

Aug. 6, 1957

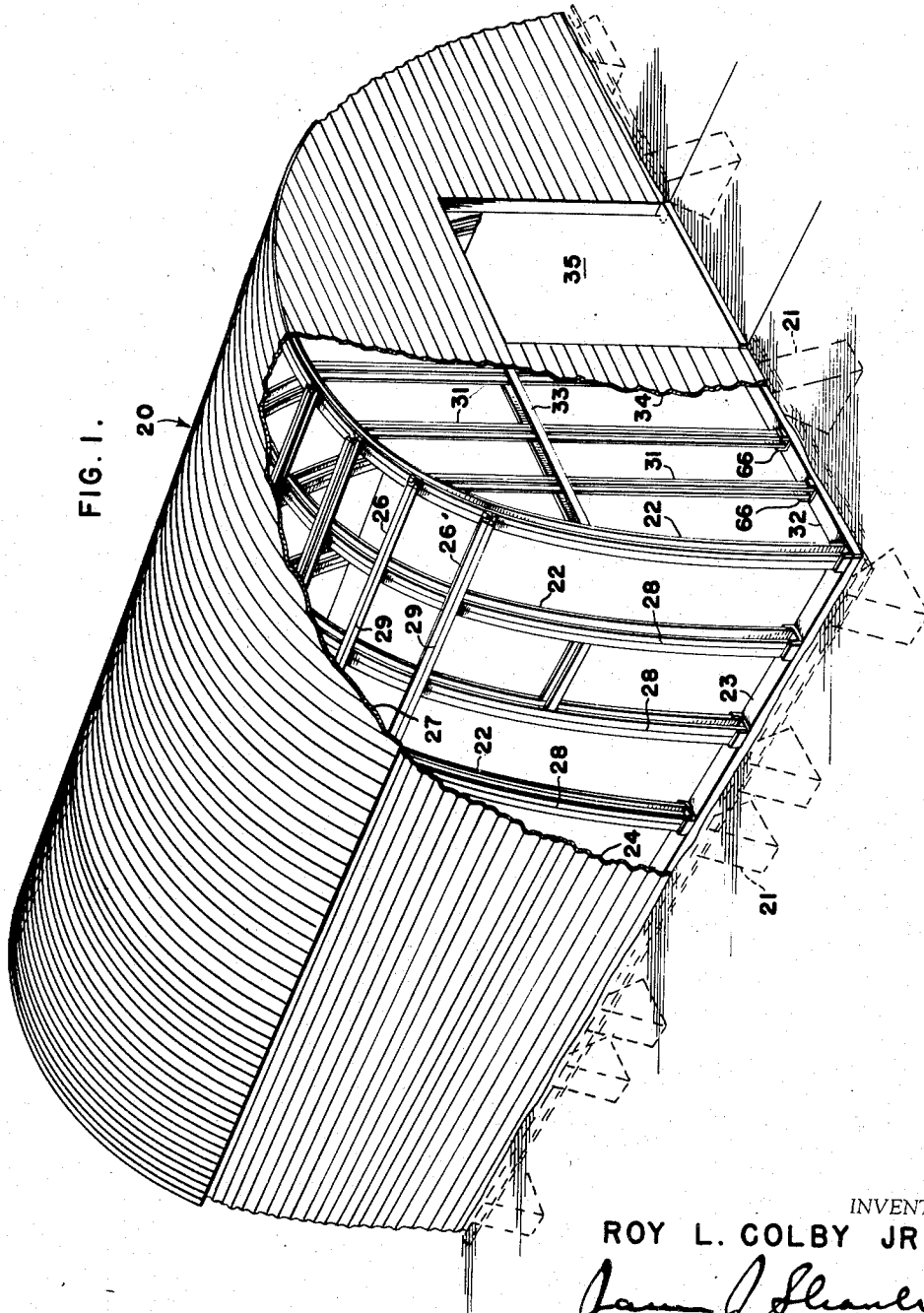
R. L. COLBY, JR

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Filed March 19, 1952

6 Sheets-Sheet 1



INVENTOR

ROY L. COLBY JR.

BY

James J. Shanley

ATTORNEY

Aug. 6, 1957

R. L. COLBY, JR

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Filed March 19, 1952

6 Sheets-Sheet 2

INVENTOR

ROY L. COLBY JR.

BY

James J. Blumenthal
ATTORNEY

ATTORNEY

Aug. 6, 1957

R. L. COLBY, JR

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Filed March 19, 1952

6 Sheets-Sheet 3

FIG. 4.

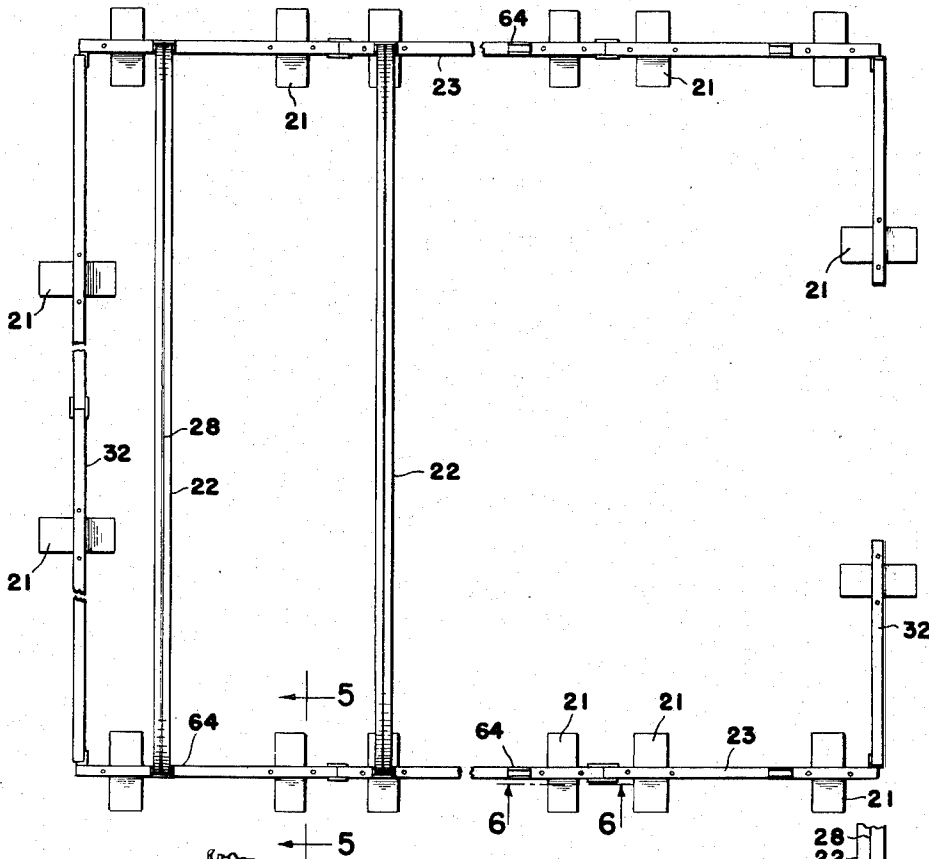


FIG. 5.

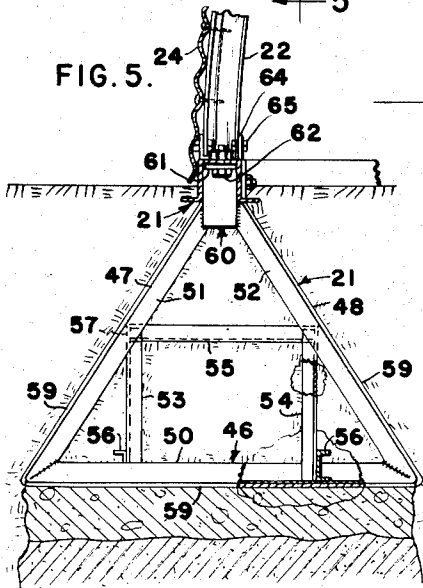
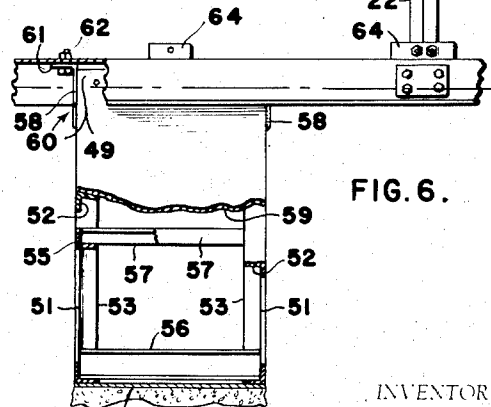


FIG. 6.



INVENTOR

59 ROY L. COLBY JR.

BY

James J. Stanley
ATTORNEY

Aug. 6, 1957

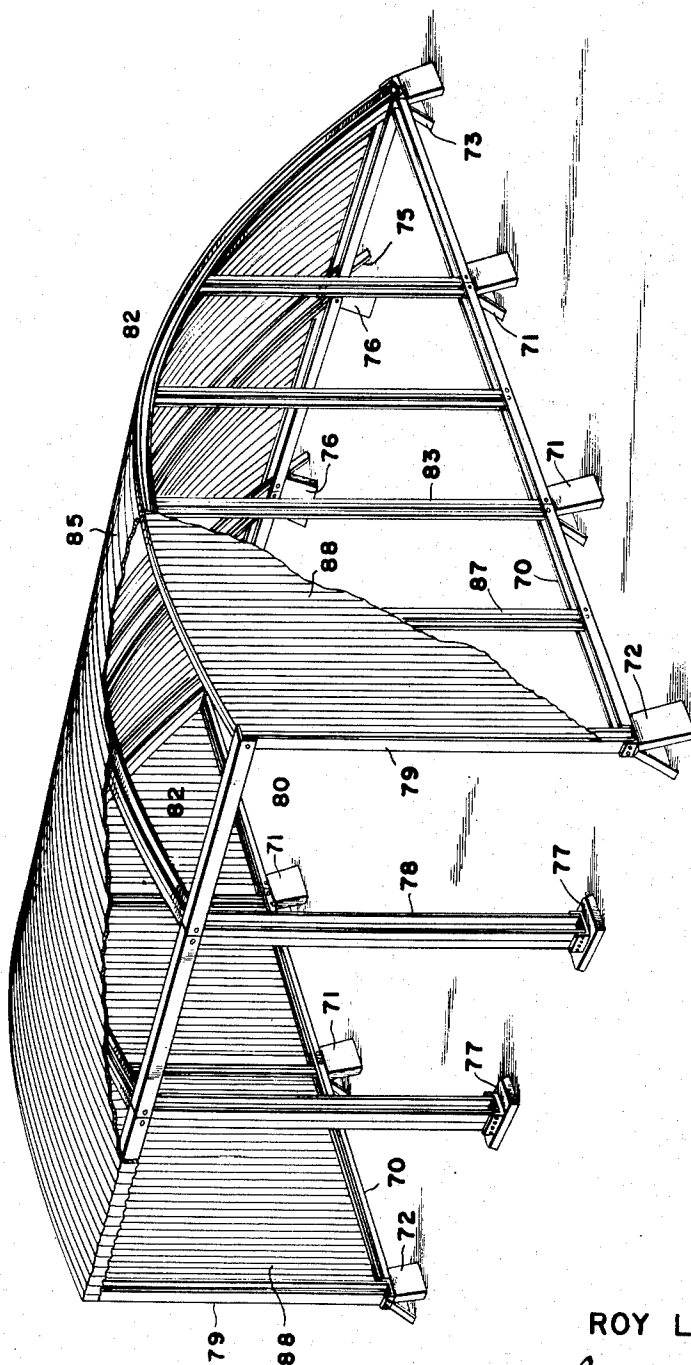
R. L. COLBY, JR

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Filed March 19, 1952

6 Sheets-Sheet 4



INVENTOR

ROY L. COLBY JR.

BY

James H. Cleary
ATTORNEY

ATTORNEY

Aug. 6, 1957

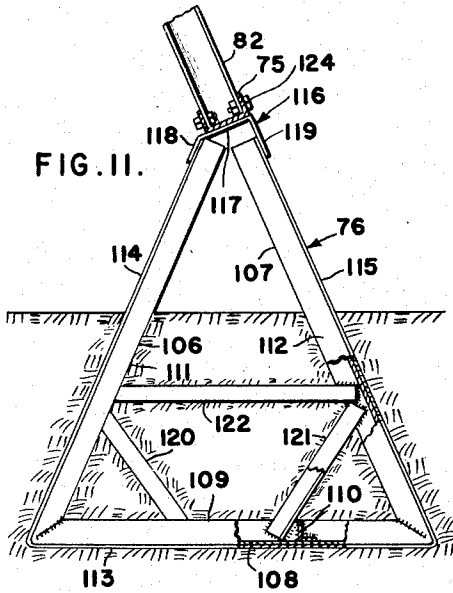
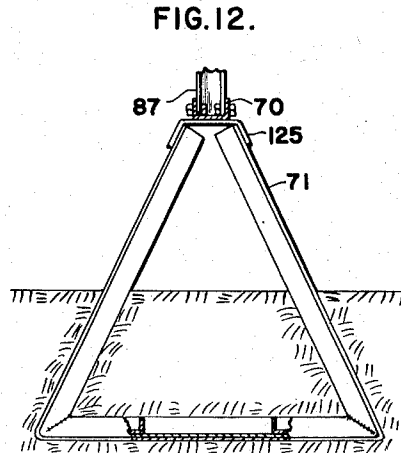
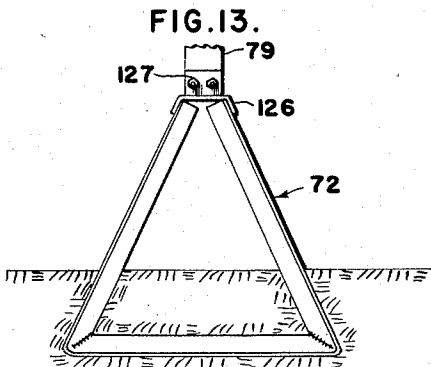
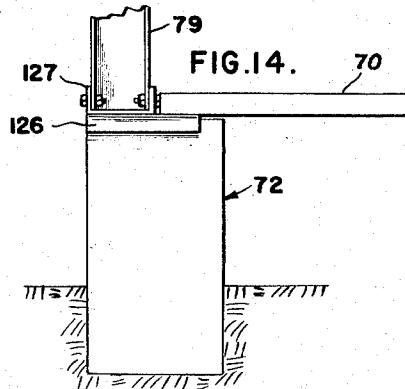
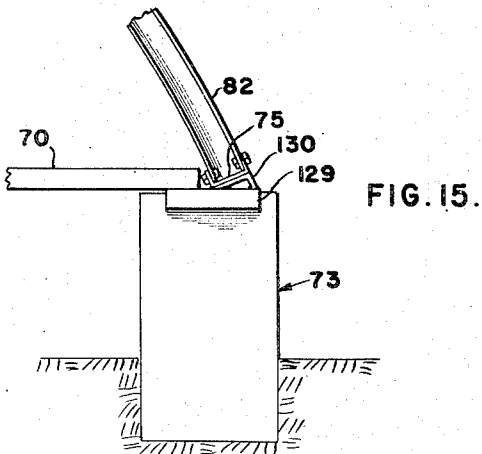
R. L. COLBY, JR

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Filed March 19, 1952

6 Sheets-Sheet 6



INVENTOR

ROY L. COLBY JR.

BY

James J. Shaver

ATTORNEY

1

2,801,716

FOUNDATION UNIT AND BUILDING INCLUDING SAME

Roy L. Colby, Jr., Dearborn, Mich., assignor to National Steel Corporation, a corporation of Delaware

Application March 19, 1952, Serial No. 277,413

1 Claim. (Cl. 189—1)

The present invention relates to improvements in foundation units for supporting buildings and other structures and to novel building structures including such novel foundation units.

Customarily, a building is supported on a suitable, fixed foundation such as concrete footings, a concrete slab or other stable, strong supporting means. The preparation of the ground and the pouring of such a concrete support requires considerable time. In addition to the time required for the concrete to set, it is difficult and at times impossible to provide a concrete foundation of the usual type in some localities. The character of the ground may be such as to preclude the use of concrete footings or transportation problems and lack of availability may prevent the use of cement in preparing a foundation of the customary type.

Accordingly, it is an object of the present invention to provide an improved foundation unit that can be readily embedded in the ground and leveled at the desired position to provide a strong stable support for a building structure.

It is an object of the present invention to provide an improved foundation unit so constructed and arranged that when embedded in the ground, the unit will distribute the weight of the building over a relatively large area and will be stable against tilting or shifting.

It is an object of the present invention to provide an improved foundation unit that is relatively light in weight but which is sufficiently strong to support a large load.

It is an object of the present invention to provide an improved building structure including a building supported on a novel foundation unit.

It is an object of the present invention to provide an improved building structure including a building supported on spaced apart foundation units, that is rodent proof.

It is an object of the present invention to provide an improved building structure that can be erected on ground where the footings, slabs and the like cannot be used and that will be stable when erected on such ground.

These and other objects and advantages will become more readily apparent from the following detailed description, taken with the accompanying drawings, in which:

Figure 1 is an isometric view of a building structure supported on foundation units embedded in the ground with portions broken away to illustrate better the construction and embodying the principles of the present invention;

Figure 2 is an enlarged, fragmentary isometric view, partially in section, of a portion of the building and supporting units of Figure 1;

Figure 3 is an enlarged fragmentary plan view of the sill construction at the corner shown in Figure 2;

Figure 4 is a plan view with portions deleted illustrating the arrangement of the supporting units and portions of the building of Figure 1;

2

Figure 5 is an enlarged fragmentary sectional view taken along line 5—5 of Figure 4 with portions broken away;

Figure 6 is an enlarged fragmentary sectional view taken along line 6—6 of Figure 4;

Figure 7 is an isometric view of another building with portions broken away and also embodying the principles of the present invention;

Figure 8 is a plan view similar to Figure 4, illustrating the building of Figure 7;

Figure 9 is an enlarged, fragmentary sectional view taken along line 9—9 of Figure 8;

Figure 10 is a sectional view taken along line 10—10 of Figure 9;

Figure 11 is an enlarged fragmentary view taken along line 11—11 of Figure 8;

Figure 12 is an enlarged fragmentary view taken along line 12—12 of Figure 8;

Figures 13 and 14 are enlarged fragmentary views taken along lines 13—13 and 14—14, respectively of Figure 8, and

Figure 15 is an enlarged fragmentary view taken along line 15—15 of Figure 8.

Referring to Figures 1 to 6, inclusive, the building unit of Figure 1 comprises a building 20 supported by a plurality of foundation units 21. The building 20 includes a plurality of spaced apart, arched ribs 22 extending from side to side of the building with the ends of the arched ribs being supported on side sills 23. The side walls are covered with corrugated sheathing 24. The roof includes a plurality of longitudinally extending purlins 25 which are connected to the ribs 22 in any suitable manner. Corrugated sheathing 27 covers the roof and the corrugations extend around the roof. Preferably the arched ribs 22 present outwardly facing, nail receiving grooves 28 and the purlins 26 present nail receiving grooves 29 for receiving and holding nails or other fastening elements forced into the grooves whereby the sheathing or other covering material may be readily fastened in place.

At each end of the building 20 there is an end wall comprising a plurality of vertical studs 31 extending from a lower sill 32 up to the arched rib 22 at the end of the building. A beam 33 or other similar bracing means may be used for bracing the studs 31 and the end arched rib 22. The end wall is covered with corrugated sheathing 34 which may be attached to the studs in any suitable manner. As shown in Figure 1 at least one end wall of the building preferably includes a doorway 35.

While an arched rib building that is substantially semi-circular in cross section has been shown and described, it is to be understood that other types of buildings may be used.

As shown more clearly in Figure 2, the supporting units are embedded in the ground indicated generally at 36. Before units 21 are placed in position and if the character of the ground 36 permits, a trench may be dug outlining the periphery of the base of the building. The bottom of this trench may be filled with a layer of sand 37 and the layer of sand may then be covered with a layer of cinders or gravel 38. The cinders and sand preferably are packed and leveled. In place of a trench, a hole may be dug for each foundation unit 21. After the foundation units 21 are in place, the ditch or hole is filled with dirt which preferably is tamped in place to avoid settling. Prior to covering the foundation units the side and end sills 23 and 32 may be attached to the units and leveled.

As shown more clearly in Figures 2 and 3, the adjacent ends of the sills 23 and 32 at the corners of the building are connected together. This may be done by

3

means of an L-shaped bracket 39 having one leg 40 attached to the side of sill 32 and the other leg 41 attached to the sill 23. As shown each of the sills is a structural member having in cross section a hat shape, with each hat-shaped sill member including a bottom web 42, side webs 43 extending downwardly from the bottom web and terminating in lower outwardly extending flanges 44. In order to provide continuity about the periphery of the base of the building, the sill members at each corner may be arranged so that one sill extends at least part way across the end of the adjacent sill and the adjacent sill substantially abuts against the respective side web 43 and extends inwardly beyond the outer edge of the respective flange 44. As shown, the sill 23 extends part way across the end of sill 32. The sill 32 in turn extends very close to the side of web 43 of sill 23 and extends inwardly of sill 23 beyond the outer edge of the adjacent flange 44. The side sills 23 and the end sills 32 present a substantially continuous sill extending about the periphery of the base of the building. The hat-shaped sills face downwardly and their flanges 44 are preferably buried in the ground and these outwardly turned flanges prevent the burrowing of rodents underneath the sill. Particularly where the problem of rodents is not severe, other types of structural units or channel members may be used for the sills.

The arrangement of the foundation units about the base of the building will depend in part upon the construction of the building and the points of maximum loading.

Preferably and as is shown in Figure 4, a foundation unit 21 is located adjacent each of the four corners. As the arched ribs support most of the weight, more foundation units are usually required beneath sills 23 than sills 32. The foundation units are identical and only one unit will be described in detail. Referring more particularly to Figures 2, 5 and 6 the foundation unit 21 is substantially triangular in cross section and includes a flat base 46 with two opposite sides 47 and 48 extending upwardly from the sides of the base 46. The sides 47 and 48 extend upwardly from the sides of the base and converge inwardly to a ridge 49 above the base 46 midway of the sides of the base. At each end of the foundation unit there is a substantially triangular truss formed of members 50, 51 and 52. Each of the members 50, 51 and 52 is preferably a structural member such as an angle member having in cross section an L-shape with the ends of the members being welded or fastened together in any suitable manner to present an equilateral triangle. These end trusses are preferably reinforced by a member 53 which extends upwardly from member 50 to member 51 and a member 54 which extends upwardly from member 50 to member 52. A third bracing member 55 extends between members 52 and 51. The members 53, 54 and 55 may be angle members as shown or have any other suitable cross sectional shape. The trusses at the ends of the units are preferably spaced apart and reinforced by structural members 56 extending longitudinally of the base 46 and between the two end base members 50. The members 56 are preferably channel-shaped in cross section. A bracing member 57 also extends between the two members 52 and the two members 51. Members 56 as well as the other reinforcing members may be attached to each other and the respective members of the truss by means of welding or other suitable means.

The base 46 as well as the sides 47 and 48 are covered with sheet metal and the ends of the units are open. The base 46 has a relatively large area and distributes the weight supported by the unit over a relatively large area of the ground. This is particularly desirable when the ground is not stable or soft. The pressure of the dirt against the sides holds the unit in position and provides an additional resistance to tilting of the unit. Preferably, the ends are open so that when the dirt is filled in around the units, the unit will in turn be filled with dirt which

4

additionally increases the stability of the unit. Any suitable means may be used for attaching the unit, preferably at the ridge to the sill 23 or other portion of the building. As shown, at each end of the ridge 49, there is a bracket 60 attached to the respective truss members 51 and 52. Each bracket 60 presents a horizontally disposed leg 61 which is attached to the bottom of the sill member by means of a bolt 62.

Preferably the ends of the arched-shaped ribs are attached to the sill 21 by means of suitable brackets. As shown, at each end of each arched rib, there is an upwardly facing channel-shaped bracket 64 having a U-shape in cross section and attached to the top of the sill in back to back relationship. The end of the arched rib 22 is received between the upstanding sides of the bracket 64. The end of the arched rib may be connected to the brackets by means of bolts 65. The lower ends of the vertical studs 31 are similarly connected to the end sills 32 by means of brackets 66.

Referring more particularly to the building structure shown in Figures 7 to 15 inclusive, the building in Figure 7 includes end sills 70 each supported on intermediate foundation units 71 and corner foundation units 72 and 73. The side sill 75 is supported at its ends by the corner foundation units 73 and also is supported by the intermediate foundation units 76. At the other side of the building there are intermediate foundation units 77 supporting upwardly extending studs 78. Each of the corner foundation units 72 also support upwardly extending studs 79. The studs 78 and 79 support an upper joist 80 which may be a continuous member or may be made up of a series of relatively short members arranged in end to end relationship. Arched ribs 82 extend upwardly from side sill 75 to joist 80. At each end of the building, studs 83 extend upwardly from the end sill 70 to support the respective end rib 82. Preferably, each of the arched ribs 82 presents an outwardly opening tortuous groove 84 for receiving nails or other suitable fastening means for fastening covering 85 in place. The studs 83 also preferably present outwardly facing grooves 87 for receiving suitable fastening means for fastening the covering 88 to the end walls. As shown and described, the roof and side covering 85 and the end wall covering 88 comprise corrugated sheathing, but other suitable covering materials may be used.

The foundation units referred to by the same reference numeral are identical in construction and only one foundation unit of each group will be discussed in detail. Referring more particularly to Figures 9 and 10, the foundation unit 77 includes a base 90 and upwardly and inwardly converging sides 91 and 92. The base comprises a truss member 94 at each end of the unit covered with sheet metal 96. The two truss members 94 are laterally spaced apart and the unit is reinforced by a pair of structural members 97, only one structural member being shown in detail. Each of the sides 91 and 92 includes a pair of end truss members 98 covered with sheet metal 99. A ridge member 100 overlies and connects together the two sides 91 and 92. The ridge member includes an upper flat substantially horizontal web portion 101 and side flanges 102 and 103 which overlie and are connected to the sides 91 and 92, respectively. At each end of the unit the upwardly extending truss members 98 are welded to the respective base truss member 94 to form a substantially triangular truss with the truss members 98 being connected together by the ridge member 100. A channel-shaped bracket 103 is arranged back to back on the ridge member 101 and receives the lower end of the upwardly extending stud 78.

Referring more particularly to Figure 11 showing the intermediate foundation unit 76, the unit 76 comprises a base 105 and upwardly extending sides 106 and 107. The base 105 has at each end a base truss member 109 and is reinforced by angle members 110 extending between the truss members 109. The side 106 includes at

5

6

each end a truss member 111 and the side 107 includes at each end a truss member 112. The base is covered with sheet metal 113 and the sides are covered with sheet metal 114 and 115, respectively. At the ridge of the unit there is a ridge member 116 including an intermediate web portion 117 overlying the ridge and including side flanges 118 and 119 which extend down and overlie the respective sheet metal sides 114 and 115. The flanges 118 and 119 are attached to the sides 114 and 115 in any suitable manner such as by welding to connect the sides together. Thus, at each end of the unit there is a substantially triangular truss including a base member 109 and side truss members 111 and 112 which extend upwardly from and converge inwardly to the ridge of the unit where their upper ends are connected together by the ridge member 116. The ends of the side truss members 111 and 112 are connected to the respective ends of the base truss member 109 by welding or any other suitable means. In addition, each triangular truss member at the end of the unit is reinforced by members 120 and 121 each having its lower end fastened to a base truss member 109 and extending upwardly and having its upper end attached to the respective truss member 111 or 112. Each triangular truss also is reinforced by a structural member 122 extending between and connected to the side members 111 and 112.

As shown in Figure 11, the web or mid-portion 117 of ridge member 116 is inclined and is perpendicular to the end of the arched rib 82. The ridge member 116 directly supports the sill member 75 which is an upwardly facing channel receiving between its sides the end of the arched rib 82. Any suitable means may be used for attaching the end of the rib 82 to the sill 75, such as the bolts 124.

The foundation units 71, 72 and 73 shown more fully in Figures 12 to 15 inclusive, are substantially the same and are similar to the foundation units 77 and 76, except for the ridge member. In addition the bracing members 120, 121 and 122 have been omitted from foundation units 71, 72 and 73. The foundation units 71, 72 and 73 are similar to the foundation unit 77 and will not be described in detail. The foundation unit 71 includes an upper ridge member 125 which is similar to ridge member 100. The ridge member 125 supports the upwardly facing channel shaped sill 70 which receives the lower end of the studs 87.

The foundation unit 72 includes a ridge member 126 which extends only part way along the length of the ridge of the unit. The ridge member 126 may extend the entire length of the unit. As shown, the ridge member 126 supports the end of the sill 70 and also supports an upwardly facing channel-shaped bracket 127 which receives the lower end of the corner stud 79. The corner foundation unit 73 includes an upper ridge member 129 which supports the other end of the sill 70. The foundation unit 73 also supports the end of the side sill 75. The end of the side sill 75 is supported on the ridge member 129. A bracket 130 is mounted on the ridge member 129 for supporting the sill 75 which in turn receives the end of the respective end rib 82. As shown more clearly in Figure 15, the bracket 130 supports sill 75 in the same inclined or tilted position as ridge member 116.

Each of the foundation units includes a lower base and

two sides extending upwardly from the base. The two sides of the unit converge inwardly toward each other and are connected directly or indirectly together at their upper edges and at the ridge of the unit. The sill overlies the ridge of the unit. Thus, each unit is substantially triangular in cross-section with the base of the triangle positioned downwardly and the peak of the triangle positioned uppermost below the sill.

I claim:

- 10 In a building structure adapted to be erected on the ground, an elongated sill member adapted to be mounted on the surface of the ground and a plurality of foundation units spaced apart along the length of the sill member and adapted to be embedded in the ground below the surface of the ground supporting the sill member, each
- 15 foundation unit comprising a pair of spaced similar triangular truss structures, each truss structure including a base member and a pair of side members, means for connecting one end of each side member to one side of the base member at its opposite ends, the side members being
- 20 inclined inwardly of the respective ends of the base truss member toward each other with their other ends terminating in contiguous relation in the region of a point spaced from the base member and intermediate its ends,
- 25 means for joining the other ends of the side members a rectangular base cover portion of continuous sheet material having one dimension substantially corresponding to the length of the base members of the truss structures and another dimension substantially corresponding to the space between the truss structures, means for joining the rectangular base cover portion to the other side of the base members with the edges of the rectangular base cover of the one dimension lying along the base members of the truss structures, a pair of rectangular side cover
- 30 portions of continuous sheet material having one dimension substantially corresponding to the length of the side members of the truss structures and another dimension substantially corresponding to the space between the truss structures, means for joining one side cover portion of the pair of rectangular side cover portions to corresponding side members of each truss structure with the edges of the side cover portion of the one dimension lying along the respective side members, the sill member being channel-shaped in cross section and including an upper web, a side portion extending downwardly from each of the two elongated sides of the web and each side portion terminating at its lower edge in an outwardly extending flange, and means connecting the foundation units to the sill member with the sill member overlying the other ends of the side members of the truss structures.

References Cited in the file of this patent

UNITED STATES PATENTS

55 567,332	Burster	Sept. 8, 1896
923,921	Wise	June 8, 1909
1,342,021	Jennings	June 1, 1920
2,045,478	Kuehn	June 23, 1936
2,073,185	Shafer	Mar. 9, 1937

FOREIGN PATENTS

459,461	Great Britain	Jan. 8, 1937
622,929	Great Britain	May 10, 1949