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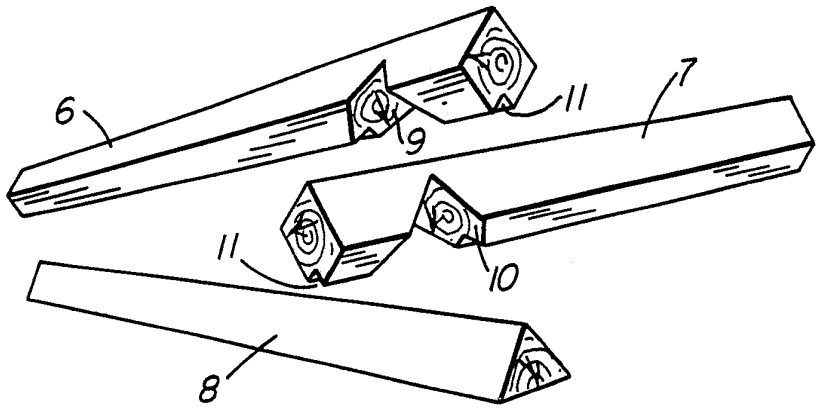
(54) Title: LOG BUILDING ELEMENT



(57) Abstract

A log structure may be built from interfitting squared logs (6, 7, 8) mounted with their diagonals vertically aligned, with the upper corner of each log fitted into a "V" shaped groove (11) formed into the lower edge of each log. Intersecting log walls are interfitted by "V" shaped notches (9) cut on the underside of each interjecting log. The depth of the "V" notch (9) should not exceed half of the diagonal of each log by more than one half of the depth of the longitudinal groove (11).

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TITLE: Log Building Element

FIELD OF THE INVENTION

This invention relates to a building elements adapted to form a wall or structure out of logs. More particularly, this invention relates to a means of interfitting logs so as to form an integral wall.

BACKGROUND TO THE INVENTION

The construction of log structures by the method of notching logs so that they interfit with each other is well known. Logs have long been notched transversely near their ends so as to allow such logs to be interfitted at corners, thus allowing the longitudinal span of consecutive logs, on progressively elevated courses, to lie in closer proximity to each other. Logs have also been grooved longitudinally to allow logs resting directly on top of each other to be more closely interfitted.

In the case of transverse notches used in traditional log cabins having singularly notched logs laying over round logs, the notches have been shaped to a round profile. Such a single rounded notch generally has a depth of about one-half of the log diameter. When complementary notches in crossing logs have been employed, such notches have customarily been rectangular in cross-section. Notches in this case are about one-quarter of the log diameter in depth. An example of notching in this latter form is shown in United States Patent No. 2,059,598 to N. J. Paulson. Triangular or "V" shaped notches

adapted to allow intersecting courses of rectangular logs (oriented with their diagonals in the vertical plane) to be interfitted have also been proposed. An example in this latter category is United States Patent 2,669,060 to Kalvig.

To allow logs to be interfitted longitudinally, use of an extended longitudinal tongue or tenon has been proposed. Such a tenon may be milled or fitted into a log along its length. This longitudinal tenon, positioned on the upper side of one course of logs, is arranged to interfit into a complementary longitudinal groove formed in the lower side of the next above course of logs. Such an arrangement is shown in United States Patent 2,238,039 to De Witt.

The prior art does not show, however, an arrangement by which courses of logs of rectangular cross-section are longitudinally interfitted directly into each other without the necessity of forming a specially shaped tenon along the length of the individual logs.

This invention is directed to a means by which logs may be shaped so as to be so interfitted longitudinally, without the formation of a tenon by a supplementary operation, or by any operation other than the squaring of the log. These and other features of the invention will become apparent from the description of the invention which now follows.

SUMMARY OF THE INVENTION

The invention consists of a structure having walls which intersect at corners, such walls being formed from courses of logs of the same substantially rectangular overall cross-section, each of said logs being oriented with a diagonal lying in a vertical plane which is the vertical plane of the wall, said logs being further characterized by having a longitudinal groove running the length of the underside of each log, said longitudinal groove being composed of two flat longitudinal surfaces which intersect at a right angle and which are symmetrically disposed about the vertical plane of the wall, each of said logs being provided with a transverse "V" shaped notch at the corners of said structure whereby intersecting courses of logs are nested with said "V"-shaped notch fitted over the upper surfaces of a transverse log from the intersecting wall.

By an added feature of the invention the depth of the transverse "V"-shaped notch on a first log, laying over a transverse log at a corner, does not exceed one half of the length of the major diagonal of the transverse log by more than one half of the amount of the depth of the longitudinal groove in the first log, measured in the vertical plane.

By a further feature of the invention, the depth of said "V"-shaped notch is equal to one-half of the major diagonal of the next lower log upon which said "V"-shaped

groove rests, plus one half of the depth of the longitudinal groove of said next lower log, measured in the vertical plane.

By a further preferred feature of the invention, the depth of said longitudinal groove does not exceed one half of the length of the major diagonal of each log.

By a further feature of the invention, the depth of the longitudinal groove is greater than one eighth, but less than one quarter of the length of the major diagonal of each log.

These and further features of the invention will become more apparent from the description of the preferred embodiments which now follow.

SUMMARY OF THE FIGURES

Figure 1 is a perspective view of a structure constructed with logs made in accordance with the invention;

Figure 2 is an exploded perspective view of two logs of the type of Figure 1 as they intersect at a corner;

Figure 3 is a face view of a wall corner with intersecting courses of logs interfitted between each other at their ends;

Figure 4 is a cut-away cross-section of the corner of Figure 3 in which the ends only of the transverse logs are shown in cross-section;

Figure 5 a,b is a view of three logs intersecting at a corner wherein the depth of the transverse notch in the

log shown in side view equals one half of the diagonal of the transverse log on which it rests plus one half of the depth of the longitudinal groove in such log. Figure 5b is a face view of the intersecting logs and Figure 5a is an end view of the log shown in side view of Figure 5b; and

Figure 6 is a diagrammatic depiction of the end of a log, showing the definition of the measurement of the depth of the groove formed therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In Figure 1, a walled log structure is shown having intersecting walls 1,2 composed of logs 3 of overall square cross section, stacked with their diagonals vertically aligned with the walls 1,2. The logs meet at corners 4 where the log ends 5 are interleaved in the standard fashion.

Details of this intersection are shown in Figure 2 where a log 6 is shown overlying a log 7. The latter log 7 overlies a base half-log 8 which sits on the foundation (not shown). Cut into the logs 6,7 are transverse "V"-shaped notches 9, 10 and longitudinal grooves 11.

A longitudinal groove 11 cut into the lower side of a log 6 is shown in end view in Figure 3. This groove 11 has two flat sides 12,13 that run the length of the log and are symmetrical about the central vertical plane 14 of the course of logs shown in end view. The sides 12,13 of the longitudinal groove 11 meet at 90 degrees, at an apex

26, giving the groove a profile into which the upper edge 15 of the next lower transverse log 16 will fit intimately.

Figure 4 shows the manner in which a transverse notch 17 is cut into a log 7 in order to permit it to fit over the transverse log 16 with an intimate engagement. of the upper surface 30 of that log 16. In this cut-away view, the upper edge 19 of the next lower log 18 is elevated above the shoulder 21 of the groove (not shown) in the next log 7 above.

The upper corner 22 of the transverse notch 17 will be seen in Figure 4 to be located above the median edge 23 of the log 7. As the notch 17 is made deeper, the longitudinal groove 11 in the upper transverse log 6 must be made wider to assure an intimate fit between the logs 6 and 16. A wider engagement between these logs is desirable to improve the weather tightness of the wall, and its insulative capacity.

A penalty arises, however, from increasing the depth of the notch 17 excessively. As this notch 17 is deepened, less wood remains in the bridging portion 25 of the upper log 7. This wood provides support for the end 26 of the upper log 7. A convenient limit believed appropriate for the depth of the notch 17 is for this notch to penetrate into the log 7 no further than three quarters of the distance of diagonal of the log 7. This limit is shown in Figure 5b, wherein the lower log 18,

which was previously screening the face of the notch cut into the lower transverse log 16 has been omitted, and the transverse log 16 is sectioned at the plane of the corner.

This limit of penetration allows for the groove 11 to be of substantial width. This improves the weather-tightness and stability of the wall 2. However, increasing this width further will increase the consumption of logs 5 required to produce a wall of given height. A preferred criteria for the respective depths of the transverse notches and grooves is for the grooves to have a depth of between one eighth and one quarter of the diagonal 29 of a standard squared log. This, in turn, places the depth of the transverse notches as equal to one half of that diagonal 29, plus one half of the depth of the groove 28.

The "depth of the groove" 28 referred to in this context is the length of the diagonal running from the apex 26 of the groove 11 to the lower corner 27 that would complete the log 6 if the groove were not formed. This is shown in Figure 6.

The preferred ratios given assume that a close fit is desired both along the groove of each log and at each notch. To prevent a gap from existing at the notches, the depth of the transverse "V"-shaped notch should not exceed one half of the length of the diagonal of the transverse log below, by more than one half of the depth of the longitudinal groove formed in the log being notched. A

small gap between courses of logs may be desirable where such gap is to be filled with felt, or other compressible sealing material, in order to accommodate for slight misfitting between logs.

A further advantage that arises from providing a joint of the type that has been described is that providing an angle of cut for the notch that corresponds to the angle of the upper sides against which the notch rests, a flat end surface will be able to bear against a flat side surface. Under vertical load this greatly stabilizes each log in its place, resisting both vibrational dislocation and distortions due to warping.

From the foregoing it will be seen that a means has been shown by which logs may be conveniently formed in a manner that will provide a weather-tight fit between courses, that will resist separation through warping, and will provide a secure interengagement at corners.

Throughout, reference has been made to "Logs". The structure as described is capable of being built using logs made of wood, or "logs" that are made of concrete. In the latter case, it may be preferable to employ light-weight concrete, such as concrete with expanded polystyrene beads or similar materials. Alternately, or in conjunction with such features, such concrete log elements may be hollow-cored to reduce their weight.

In summarizing the invention above, and in describing the preferred embodiments, specific terminology has been

resorted to for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

The foregoing description has been of preferred embodiments which are intended to be exemplary of the invention. The invention in its broadest and more specific aspects is further described and defined in the claims which now follow.

THE EMBODIMENTS OF THE INVENTION FOR WHICH AN EXCLUSIVE RIGHT IS CLAIMED ARE AS FOLLOWS:

1. A structure having walls (1,2) which intersect at corners (4), such walls being formed from courses of logs (3,6,7) of the same substantially square or trazoidal overall cross-section, each of said logs being oriented with a diagonal lying in a vertical plane (14) which is the vertical plane of the wall, said logs (6,7) being further characterized by having a longitudinal groove (11) running the length of the underside of each log, said longitudinal grooves being composed of two flat longitudinal surfaces (12, 13) which intersect at a right angle and which are symmetrically disposed about the vertical plane of the wall, each of said logs being provided with a transverse "V" shaped notch (9,10) at the corners of said structure whereby intersecting courses of logs are nested with said "V"-shaped notch (9) fitted over the upper surfaces (30) of a transverse log from the intersecting wall.

2. A structure as in claim 1 wherein the depth of the transverse "V"-shaped notch (17) on a first log (7) laying over a transverse log (16) at a corner, does not exceed one half of the length of the major diagonal (29) of the transverse log by more than one half of the amount of the depth (28) of the longitudinal groove in the first log, measured in the vertical plane (14).

3. A structure as in claim 1 wherein the depth (28) of said "V"-shaped notch (17) is equal to one-half of the major diagonal (20) of the next lower log upon which said "V"-shaped notch rests, plus one half of the depth of the longitudinal groove (11) of said next lower log, measured in the vertical plane (14).

4. A structure as in claim 1 wherein the depth (28) of said longitudinal groove (11) does not exceed one half of the length of the major diagonal (29) of each log.

5. A structure as in claim 1 wherein the depth of the longitudinal groove (11) is greater than one eighth, but less than one quarter of the length of the major diagonal (29) of each log.

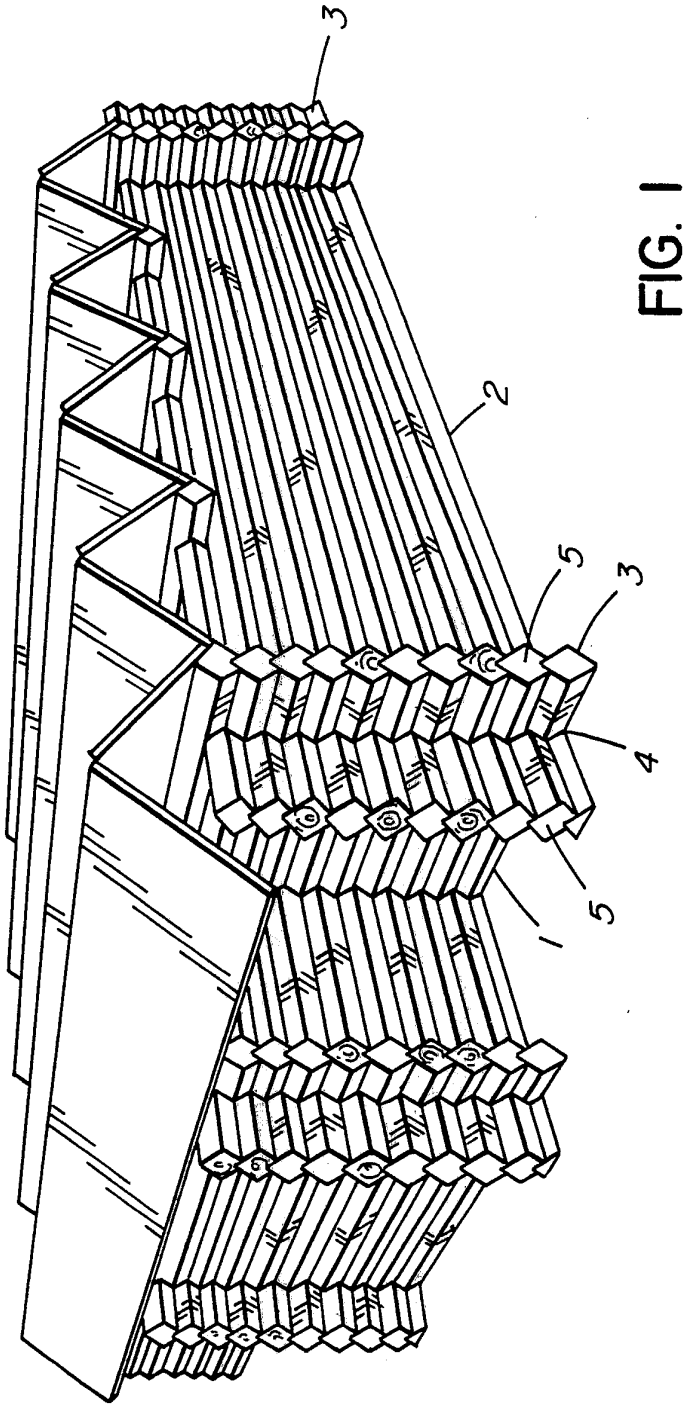

FIG. 1

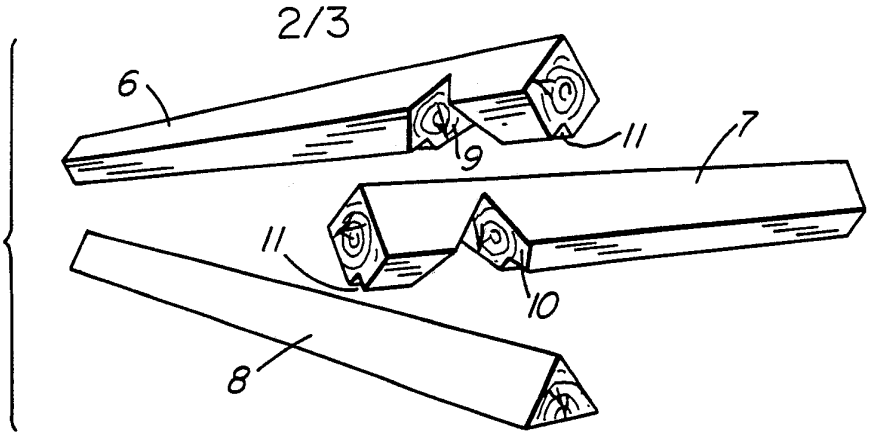

FIG. 2

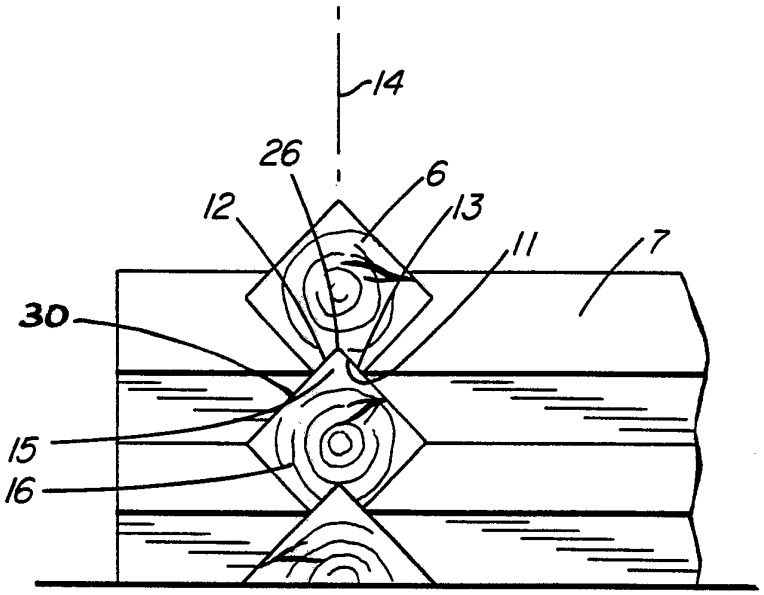

FIG. 3

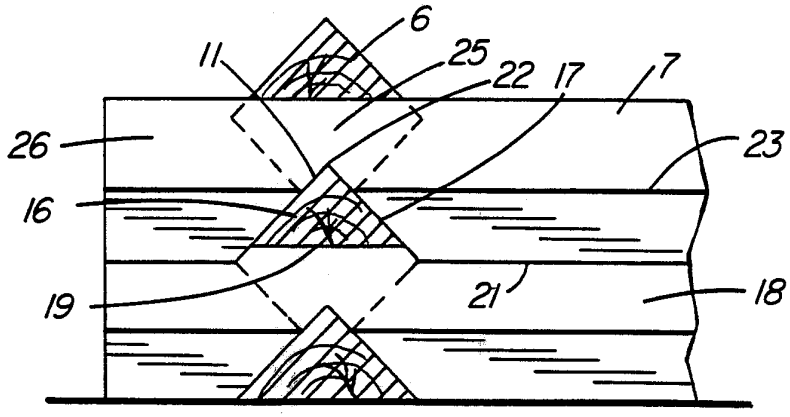

FIG. 4

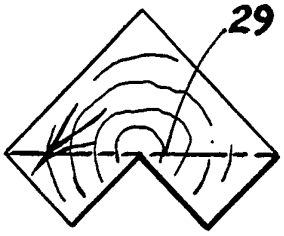

FIG. 5a

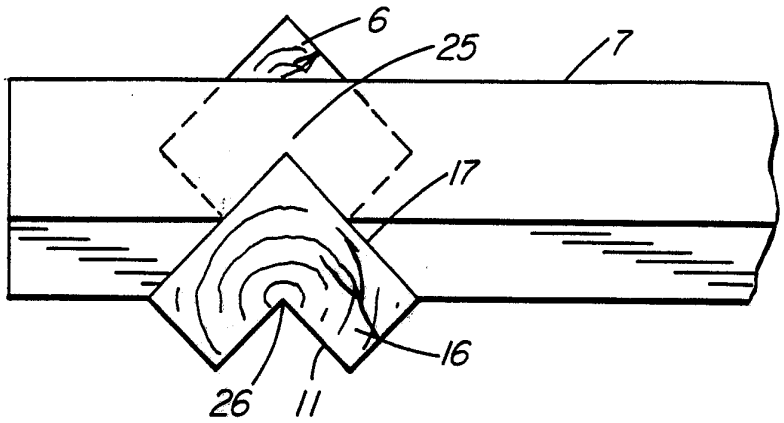

FIG. 5b

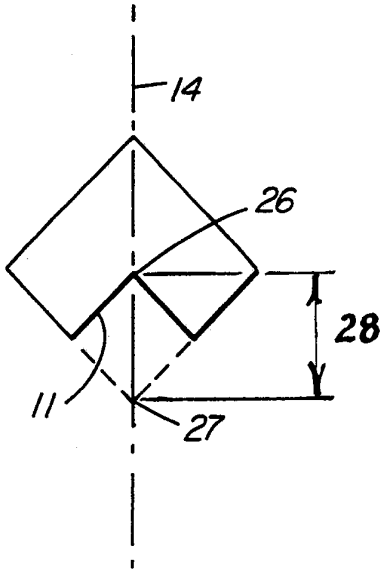

FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No PCT/CA 91/00042

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: E 04 B 2/70

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	E 04 B, A 63 H

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	US, A, 2669060 (KALVIG) 16 February 1954 see page 1, column 1, lines 48-56; claims; figure 7 cited in the application	1,2,4
Y	CH, A, 166686 (FONTANA) 16 March 1934 see page 2, column 2, paragraph 1; figure 7	1,2,4
A	US, A, 2588814 (KRISTIANSAND et al.) 11 March 1952 see claims 1; figures 1,2	1,2
A	US, A, 2416162 (DRAKE) 18 February 1947 see column 2, lines 27-34; column 4, lines 13-36; figures 1,4,5,6	1,2

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* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
22nd April 1991	04 JUN 1991
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	MISS T TAZELAAR

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	DE, U, 8531060 (KLEINHENZ) 10 April 1986 see claims 1,4; figures 1-3	1,2

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. CA 9100042 SA 44306

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 29/05/91
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 2669060		None	
CH-A- 166686		None	
US-A- 2588814		None	
US-A- 2416162		None	
DE-U- 8531060	27-02-86	None	