid and associated juxtaposed stacking racks including engageable surfaces at least one of which provides wedge means extending at an angle to the horizontal, and means fastening said skids to said stacking racks and limiting movement of the skids in a vertical direction away from the stacking racks.

Other objects, features and advantages of the invention will be apparent from the drawings, the specification and the claims.

In the drawings wherein an illustrative embodiment of this invention is shown, and wherein like reference numerals indicate like parts:

Figure 1 is a diagrammatic view of an erected building;

Figure 2 is a diagrammatic view of the building of Figure 1 in collapsed shipping condition;

Figure 3 is a view in side elevation illustrating a plurality of buildings stacked and secured together for shipping;

Figure 4 is an enlarged fragmentary view illustrating the stacking and securing assembly in accordance with this invention; and

Figure 5 is a view along the line 5-5 of Figure 4.

The building shown erected in Figure 1 and collapsed in Figure 2 may be erected and collapsed in the manner taught in my patent Reissue 25,827. The roof 10 is raised and the two end walls, one of which is shown at 11, and two side walls, one of which is shown at 12, are laid down on the skid 13. The roof 10 is then lowered over the walls and supported on the skid as shown in Figure 2.

A plurality of stacking racks indicated generally at 14 are secured to and extend upwardly from the skid 13. Preferably there are

four stacking racks as shown in Figure 2, one at each corner of the skid.

Each of the stacking racks 14 is provided by a wide flange I-beam 15 welded to the upper flange 16 of an I-beam which provides one of the runners of the skid. It will be noted that the lower flange 17 of this runner has its end portion 17a inclined upwardly in the manner of a sleigh runner. A pipe 18 extends between a pair of the I-beam runners as shown in Figures 1 and 2.

A short section of U-shaped iron 19 is secured to the upper ends of the I-beams 15 as by welding. The U-shaped member 19 is provided with two upwardly extending flange members 21 and 22 which are spaced apart a slightly greater distance than the width of the flange 17 of the skid runner. Thus as shown best in Figures 4 and 5 the skid of an upper building is supported on the stacking racks 15 of the lower building and rest on the horizontal support member provided by the U-shaped upper portion thereof.

Means are provided for fastening the skids to the stacking racks to limit vertical movement of the skids away from the stacking racks. The support member includes a web 23 having a vertically extending hole 24 therethrough for use in securing the assemblies together. The lower flange 17 of each runner has a vertical hole 25 extending therethrough. The bolt 26 extends through the two holes 24 and 25 and when the nut 27 is run up tight the two skids shown in Figure 4 will be firmly secured together. It will be noted from Figure 5 that one of the holes, preferably the hole in the lower skid flange 17, is provided by a slot which extends fore and aft of the building to permit some horizontal movement between stacked buildings.

In accordance with this invention, a wedge means is provided which extends at an angle to the horizontal. The wedge means may be on the skid or the support member. Preferably the wedge means extends upwardly and outwardly. In either event, it cooperates with a surface on the other of the support member or skid which is engageable with the wedge means. Preferably the skid surface is complementary to the wedge means. In the illustrated embodiment, the wedge means is provided by a downwardly facing angle iron 28 which has the free ends of each leg welded to the web member 23 of the support. The angle iron 28 is thus positioned with its leg 28a extending upwardly and outwardly, and the upwardly inclined flange portion 17a of the skid runner is complementary to and engages this flange leg 28a. It will be noted that the relationship is not critical. It is preferred that there be a wedge surface on the support member and a generally complementary surface on the skid so that upon any relative horizontal movement between the two stacked buildings, the wedge

surface will be effective to force the two skids to move apart.

In shipping, the collapsed buildings are stacked with the skid of an upper building supported on the stacking racks 14 of a lower building, with the holes 24 and 25 in register. The bolts 26 and nuts 27 are run up tight to secure the buildings together. In this position, the angle iron members 28 and the inclined skid flange 17a will be in engagement or very close to each other. It will be appreciated that to avoid stacking problems it is preferred that the relationship of the inclined member 17a of one skid and the angle member 28a of the wedge with which it cooperates be so positioned that slight clearance is present to avoid the problems of tolerance.

If during shipping of the buildings they are subjected to sudden acceleration or deceleration, the buildings will tend to slide relative to each other. If this occurs the inclined member 17a and wedge surface 28a will engage and the skid will tend to move upwardly along the wedge surface. As the skid tends to climb the wedge surface 28a, it will of course place the bolt 26 in tension. As the bolts are sized to prevent the skid and stacking rack from moving apart, the assembly of buildings will be held together. As the bolt 26 is not placed in shear by relative movement between two stacked buildings, the problem encountered in the past of the bolts being sheared off has been eliminated.

It will be appreciated that the complementary wedge surfaces between the stacking racks and the skids could extend either up or down, and could be placed in either side of the bolt 26. It is preferred that the relationship shown in the drawings be utilized, as the runners of the skids normally have the upturned sleigh-runner configuration shown at 17a so that the buildings may be readily pulled overland for a short distance.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the system may be made within the scope of the appended claims.

WHAT I CLAIM IS:

1. An assembly of buildings for shipping comprising,
 - a plurality of collapsed buildings each having a skid with the walls and roof of the building supported on the skid,
 - a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof,
 - said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building,
 - wedge means on at least one of the stacking racks of each skid extending at an angle to the horizontal,
 - said skids including surfaces complementary



four stacking racks as shown in Figure 2, one at each corner of the skid.

Each of the stacking racks 14 is provided by a wide flange I-beam 15 welded to the upper flange 16 of an I-beam which provides one of the runners of the skid. It will be noted that the lower flange 17 of this runner has its end portion 17a inclined upwardly in the manner of a sleigh runner. A pipe 18 extends between a pair of the I-beam runners as shown in Figures 1 and 2.

A short section of U-shaped iron 19 is secured to the upper ends of the I-beams 15 as by welding. The U-shaped member 19 is provided with two upwardly extending flange members 21 and 22 which are spaced apart a slightly greater distance than the width of the flange 17 of the skid runner. Thus as shown best in Figures 4 and 5 the skid of an upper building is supported on the stacking racks 15 of the lower building and rest on the horizontal support member provided by the U-shaped upper portion thereof.

Means are provided for fastening the skids to the stacking racks to limit vertical movement of the skids away from the stacking racks. The support member includes a web 23 having a vertically extending hole 24 therethrough for use in securing the assemblies together. The lower flange 17 of each runner has a vertical hole 25 extending therethrough. The bolt 26 extends through the two holes 24 and 25 and when the nut 27 is run up tight the two skids shown in Figure 4 will be firmly secured together. It will be noted from Figure 5 that one of the holes, preferably the hole in the lower skid flange 17, is provided by a slot which extends fore and aft of the building to permit some horizontal movement between stacked buildings.

In accordance with this invention, a wedge means is provided which extends at an angle to the horizontal. The wedge means may be on the skid or the support member. Preferably the wedge means extends upwardly and outwardly. In either event, it cooperates with a surface on the other of the support member or skid which is engageable with the wedge means. Preferably the skid surface is complementary to the wedge means. In the illustrated embodiment, the wedge means is provided by a downwardly facing angle iron 28 which has the free ends of each leg welded to the web member 23 of the support. The angle iron 28 is thus positioned with its leg 28a extending upwardly and outwardly, and the upwardly inclined flange portion 17a of the skid runner is complementary to and engages this flange leg 28a. It will be noted that the relationship is not critical. It is preferred that there be a wedge surface on the support member and a generally complementary surface on the skid so that upon any relative horizontal movement between the two stacked buildings, the wedge

surface will be effective to force the two skids to move apart.

In shipping, the collapsed buildings are stacked with the skid of an upper building supported on the stacking racks 14 of a lower building, with the holes 24 and 25 in register. The bolts 26 and nuts 27 are run up tight to secure the buildings together. In this position, the angle iron members 28 and the inclined skid flange 17a will be in engagement or very close to each other. It will be appreciated that to avoid stacking problems it is preferred that the relationship of the inclined member 17a of one skid and the angle member 28a of the wedge with which it cooperates be so positioned that slight clearance is present to avoid the problems of tolerance.

If during shipping of the buildings they are subjected to sudden acceleration or deceleration, the buildings will tend to slide relative to each other. If this occurs the inclined member 17a and wedge surface 28a will engage and the skid will tend to move upwardly along the wedge surface. As the skid tends to climb the wedge surface 28a, it will of course place the bolt 26 in tension. As the bolts are sized to prevent the skid and stacking rack from moving apart, the assembly of buildings will be held together. As the bolt 26 is not placed in shear by relative movement between two stacked buildings, the problem encountered in the past of the bolts being sheared off has been eliminated.

It will be appreciated that the complementary wedge surfaces between the stacking racks and the skids could extend either up or down, and could be placed in either side of the bolt 26. It is preferred that the relationship shown in the drawings be utilized, as the runners of the skids normally have the upturned sleigh-runner configuration shown at 17a so that the buildings may be readily pulled overland for a short distance.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the system may be made within the scope of the appended claims.

WHAT I CLAIM IS:

1. An assembly of buildings for shipping comprising,
 - a plurality of collapsed buildings each having a skid with the walls and roof of the building supported on the skid,
 - a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof,
 - said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building,
 - wedge means on at least one of the stacking racks of each skid extending at an angle to the horizontal,
 - said skids including surfaces complementary

to and engageable with said wedge means, and means fastening said skids to said stacking racks and limiting movement of the skids in a vertical direction away from the stacking racks.

2. An assembly of buildings for shipping comprising,

a plurality of collapsed buildings each having a skid with the walls and roof of the building supported on the skid,

a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof,

said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building,

a support member on top of each stacking rack having a vertical hole therethrough,

wedge means on each support member extending at an angle to the horizontal,

said skids including surfaces complementary to and engageable with said wedge means, vertical holes through at least a portion of each skid registering with said holes in the support members,

and bolts extending through said registering holes and securing said skids to said stacking racks.

3. An assembly of buildings for shipping comprising,

a plurality of collapsed buildings each having a skid with the walls and roof of the building supported on the skid,

a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof,

said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building,

a horizontal support member on top of each stacking rack having a vertical hole there-through,

wedge means on each support member extending upwardly and outwardly of the skid,

said skids including upwardly and outwardly extending surfaces engageable with said wedge means,

vertical holes through at least a portion of each skid registering with said holes in the support members,

at least one of each pair of registering holes being elongated to provide a slot,

and bolts extending through said registering holes and securing said skids to said stacking racks.

4. The assembly of claim 3 wherein the holes through the support members are in-board of the wedge means.

5. The assembly of claim 3 wherein the wedge means is provided by an angle iron member welded to the support member.

6. An assembly of buildings for shipping comprising,

a plurality of collapsed buildings each having a skid with the walls and roof of the building supported on the skid,

a plurality of stacking racks secured to and extending upwardly from each skid to a level above the collapsed walls and roof,

said buildings being stacked with the skid of an upper building supported on the stacking racks of a lower building,

each skid and associated juxtaposed stacking racks including engageable surfaces at least one of which provides wedge means extending at an angle to the horizontal, and

means fastening said skids to said stacking racks and limiting movement of the skids in a vertical direction away from the stacking racks.

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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1971.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.



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