June 14, 1949. T. J. EDWARDS 2,473,018

BUILDING STRUCTURE

Filed July 25, 1947 6 Sheets-Sheet 1

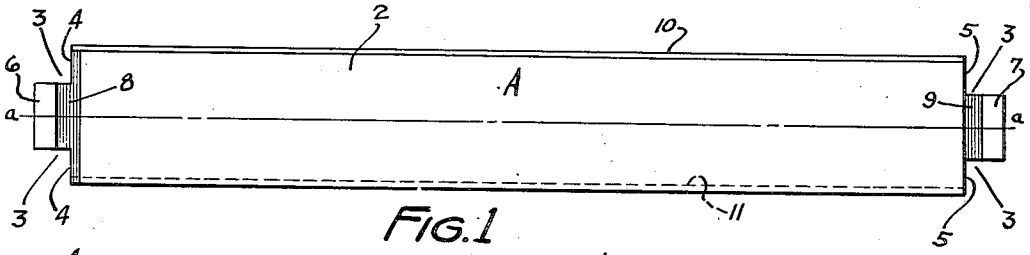


FIG. 1

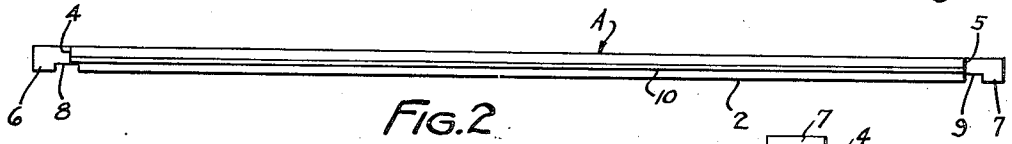


FIG. 2

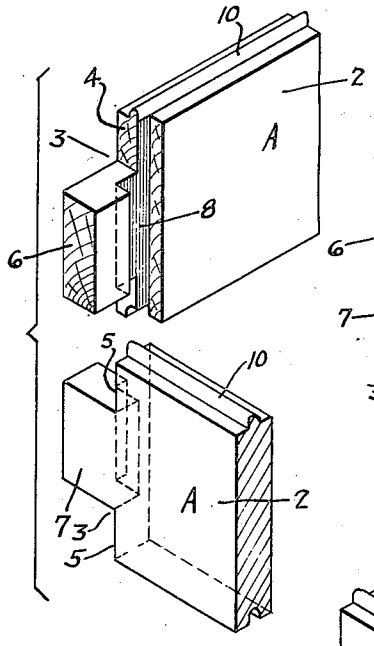


FIG. 3

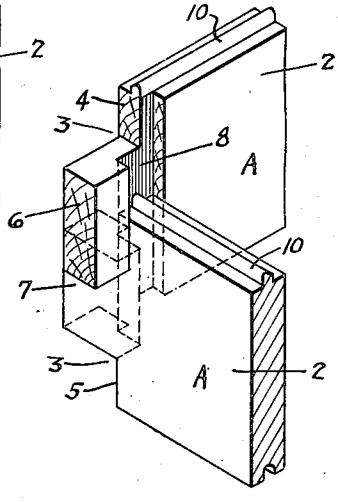


FIG. 4

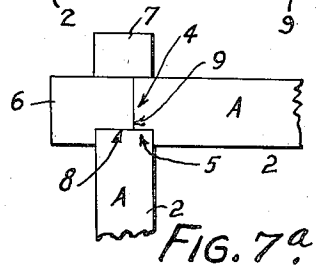


FIG. 7a

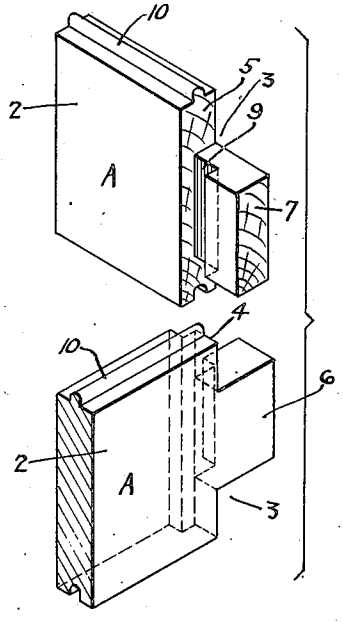


FIG. 5

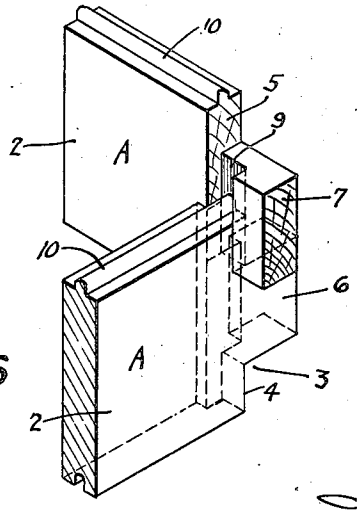


FIG. 6

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BUILDING STRUCTURE

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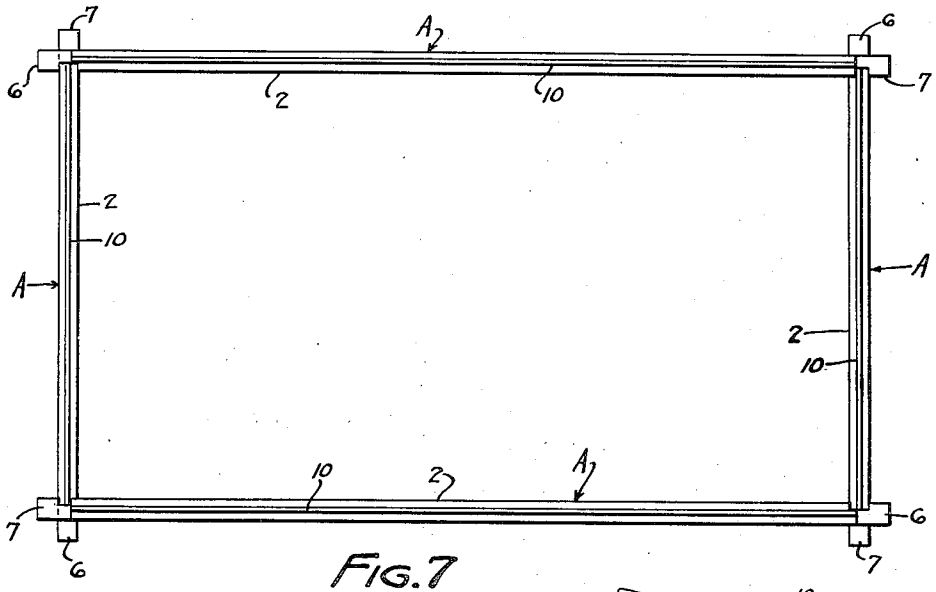


FIG. 7

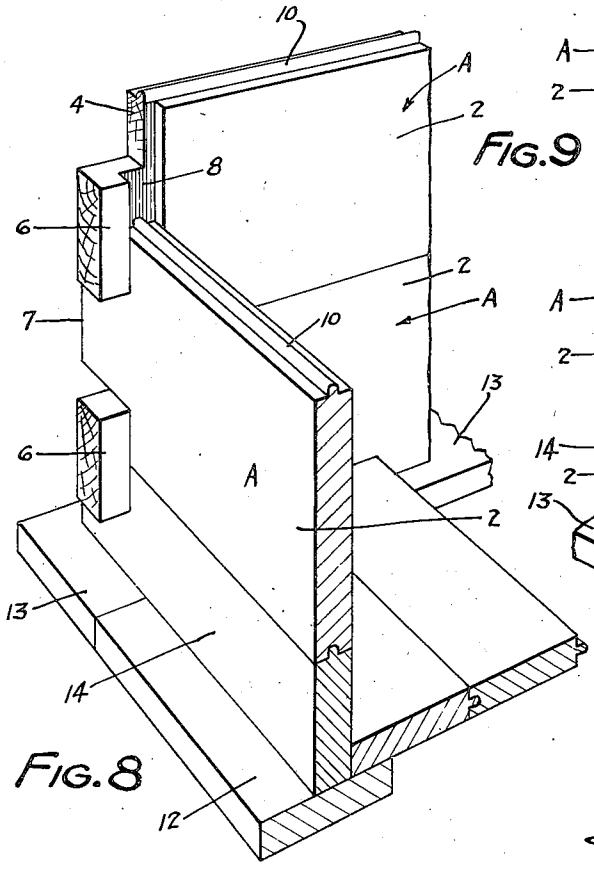


FIG. 8

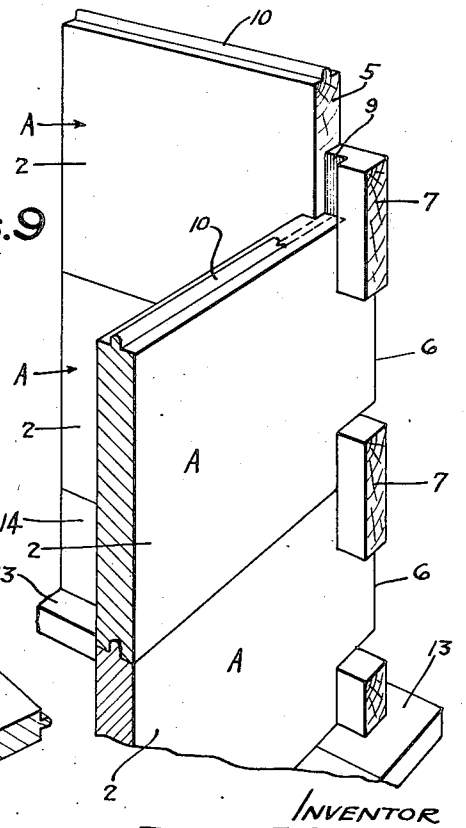


FIG. 9

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BUILDING STRUCTURE

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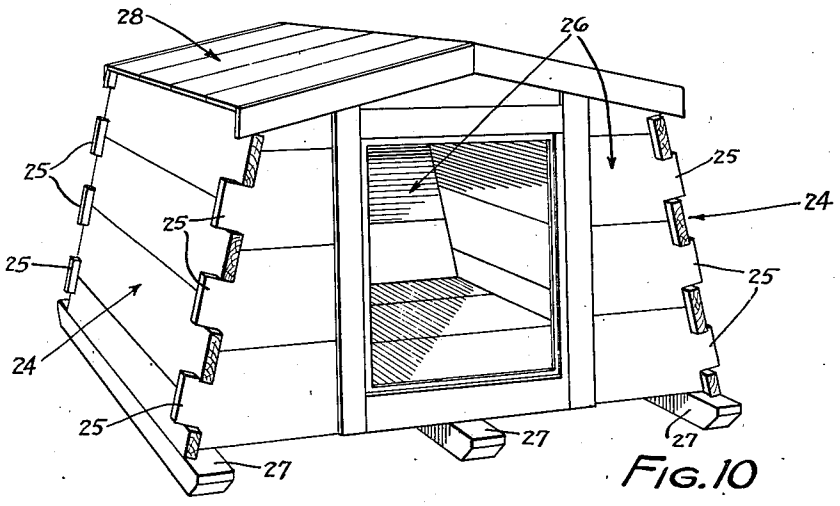


FIG. 10

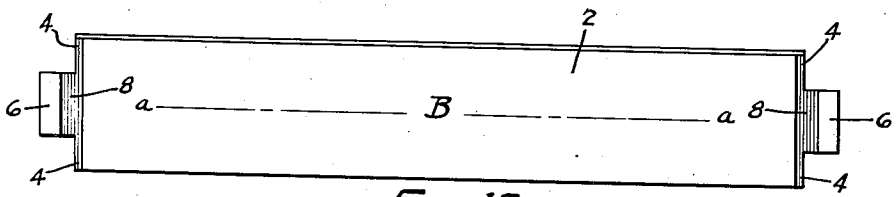


FIG. 15

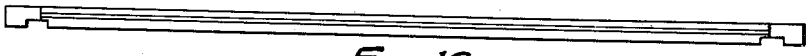


FIG. 16

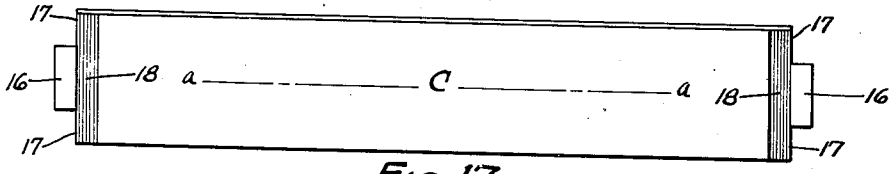


FIG. 17

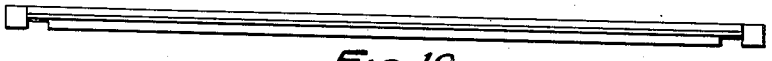


FIG. 18

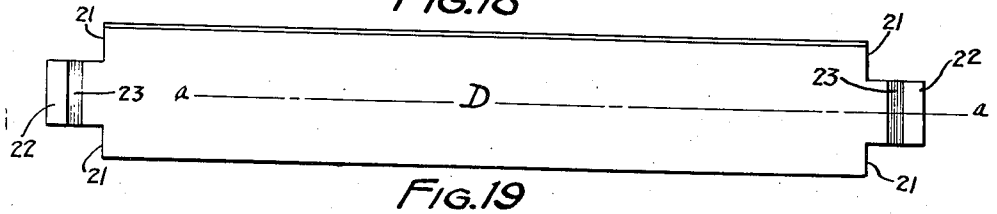


FIG. 19

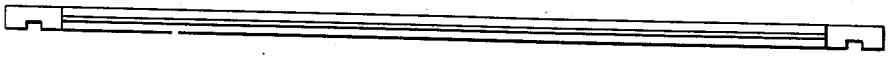


FIG. 20

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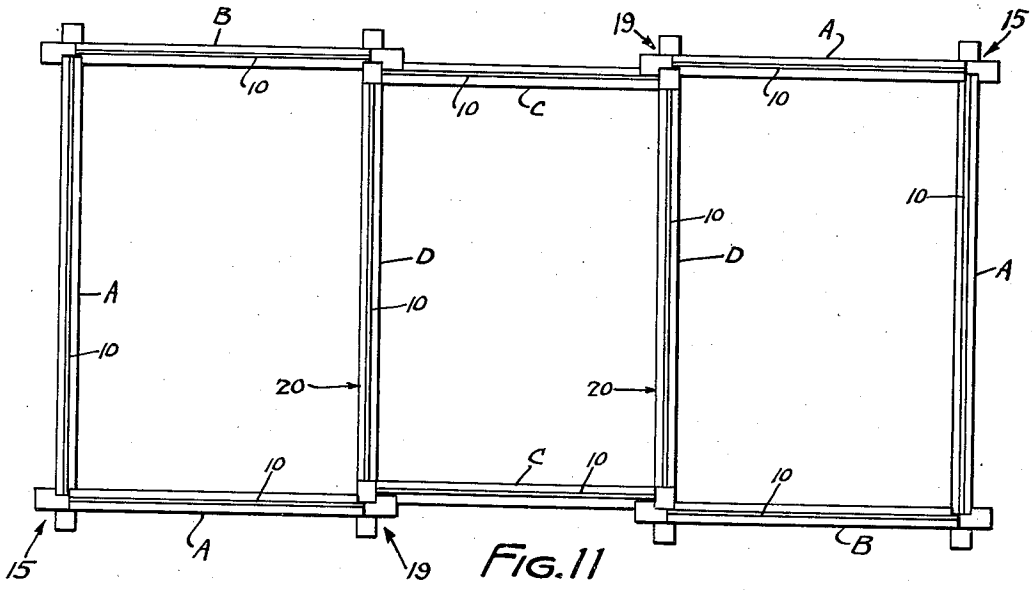


FIG. 11

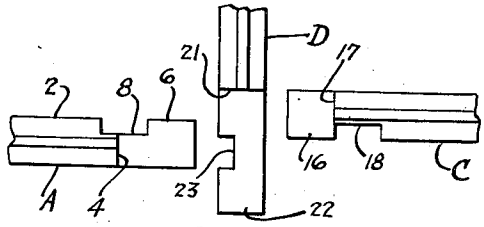


FIG. 12

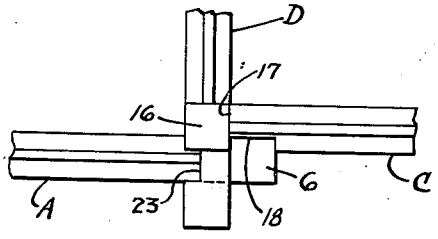


FIG. 13

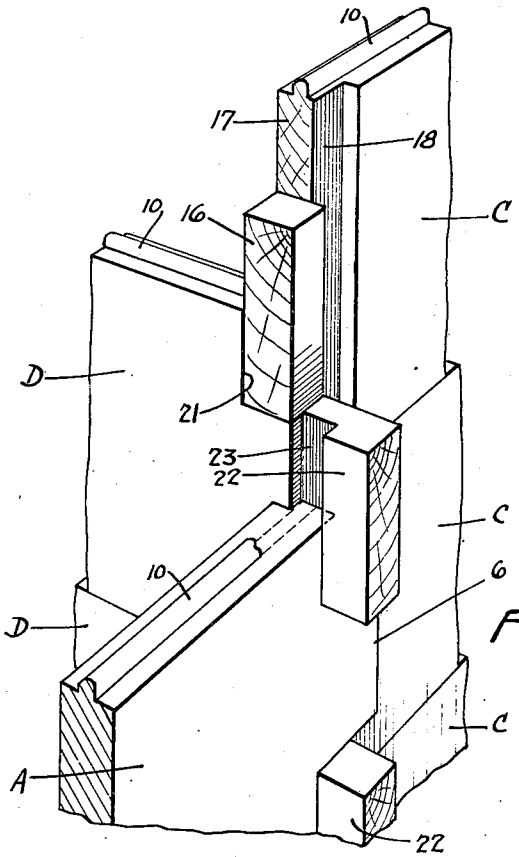


FIG. 14

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BUILDING STRUCTURE

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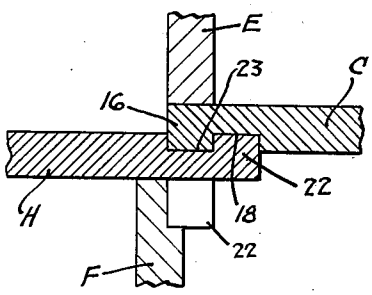


FIG. 22

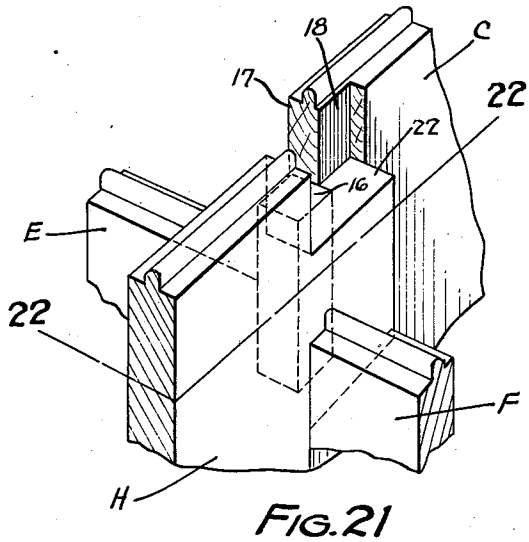


FIG. 21

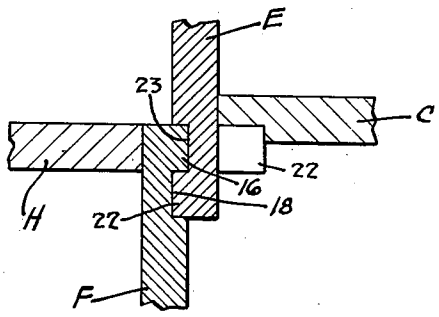


FIG. 23

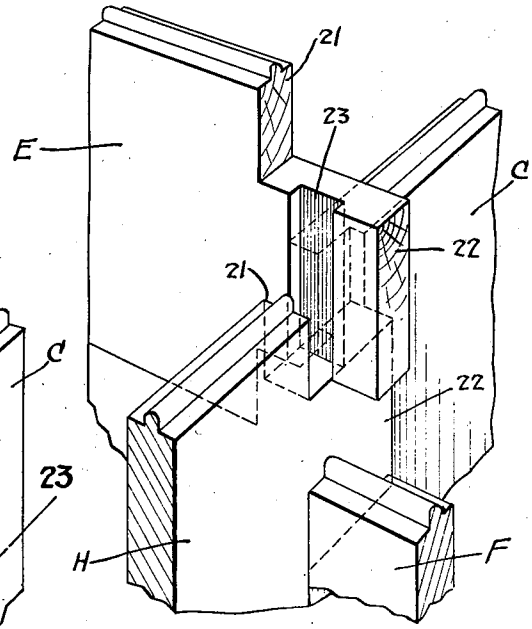


FIG. 24

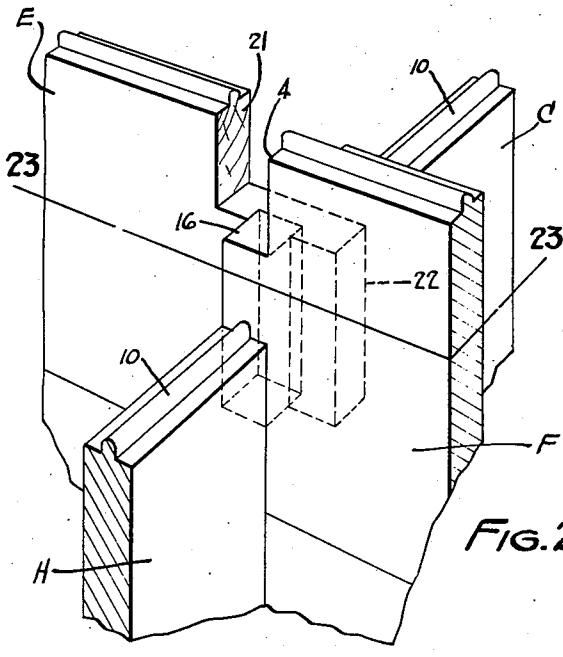


FIG. 25

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BUILDING STRUCTURE

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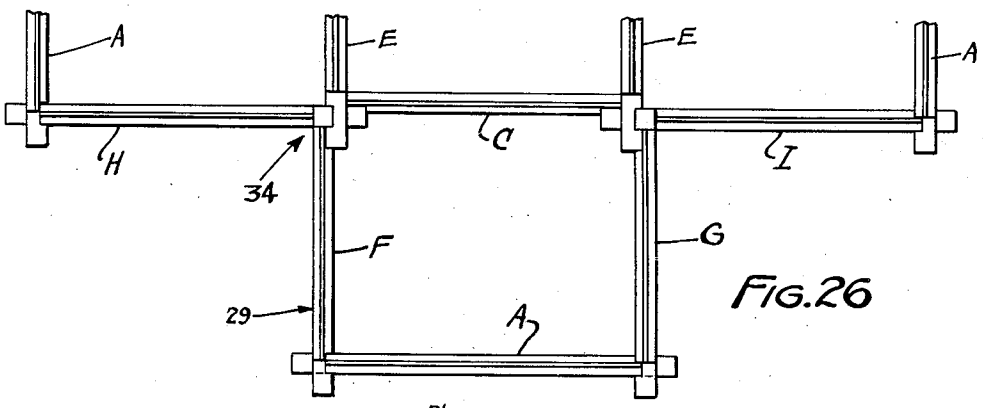


FIG. 26

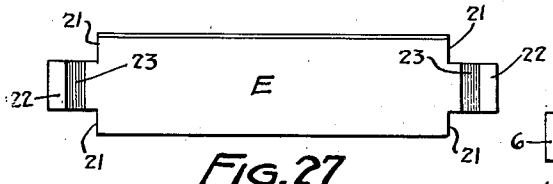


FIG. 27

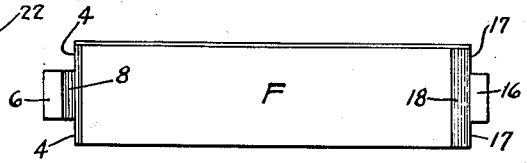


FIG. 29

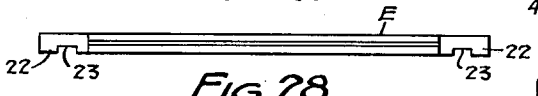


FIG. 28

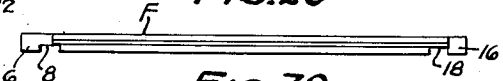


FIG. 30

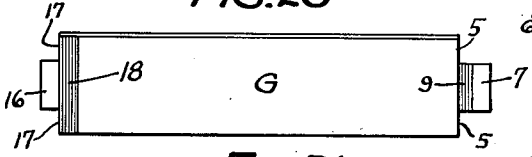


FIG. 31

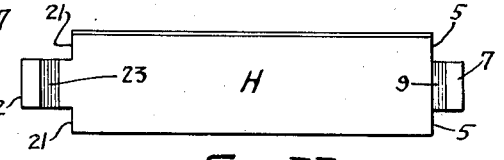


FIG. 33

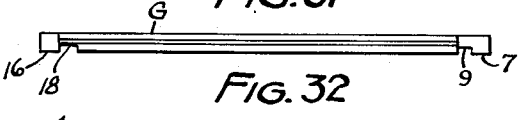


FIG. 32

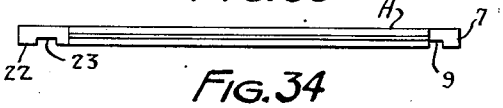


FIG. 34

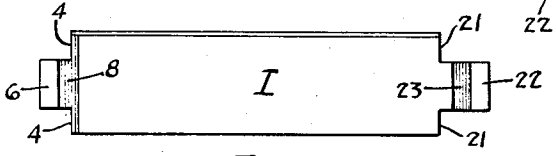


FIG. 35

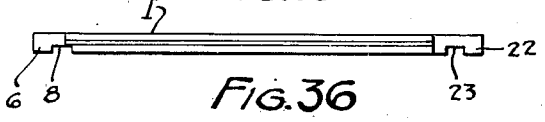


FIG. 36

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Patented June 14, 1949

2,473,018

UNITED STATES PATENT OFFICE

2,473,018

BUILDING STRUCTURE

Thomas J. Edwards, Klamath Falls, Oreg., assignor to Burke H. Critchfield

Application July 25, 1947, Serial No. 763,705

2 Claims. (Cl. 20—4)

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This invention relates to new and useful improvements in building structures and more particularly to such structures wherein the walls are composed of a plurality of prefabricated boards or panels having means whereby they may be assembled in the erection of the walls without the use of nails, screws or other separable securing elements.

An object of the invention is to provide a building structure in which all of the parts may be prefabricated, the wall board or panels having their ends so constructed that the boards of one wall may have their ends interlocked with the boards of adjacent walls in such a manner that the wall boards cannot become disengaged from one another at the corners of the building, and whereby the wall boards are free to expand and contract without interference from the interlocked joints at the corners of the building.

A further object is to provide a building of the class described in which substantially all of the parts including the supporting sills, flooring, upright walls, rafters and roof boards may be prefabricated, and the boards or panels constituting the upright walls of the building having their ends suitably notched at their ends to provide interlocking elements between the ends of the boards of adjacent walls without the use of metal or other connectors, and whereby the building may be quickly erected without the use of skilled labor.

A further object is to provide a plurality of wall boards or panels having their ends so notched as to provide interlocking joints at the corners of the building which are substantially weather-proof, and also whereby cross walls or partitions may be provided in the building to divide it into two or more rooms or compartments, the boards or panels forming the cross walls or partitions being secured to the outside walls by interlocking engagement with the wall boards thereof and without the use of nails, screws or other separable connectors.

A further object of the invention is to provide a building board or panel having its opposed edges at each end transversely notched to provide a tenon or tongue, and a transverse groove being provided in one face of the board at each end thereof, which grooves are adapted to receive end portions of adjacent boards, whereby the boards of adjacent walls may be secured together at the corners of the building by interlocking engagement, and without the use of nails, bolts or other separable connectors, in such a manner that a very rugged and substantial structure is provided whose walls are capable of withstanding

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considerable outward pressure, as may result when the building is utilized for storing bulk grain or other bulk materials.

A further and more specific object is to provide an elongated building board or timber having a tongue on one edge and a groove in its opposite edge adapted to interfit with similar tongues and grooves in adjacent boards, and each board being formed at each end with opposed shoulders and a longitudinally extending tenon disposed centrally of the board, one of said tenons having a transverse groove in one side face thereof having a side wall located in the plane of the shoulders at that end of the board, and the tenon at the opposite end of the board having a relatively wider groove therein extending inwardly beyond the shoulders at that end of the board whereby a portion of said last mentioned groove extends the full width of the board.

A still more specific object of the invention is to provide a plurality of building timbers or panels each provided at each end with a longitudinally extending terminal tenon and a pair of opposed shoulders, and one face of each timber having spaced transverse grooves therein, one located adjacent to each tenon of each timber, and the grooves in certain of said timbers being of less width than others and adapted to receive correspondingly sized shoulders provided on others of said timbers, whereby when a series of said timbers are assembled in the erection of adjacent walls, the timbers are securely interlocked in fixed position at the corners of the building and labyrinth seals are provided in the joints between adjacent walls whereby said joints are rendered substantially weather-proof.

Other objects of the invention reside in the unique manner of notching and grooving the ends of each board to provide interlocking tenons and grooves, and whereby such notching and grooving may readily be performed on standard automatic machinery; in the provision of a plurality of prefabricated building boards or panels having their ends so notched and grooved that they may readily and quickly be assembled in the construction of a building by unskilled labor, and without the use of nails, bolts, or other separable fastening elements, and also whereby multiple room buildings of various types and shapes may be quickly erected substantially without the use of a hammer and saw, and whereby such a building may be erected in a comparatively short time; and in the unique shape and design of the tenons, grooves and shoulders provided at the ends of the timbers whereby all of the walls of said tenons,

grooves and shoulders are disposed in either right angular or parallel relation to the longitudinal centerline of the timber, whereby the operation of forming said tenons, grooves and shoulders is an extremely simple one and may be accomplished in quantity production at very low cost.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow:

In the drawings:

Figure 1 is a face view showing one of my novel building timbers;

Figure 2 is a top view of Figure 1;

Figure 3 is a fragmentary detail sectional view in perspective showing adjacent ends of two of the building timbers about to be interlocked;

Figure 4 is a similar view showing the timbers of Figure 3 completely assembled;

Figure 5 is a view similar to Figure 3 showing the opposite ends of the timbers about to be interlocked;

Figure 6 is a view showing the timbers of Figure 5 interlocked;

Figure 7 is a plan view of a building on a smaller scale showing the interlocking of the timbers at the corners of the building;

Fig. 7*a* is an enlarged detail plan view of a corner joint showing the interlocking arrangement of two timber ends, and showing by that portion of each interlocking timber which is in overlapped relation with the other and at the outer corner of the joint, and also the arrangement of grooves and cooperating shoulders of the timbers at the inside corner of the joint, the tongues **10** not shown in this figure;

Figure 8 is an enlarged detail sectional view in perspective showing the arrangement of the timbers at one corner of the building;

Figure 9 is a similar view showing a portion of the corner at the opposite end of the building;

Figure 10 is a perspective view of a building constructed in accordance with the invention herein disclosed, but in which the side walls are disposed at a slight incline;

Figure 11 is a plan view of a building showing a construction comprising a plurality of rooms;

Figure 12 is a view showing the connection between one of the cross walls or partitions with the timbers forming one of the outside walls;

Figure 13 is a view showing the timbers of the cross wall interlocked with the timbers forming the side wall;

Figure 14 is an enlarged detail sectional view in perspective showing the construction of the wall structure illustrated in Figure 13;

Figure 15 is a face view of a timber showing portions of the transverse grooves at the ends thereof extending the full width of the timber;

Figure 16 is a top view of Figure 15;

Figure 17 is a face view of a timber in which the transverse grooves are entirely within the body of the timber and extend the full width thereof;

Figure 18 is a top view of Figure 17;

Figure 19 is a view showing a timber having relatively longer tenons at their ends and in which the transverse grooves are formed in the tenons and are relatively smaller in width than those shown in Figures 15 and 17;

Figure 20 is a top view of Figure 19;

Figure 21 is a fragmentary detail sectional view in perspective showing the construction wherein four walls are joined together;

Figure 22 is a sectional plan view on the line 22—22 of Figure 21;

Figure 23 is a sectional plan view on the line 23—23 of Figure 25;

Figure 24 is a view corresponding to the Figure 21 but showing an additional board;

Figure 25 is a view similar to Figure 24 but showing another board added;

Figure 26 is a view showing a multiple room building and showing the interlocking of the timbers at the corners of the various rooms;

Figures 27 to 36, inclusive, illustrate various forms of boards used in the construction of the building shown in Figure 26.

To facilitate the erection of buildings of various sizes and shapes in accordance with the present invention, a plurality of slightly variantly shaped timbers or panels are utilized, all of which embody the same general characteristics or features. In Figures 1 and 2 I have shown a timber or panel which will hereinafter be referred to by the reference character A. This timber comprises a body **2** which is transversely notched at each end as indicated at **3**, to provide a pair of shoulders **4** at one end and a pair of shoulders **5** at the opposite end. The shoulders of each pair are disposed in a common plan, or in other words, are vertically aligned with one another and are disposed at right angles to the axis *a*—*a* of the timber, as clearly illustrated in Figure 1. Tenons **6** and **7** are provided at the ends of the timber and are preferably symmetrically disposed about its axis *a*—*a*, as clearly illustrated in Figure 1.

To secure together the timbers at the corners of the building without the use of nails, screws, bolts, or other separable securing elements, the tenon **6** is shown provided with a transverse or vertically disposed groove **8** which extends partially into the body of the timber. The width of the groove **8** is substantially equal to the thickness of the timber. A relatively smaller groove **9** is provided in the tenon **7**, one wall of which is aligned with the shoulders **5**. The width of the groove **9** is substantially equal to the width or thickness of the shoulders **4** provided at the opposite end of the timber. To provide leakproof joints between adjacent timbers the upper edge of each timber is preferably provided at its upper edge with a tongue **10**, and its lower edge preferably has a groove **11** of conventional design adapted to receive the tongue **10** of a contiguous timber.

The timber A, shown in Figures 1 and 2, is designed for use in most types of buildings, and particularly to buildings of the general type disclosed in Figure 7, wherein each corner is defined by joining together the timbers of adjacent walls. The labyrinth seal provided at each corner as a result of the particular arrangement of the vertical recesses **8** and **9** is clearly shown in Figures 8 and 9, which seals are substantially weatherproof, as will readily be understood.

Figures 3 to 6, inclusive, illustrate the manner of interlocking the timbers at the corners of the building. As here shown, the relatively wider shoulders **5** at one end of each timber are received in grooves **8** of adjacent timbers, and the relatively smaller shoulders **4** are received in

grooves 9. The width or up-and-down dimension of each tenon is substantially equal to one-half the width or up-and-down dimensions of its respective timber, whereby the tenons in a completed wall will be abuttingly engaged, as clearly illustrated in Figures 4, 6, 8 and 9, and also whereby the joints between adjacent timbers in one wall will be staggered with relation to the joints between adjacent timbers in another wall.

By way of further explanation in this connection, these corner joints as shown in Figure 7 for instance are formed by arranging a series of timbers in superimposed interlocked edgewise relation, and each timber having its interlocked ends shaped to provide a pair of opposed shoulders and a terminal tenon, said tenon extending beyond the joint at substantially the same thickness as the timber, but at only the height of the narrowest part of the tenon. A vertical groove 8 is cut in the face of the tenon at one end of one of the interlocked timbers, and this groove also extends for the same depth, into the body of said timber beyond the shoulders 4 formed on said timber, said groove so cut being of a width sufficient to receive the full width of the cross-sectional thickness of another timber interlocked with it, namely the shoulders 5 as formed on this last-mentioned interlocked timber. A vertical groove 9 is also formed in the tenon of said last-mentioned interlocked timber which groove is lesser in width than the aforementioned groove 8 in the first-mentioned interlocked timber by the depth of said groove, one side wall of groove 9 as formed in the tenon being located in the plane of the shoulders 5 of said last mentioned timber, and with said groove of such width as to receive the reduced cross-sectional shoulder width of the widest grooved timber, namely the shoulder 4 of said first mentioned timber. This interlocked joint between timber members formed in the manner as outlined herein, is clearly shown in Figure 7*a*, and upon reference to this figure, it will be clearly seen that the overlapping portions of the tenons of interlocking timbers are arranged only at the outside corner of the joint, (as shown by cross-hatching) and further, that the grooves and coacting shoulders of all timbers forming the corner joint are arranged at the inside corner of said joint.

In the building of a structure embodying corner joints of this character, a light-tight weatherproof joint is formed having the tenons overlying each other only on the outer corner of the joint, and with the timbers placed, one on top of another in intersecting and edgewise relation as set forth herein, and where the shoulders, tenons and transverse grooves of all of said timbers cooperate to lock the timbers together securely at the corners of the building structure, and with the grooves and cooperating shoulders of all timbers arranged at the inside corner of each building joint. Furthermore, and by particular reference to Figure 7*a*, it will be noted that with the timbers in overlapped relation and with the grooves and coacting shoulders of said overlapped timbers arranged as set forth herein, there are three or more interior vertical contacting surfaces at right angles to each other between the ends of each of said timbers and its coacting groove, thereby providing an interlocked light-tight weatherproof corner joint of the character set forth herein.

Figures 8 and 9 illustrate the preferred manner of erecting the walls of a building. Suitable sills

12 and 13 are placed upon a suitable foundation or upon the ground, and upon these sills the walls of the building are erected. When starting the erection of the walls of a building a half timber 14 is placed upon one or more of the sills 12 and 13, as shown in Figure 8, and has its ends interlocked with the ends of full width timbers A of the general type illustrated in Figures 1 and 2. By interlocking the ends of the timbers at the corners of the building as illustrated in Figures 3 to 9, inclusive, all of the walls of the building may be erected to any desired height without the use of nails, screws, bolts, or other separable securing elements and with the assurance that a very substantial and rugged structure is provided which will be substantially weatherproof in construction.

In Figure 11 I have shown a multiple room structure in which the corners at each end of the building are similar to the corners of the building shown in Figure 7. The four corners located intermediately of the ends of the building are each formed by joining together the ends of three walls. When three walls are thus jointed together the recessing at the ends of the timbers are somewhat differently arranged in order to provide the proper interlocking engagement between the timbers of the various walls at each corner of the building, and whereby each corner will be made weatherproof by a labyrinth seal, similar to the wall corners illustrated in the previous figures.

Figures 1 and 15 to 19, inclusive, illustrate the various timbers utilized in the construction of a building such as illustrated in Figure 11. As here shown diagonally opposed corners 15 of the building are constructed by joining together the ends of timbers A, similar to the ones utilized in the building shown in Figure 7. The timbers B, C, and D are used in the construction of other walls of the building, including the cross-walls or partitions 20 which divide the building into a plurality of rooms.

Each timber B comprises a body 2 which is transversely notched at its ends to provide at each end a pair of shoulders 4 separated by terminal tenons 6 corresponding to the tenons 6 shown in Figures 1 and 2. Vertically disposed grooves 8 are provided in each tenon 6 and extend partially into the body of the timber in a manner similar to that shown at the left hand end of Figure 1. In other words, both ends of the timber B are identical in construction, and are identical to the left hand end of timber A.

Timber C differs from timbers A and B in that relatively shorter tenons 16 are provided at the ends thereof. Aligned shoulders 17 are also provided at each end of the timber C and a vertical groove 18 is cut in the face of the board at each end thereof. One side wall of each groove 18 is coincident with its respective shoulders 17, and the width of each of said grooves is substantially equal to the thickness of the timber, whereby each groove 18 may receive the face of one of the tenons 6, as clearly illustrated in Figure 13. Figure 13 illustrates one of the corners 19 of the building, and Figure 12 illustrates the relationship between the adjacent ends of timbers A, D and C before being interlocked together as shown in Figure 13.

As shown in Figure 19, the timbers D which constitute the cross-walls or partitions of the building shown in Figure 11, are notched at their ends to provide a pair of vertically aligned shoulders 21 at each end of the timber. In the timbers D relatively longer tenons 22 are pro-

vided, each of which is provided with a vertically disposed groove **23**. The widths of the grooves 23 are substantially equal to the thickness of the shoulders **4** provided on timbers A and B.

In each of timbers B, C and D the tenons at the ends of said timbers are disposed in the longitudinal axes *a—a* of their respective timbers, as illustrated in the drawings.

Figure 10 illustrates a portable building constructed in accordance with the present invention, but in which the opposed side walls **24** are inwardly inclined, whereby the tenons **25** of the timbers forming the end walls **26** of the building are disposed at an incline with respect to the axes of their respective timbers, as will readily be understood by reference to Figure 10. The timbers forming the side walls **24** of the building correspond to the timbers A shown in Figure 1. The building shown in Figure 10, may be mounted upon suitable skids **27** whereby it may readily be moved about from place to place, as will readily be understood. The building may be provided with any desired type of roof **28** suitable for the purpose.

In Figure 26 I have shown a building of the general type illustrated in Figure 11, but having a laterally extending wing **29** to provide an additional room in the building. To construct such a building it is necessary to slightly vary the notching and recessing at the ends of the timbers, as shown in Figures 27 to 36, inclusive.

The timber E shown in Figures 27 and 28 is provided at each end with a pair of aligned shoulders **21** similar to the shoulders **21** of the timber D shown in Figure 19. The timber E is also provided with terminal tenons **22** which are similar to the tenons **22** shown in Figure 19, and each tenon has a vertically disposed groove **23** in a face thereof. The widths of the grooves **23** in the tenons **22** of timber E are relatively wider than the corresponding grooves in the tenon of timber D.

The left hand end of timber F shown in Figure 29, is identical to the left hand end of timber A, and the right hand end of timber F corresponds to the construction of the right hand end of timber C.

It will also be noted that the left hand end of timber G, shown in Figure 31, is similar in construction to the right hand ends of timbers C and F, and the various parts thereof will therefore be referred to by like numbers.

The right hand end of timber G is similar in construction to the right hand end of timber A, and its opposite end is similar to the corresponding end of timber C.

The left hand end of timber H corresponds to the left hand end of timber E, and the right hand end of timber H corresponds to the right hand end of timber A.

Timber I has its left hand end constructed in a manner similar to the left hand ends of timbers A and F, and the opposite end of timber I is similar to the corresponding end of timber F.

Figures 22 and 23 illustrate detail sectional views of the corners **34** of the building shown in Figure 26, and clearly illustrate the interlocking engagement between the ends of timbers E, C, F and H forming the corner construction **34** shown in Figure 26. Figures 21, 24 and 25 illustrate the various steps in the operation of assembling the timbers at the corner **34** of the building in the erection of the walls thereof.

While the drawings illustrate variant types of timbers used in the construction of the various types of buildings herein disclosed, it will be noted that the general characteristics and constructural features of the ends of all of the timbers are similar in that each end of each timber is formed with a symmetrically disposed longitudinally extending tenon, a pair of vertically disposed shoulders, and a transverse or vertically disposed groove. The sizes and shapes of the tenons, shoulders, and grooves vary somewhat, depending upon the type of building to be erected, but the same general constructional features are carried through in the fabrication of all of the timbers.

Thus by the provision of a very limited plurality of slightly variant timbers, buildings of various designs and shapes may be economically erected in a comparatively short space of time without the use of nails, screws, bolts or other securing elements for securing together the timbers at the various corners of the building.

The notching and grooving at the ends of the timbers is such that the timbers may be fabricated in quantity production on conventional automatic machinery, whereby all of the timbers to be utilized in a given building may be prefabricated and tied into small bundles for convenient handling in transit. It is also to be understood that the various timbers will be definitely marked so that they may be readily identified with the particular type of building in which they are to be used.

The particular manner of recessing one side face of each timber is of utmost importance in that it results in the provision of a labyrinth seal at each corner of the building, whereby all corners are rendered substantially weatherproof whereby the building provides an ideal structure for storing bulk grain, and various other commodities which require thorough and complete protection from the elements.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

What I claim as new and desire to secure by Letters Patent is:

1. A building structure comprising a pair of walls joined together at the corner of the structure to provide a square corner, each wall being composed of a plurality of horizontally disposed flat first and second wall members set on edge, one on top of another, and the adjacent ends of said wall members being formed with like terminal tenons whereby the end of each wall member is provided with transversely aligned shoulders and with the tenons extending beyond the shoulders for the same width throughout their length, said first wall member having a transverse groove cut in one face of its tenon adapted to receive the full cross-sectional thickness of said second wall member, said groove extending partially into the body of said first wall member beyond its shoulders whereby the shoulders of said first wall member are of less thickness than the thickness of said member, said second wall member having a relatively narrower transverse groove cut in one face of its tenon, one side wall of which is disposed in the plane of its respective shoulders

and whereby the width of the shoulders of the second wall member is equal to the full thickness of said member, the tenoned ends of said first and second wall members being disposed in overlapped relation at the outside corners of the structure with the relatively narrower shoulders of the first of said members being received in the relatively narrower groove of the second wall member, and the relatively wider shoulders of the second wall member being received in the relatively wider groove of the first wall member whereby the interfitting of said grooves and shoulders cooperate to provide an interlocked, light-tight, weather proof joint at the corner of the structure, and whereby corner joints are formed having tenons overlying each other only at the outer corners of the building structure and with the overlapping contacting portions of said tenons covering an area extending from the grooves to points in line with the outside vertical surfaces of the building structure at the corners, and with said contact surfaces of the overlapping tenons in substantial horizontal alignment with the upper and lower horizontal edge surfaces of adjacent tenons throughout their length, each of said corner joints comprising at least three vertical contacting surfaces between the shoulder ends of said interlocked wall members and the coacting grooves all located inwardly from the overlapping area of the tenons, and with each pair of the contacting surfaces disposed at right angles to its adjacent pair of contacting surfaces.

2. A building structure having square corners and in which the walls are composed of horizontally disposed wall members set on edge, one on top of another, and having the ends of adjacent wall members overlapped at the corners of the structure, each overlap forming an interlocked light-tight, weatherproof joint characterized by having the interlocked ends of each wall member shaped to provide a pair of opposed shoulders and a terminal tenon extending beyond the shoulders of its respective wall member at substantially the same thickness of the wall member but at only the height of the narrowest

part of the tenon, a transverse groove cut in the face of the tenon of one wall member adapted to receive the full cross-sectional thickness of the other wall member interlocked with it, said groove extending for the same depth into the body of said wall member and beyond the shoulders thereof, and a vertical groove in the other interlocked member less in width than the groove in the first mentioned wall member by the depth of said groove to receive the reduced cross sectional shoulder width of the said first or widest grooved member, said narrow groove having one side wall thereof located in the plane of the shoulders of said narrow grooved wall member, the grooved face of each wall member being that face of all wall members constituting the inside wall surfaces of the building structure, whereby corner joints are formed having tenons overlying each other only at the outer corners of the building structure and with the overlapping contacting portions of said tenons covering an area extending from the grooves to points in line with the outside vertical surfaces of the building structure at the corners, and with said contact surfaces of the overlapping tenons in substantial horizontal alignment with the upper and lower horizontal edge surfaces of adjacent tenons throughout their length, each of said corner joints comprising at least three vertical contacting surfaces between the shoulder ends of said interlocked wall members and the coacting grooves all located inwardly from the overlapping area of the tenons, and with each pair of the contacting surfaces disposed at right angles to its adjacent pair of contacting surfaces.

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