Dec. 21, 1943. L. A. BENOIST 2,337,224

BUILDING STRUCTURE

Filed June 29, 1942

Fig. 1.

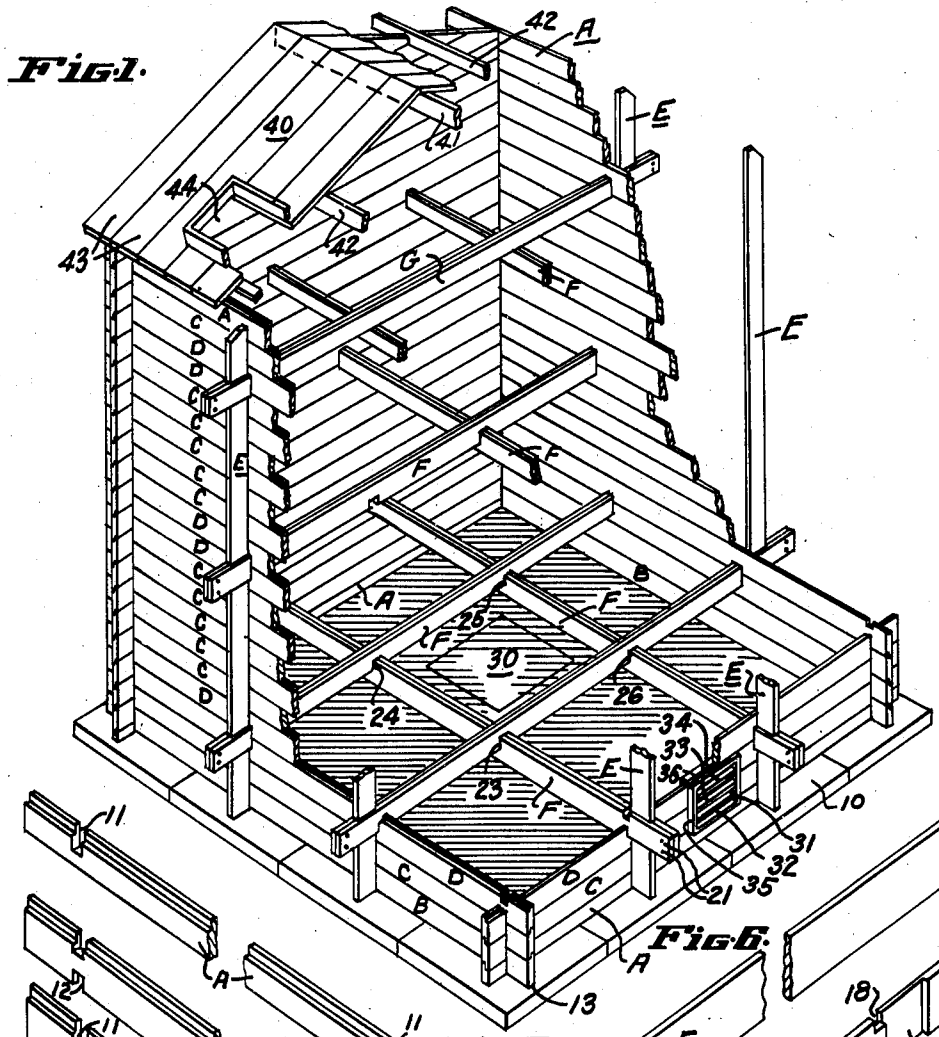


Fig. 6.

Fig. 2.

Fig. 3.

Fig. 4.



Fig. 5.

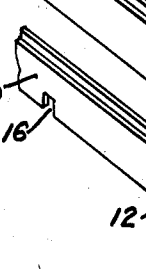


Fig. 7.

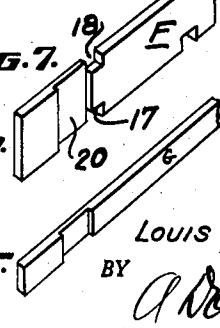


Fig. 8.

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BUILDING STRUCTURE

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Application June 29, 1942, Serial No. 448,926

2 Claims. (Cl. 20—1.2)

My invention relates to building structures, and particularly to improvements in structures which require no metal fastenings and which, for strength and support of their walls, rely on the interlocking of component parts.

The object of my invention is to provide a self-sustained, nail-less, plural-walled building structure comprising a plurality of wall forming boards laid horizontally one on the other and interlocked near their ends by overlapping with similar boards forming the adjacent walls, all having complementary notches, and a plurality of horizontally arranged braces extending between and through opposite walls of said structure, said braces being notched and fitted into complementary notches in said walls where they pass through the same, and with vertically adjacent braces notched to interlock with each other, to provide a building structure having maximum strength and yet which can be easily disassembled and moved to another location for reassembly; to provide a novel form of wall supporting structure in a building intended for storing things such as grain where the walls must withstand a substantial lateral pressure under load; to provide a structure which lends itself to pre-fabrication at the mill and can then be shipped directly to the intended assembly point and there assembled without further cutting or planing; to provide a quickly erected stand-by storage unit, which is normally kept in disassembled condition; to provide a form of brace and lock so that the lateral expansion and contraction of the horizontal wall members will not interfere with said lock or cause the sides to open up; to provide a structure in which the effect is for the walls to float alongside the vertical locking members and thereby become self-adjusting as the former contract or expand.

Other objects and advantages of my invention will become apparent from the following description taken in connection with the drawing, in which:

Fig. 1 is a view in perspective of the assembled structure, with part of the walls and roof broken away;

Fig. 2 is a view in perspective of one of a pair of top and bottom horizontal wall members A;

Fig. 3 is a similar view of one of the other pair of horizontal wall members B;

Fig. 4 is a similar view of one of the other horizontal wall members C;

Fig. 5 is a similar view of one of the horizontal wall members D as used adjacent each wall to wall brace F;

Fig. 6 is a similar view of one of the vertical lock and support members E;

Fig. 7 is a similar view of one of the horizontal brace and lock members F; and

Fig. 8 is a similar view of one of the uppermost horizontal brace and lock members G.

It is preferable to erect the structure on a suitable flat slab 10, made of concrete or other strong material. When filled with wheat the load contained within a structure about 14 feet square and 16 feet high is 80 tons or about 800 lbs. per sq. ft. This also gives an idea of the strength required in the walls to support the sidewise or lateral thrust of such a load and emphasizes the merit of my form of rugged, interlocked, self-supporting structure which at the same time is capable of such quick erection for use where needed.

Assuming that the slab 10 is provided, the next step in assembling the structure is to set a bottom wall member A on the opposite sides of 10. Then at right angles to these are set the full bottom members B, with interlocks 11 in A engaging the interlocks 12 in B. Note the flat bottoms 13 on A and B which rest on slab 10.

For the abutting faces of wall members A, B, C, and D, I prefer to use what is known as "shiplap" (see Figs. 2 to 5), which means that each abutting board has a tongue 14 adapted to fit into a complementary recess 15 in the adjacent board. This serves to distribute the lateral strain between the wall boards and to minimize leakage if cross grain shrinkage should be uneven and tend to open cracks between the horizontal boards.

The four interlocked members A and B are centered on the foundation. Then a tier of wall members C is placed so their respective slots 12 engage slots 11 in B and C. One or more tiers of wall members C may be stacked, one on the other, before placing a tier of D members, all depending on how many horizontal brace and lock members F will be used. In Fig. 1 I illustrate one tier of C members, because the lateral pressure all the way to the bottom is taken by the first set of F members.

The D members are like horizontal wall members C, except that they have additional slots 16 to engage and interlock with slots 17, 18 in the F members where they pass through the side walls.

The horizontal F members are put under tension when the structure is loaded with grain. They brace the sidewalls against the outward lateral pressure: First, by reason of the inter-

lock with D members at 16; and second, by reason of a vertical locking and support member E which is enveloped within the grooves 20 in the ends of the F members adjacent notches 17 and 18. Grooves 20 are of a combined depth about equal to the thickness of member E. Preferably the fit is a snug sliding fit so that any vertical movement of braces F, occasioned as members A, B, C, and D expand or contract, will be allowed for. Preferably the ends of each pair of brace members F are bolted together at 21. They may be tied together, or any fastening may be omitted entirely.

A further modification is possible too, namely, to use a single horizontal F member in place of the pair facing each other. In that case the support member E fits in the groove 20 just the same and instead of being held therein by an adjacent oppositely facing F member, it can be held in by a binding cord which will permit a sliding fit. Also, in case the single F members are used they can be alternated so the groove 20 faces to the right in one and to the left in the one above, and so on. This will serve to hold the E member in place.

Locking members E provide a direct surface contact and vertical support outside wall members A, B, C, and D. The lateral thrust against one wall is cancelled out by the corresponding thrust against the opposite wall, transmitted through braces F and locking members E.

While it is preferable and lends uniformity and interchangeability to have horizontal locking members F received in notches 16 in the adjacent pair of wall members D, my invention contemplates that only one of the adjacent D members might be notched. The primary purpose of the notch 16 is to allow the F member to pass through the wall to the outside so that a support member E may be received in groove 20.

For this latter purpose also, it is not essential in my invention that the F members be notched to interlock with wall members D, inasmuch as the principal support given wall members A, B, C and D by the F members is through the vertical locking member E which F supports.

Brace members F also may have notches 22 which interlock at 23, 24, 25 and 26 on the interior of the structure where they cross. These serve to add rigidity to the structure and also to provide necessary support if the structure is to be partitioned inside into vertically extending cellular bins.

The next step is to assemble one or more tiers of horizontal wall members C, then a pair of D members with the brace members F locked between them, and so on until the desired height of structure is reached.

Near the top the lateral pressure is lighter and brace members G will prove of sufficient strength to support vertical locking members E near their top. The G members are like the F members except they are of lesser vertical dimension and omit the interlock grooves 22.

From this description it will be seen that every part of the structure A, B, C, D, E, F and G is interlocked with other parts in such a manner that the strain is placed on the boards where they can best withstand it. No nails are needed to secure the structure in assembled position, thus permitting disassembly without destructive splitting, etc. There is thus no end to the number of times the structure can be moved about from place to place and assembled and disassembled at will.

In order to empty the structure a door 30 may be provided in the slab 10, opening below into a hopper or into a conventional endless conveyor. Another alternative is to have the opening 31 closed by suitable slats 32, 33, 34. The frame 35 is channeled at 36 to receive the ends of wall boards D and C, the top of member A and the bottom of member D.

Any suitable cover may be provided over the top. I have shown one at 40 supported on roof joists 41, 42 and upper wall members A. It is covered with a material such as the slats 43, through which there is a filling opening 44.

While I have illustrated the principle of my invention with a structure employing a pair of horizontal and vertical braces F and E for each wall, the same principle is present if it had one or a plurality of such sets of braces F and E.

Also, while I have illustrated a roof over the structure, it can be used without such a roof.

While I have shown the preferred construction, which answers the requirements very effectively, I do not desire to be confined to the precise details, but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. A demountable, self-supporting vertically and longitudinally expandible and contractible building structure in which each board is in slidable interlocked relation to those adjacent to it, and each wall is composed of a plurality of horizontal wall members with each vertically adjacent pair having male and female engaging slots along their abutting edges, the bottom wall members on oppositely facing walls being of less vertical height than the other bottom wall members, whereby said vertically placed wall members may be notched and locked at their intersecting corners, and the aforesaid engaging slots on adjacent boards will be slidably engaged, and in which selected horizontal wall members will have slots cut therein along their length between their interlocked corners to receive horizontal side to side locking members passing through said slots, said locking members having vertically extending notches with the innermost edge of each notch lying substantially in the plane of the outside vertical faces of said wall members, and vertical members slidably engaged in said notches.

2. A demountable, self-supporting vertically and longitudinally expandible and contractible building structure in which each board is in slidable interlocked relation to those adjacent to it, and each wall is composed of a plurality of horizontal wall members with each vertically adjacent pair having inter-engaging slots along their abutting edges, the bottom wall members on oppositely facing walls being of less vertical height than the other bottom wall members, whereby said vertically placed wall members may be notched and locked at their intersecting corners, and the aforesaid engaging slots on adjacent boards will be slidably engaged, and in which selected horizontal wall members will have slots cut therein along their length between their interlocked corners to receive horizontal side to side locking members passing through said slots, said locking members having vertically extending notches with the innermost edge of each notch lying substantially in the plane of the outside vertical faces of said wall members, and vertical members slidably engaged in said notches.

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