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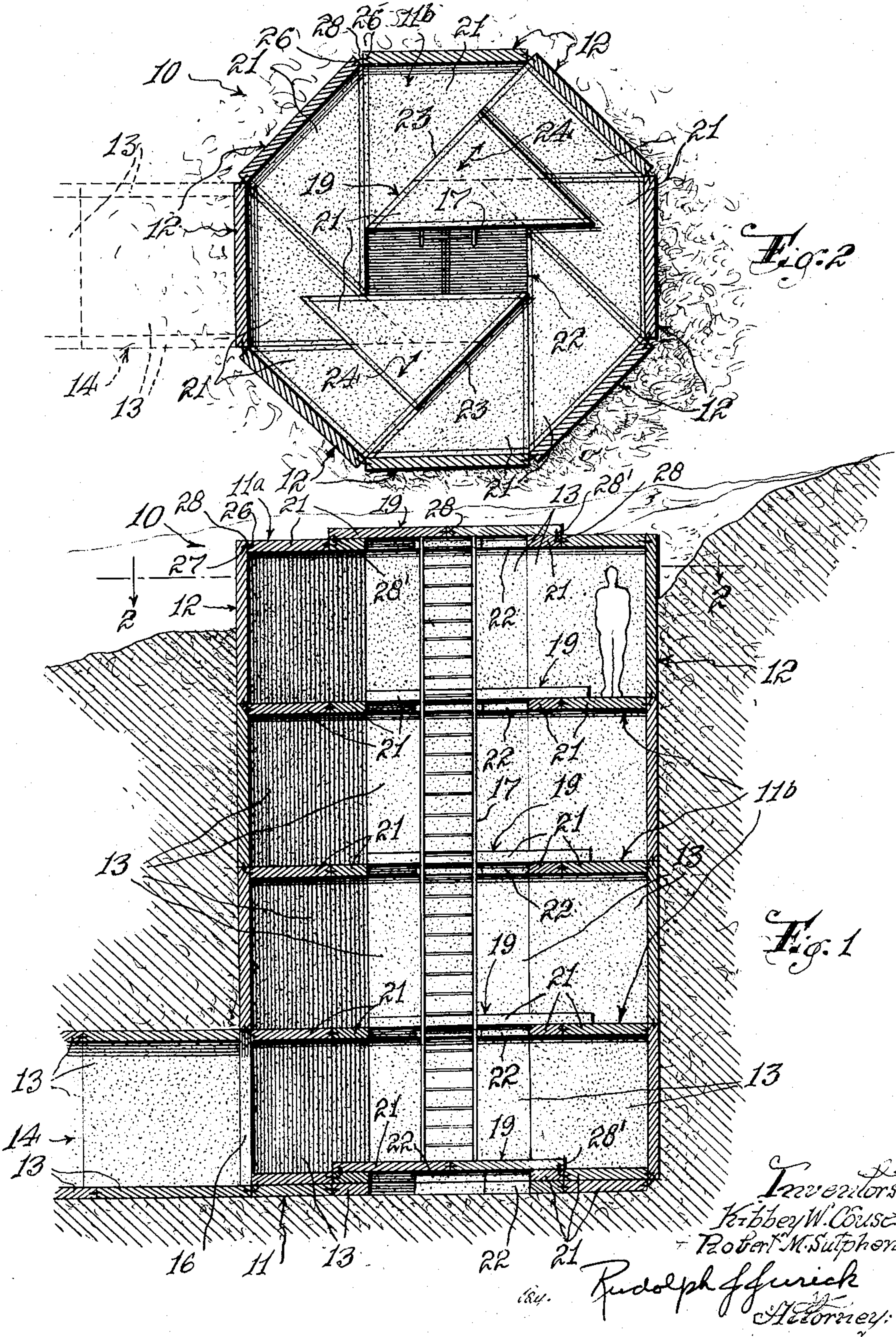
K. W. COUSE ET AL

2,849,755

OCTAGONAL-SHAPED STRUCTURE

Filed April 24, 1957

3 Sheets-Sheet 1



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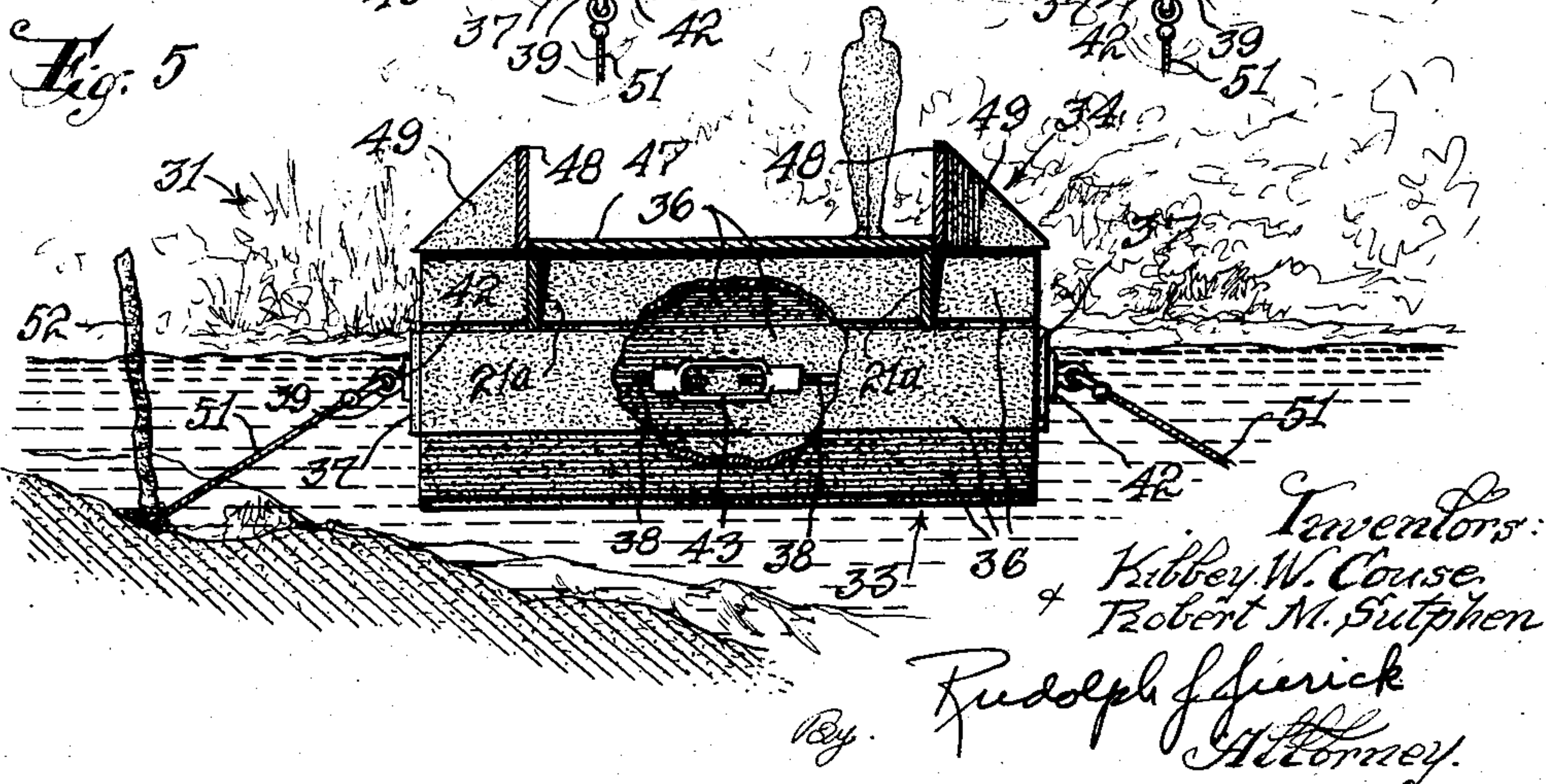
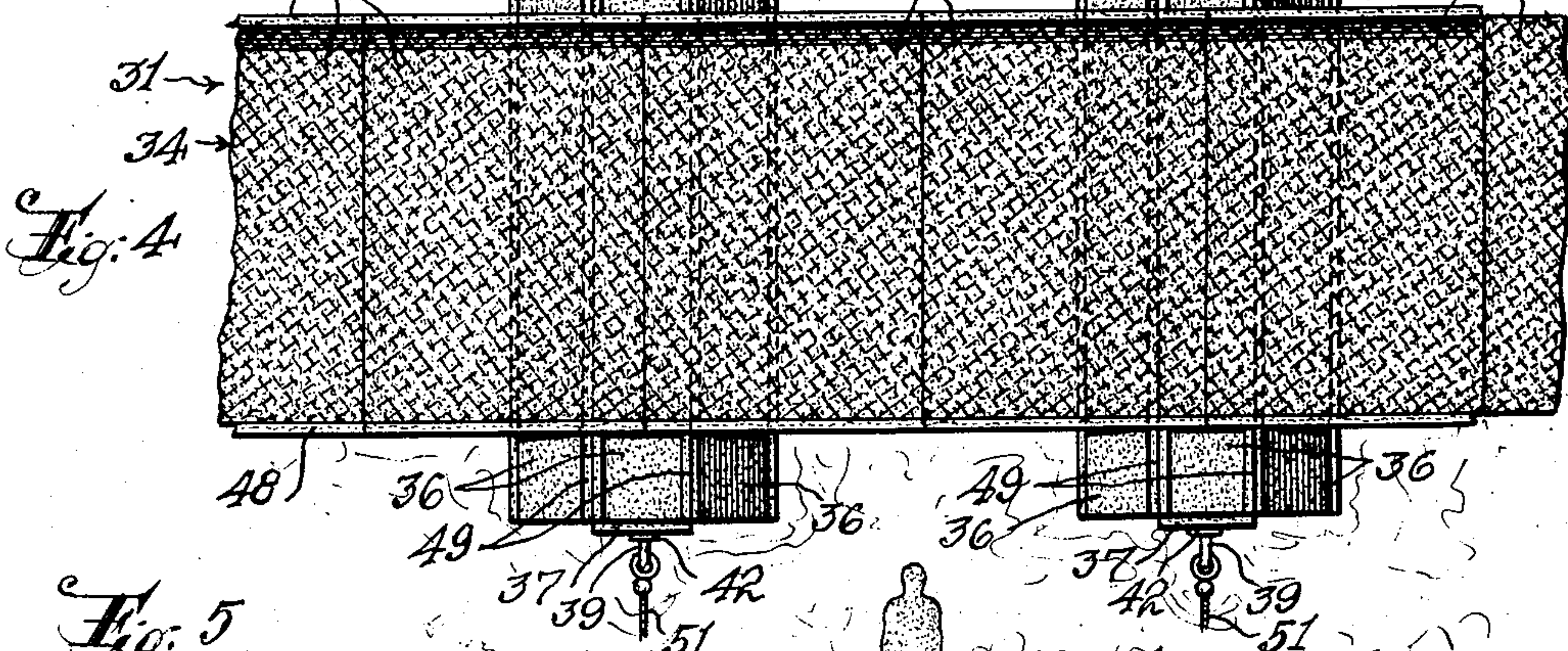
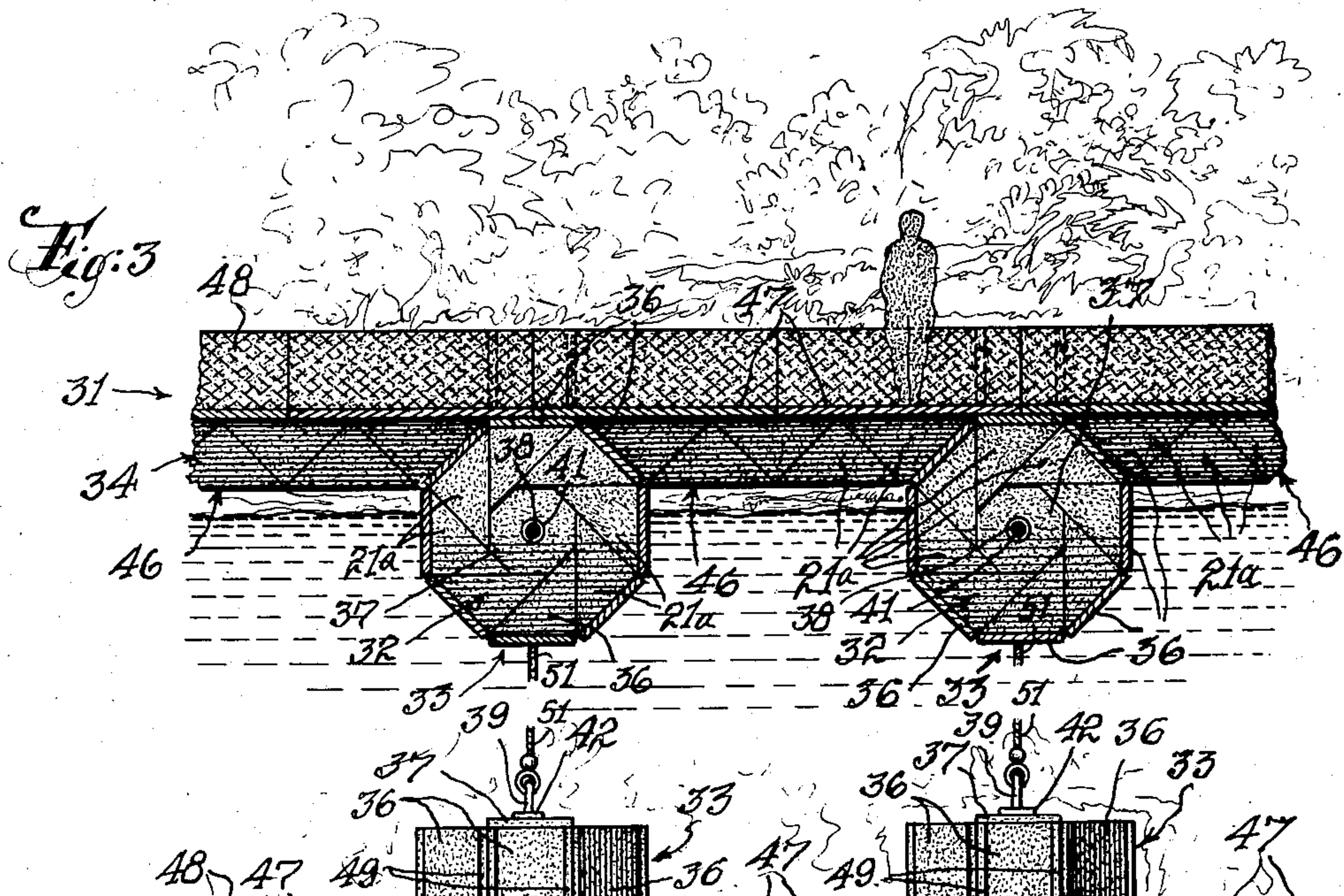
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OCTAGONAL-SHAPED STRUCTURE

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3 Sheets-Sheet 2



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**Sept. 2, 1958**

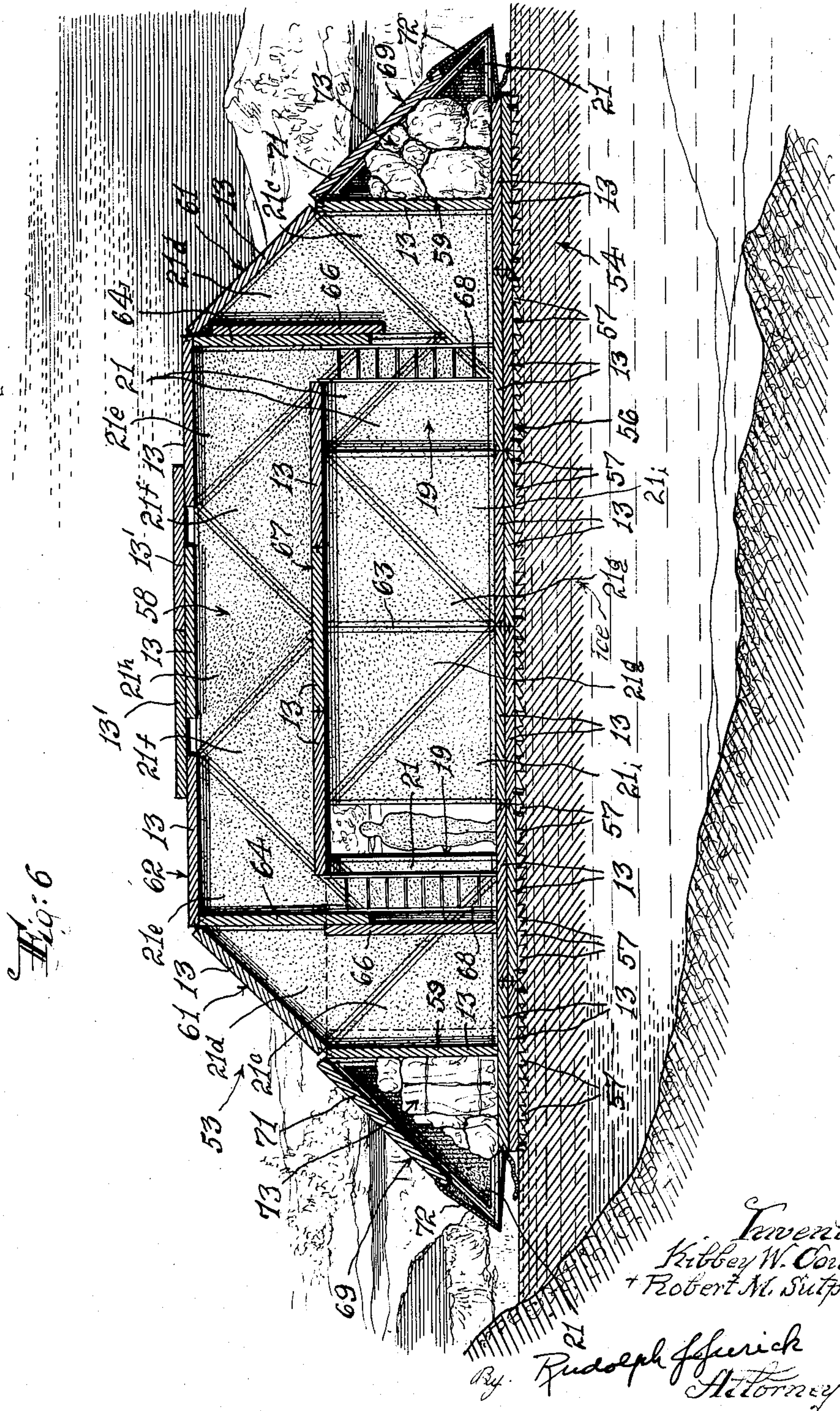
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**2,849,755**

## OCTAGONAL-SHAPED STRUCTURE

Filed April 24, 1957

3 Sheets-Sheet 3





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2,849,755

## OCTAGONAL-SHAPED STRUCTURE

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Application April 24, 1957, Serial No. 654,938

12 Claims. (Cl. 20—2)

This invention relates to structures, and more particularly to structures utilizing triangular-shaped building units therein.

In the structures contemplated by our invention the triangular-shaped building units are in the form of flat, right isosceles triangular-shaped, panels. The panels are adapted to be joined together in an edgewise abutting relation, and may be joined together in a manner forming an enlarged open octagonal-shaped member. The octagonal-shaped member is made by joining one short-length side of each of eight (8) of the right isosceles triangular-shaped building units to the long-side of each adjacent triangular-shaped unit in a manner wherein the other short-length side of each triangular-shaped unit forms the outer peripheral edge of the octagonal-shaped panel, while a portion of the long side of each forms an inner edge of an octagonal-shaped opening in the resultant panel.

Other structures contemplated by our invention include only a portion, or part, of the open octagonal-shaped panel described above. Obviously, a portion, or part, of such an octagonal-shaped structure may be formed by using fewer than the eight (8) triangular-shaped building units necessary to form the complete octagonal form.

A wide variety of uses are contemplated for the octagonal-shaped, and partially octagonal-shaped structures. For example, they may be used in building constructions for occupancy by humans, or for the storage of goods. In building structures, the octagonal, or partially octagonal, panel may be used to form all, or a portion of any of the building components, i. e., the floor, roof, ceiling, walls, etc. Further, the octagonal-shaped opening which results in the complete octagonal panel, may be utilized as a hatchway or passageway. If desired, the passageway may be provided with sliding doors made of two of the right triangular-shaped building units. A silo-type building for the storage of grain, and the like, may be formed by using the octagonal-shaped panels as a floor and roof, and connecting the outer edges thereof by elongated rectangular-shaped side walls.

The type of structures made in accordance with our invention are not limited, however, to building structures. Octagonal-shaped panels may, for example, be used in forming end members of pontoons, for pontoon-type bridges. When used for this purpose, triangular-shaped units of the type utilized in the construction of the octagonal pontoon ends may be used to form both the pontoon ends and supporting beam structure between adjacent pontoons.

Triangular-shaped building units which may be used in the various structures contemplated by our invention are described in our co-pending United States patent application Serial No. 616,298, filed October 16, 1956, and entitled Structural Panel Member. Details of fastening devices for joining the building units together are also shown in our above-mentioned co-pending patent application. It will be understood, however, any suitable triangular-shaped panel members and fastening means for

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joining the panels may be used in the structures of our present invention. Fastening means which permit easy assembly and disassembly of the building units are preferred, in order that the structures may be easily and quickly erected and dismantled. The building units may be sent to the building site in a disassembled and crated condition, and assembled at the site to form any of the desired structures contemplated by our invention.

An object of this invention is the provision of an im-  
provide structure comprising right isosceles triangular-  
shaped building units of uniform size joined together in  
an octagonal shape or form.

An object of this invention is the provision of an  
octagonal-shaped building structure comprising a floor  
and roof of substantially identical shape, each compris-  
ing a plurality of right isosceles triangular-shaped build-  
ing units joined together in octagonal form in a manner  
wherein one short-length side of each triangular-shaped  
building unit forms one outer peripheral edge of the roof  
and floor, and a portion of the long diagonal side of each  
of the said triangular-shaped building units forms one  
inner peripheral edge of an octagonal-shaped opening  
within the said floor and roof, and a plurality of plane  
upright wall members connected between the outer pe-  
ripheral edges of the said floor and roof.

An object of this invention is the provision of a pon-  
toon structure comprising: a pair of spaced end members  
of substantially identical construction, each end member  
comprising a plurality of uniform-sized triangular-shaped  
members joined together to form an open octagonal-  
shaped structure, cover members positioned over the  
openings in the open octagonal-shaped end structures;  
elongated rectangular-shaped side members joined to-  
gether along adjacent long edges, and joined along the  
short edges thereof to the outer peripheral edge of the  
said end members, and means extending through the said  
structure detachably joining the said cover members to-  
gether.

These and other objects and advantages will become  
apparent from the following description when taken with  
the accompanying drawings. It will be understood the  
drawings are for purposes of illustration and are not to be  
construed as defining the scope or limits of the invention,  
reference being had for the latter purposes to the ap-  
pended claims.

In the drawings wherein like reference characters de-  
note like parts in the several views:

Figure 1 is a vertical sectional view of one form of  
building structure embodying our invention;

Figure 2 is a view taken on line 2—2 of Figure 1;

Figure 3 is a fragmentary vertical side sectional view  
of a pontoon bridge;

Figure 4 is a fragmentary top view of the bridge shown  
in Figure 3;

Figure 5 is a vertical end sectional view of the bridge,  
parts being shown broken away for clarity; and

Figure 6 is a vertical sectional view of a building  
structure erected upon an ice mass and embodying our  
invention.

Reference is now made to Figure 1 of the drawings  
wherein there is shown an octagonal-shaped building  
designated by the reference numeral 10. The building  
may be situated in an excavation in the ground, or in a  
body of ice when used in the polar regions. The build-  
ing 10 comprises a double-thickness floor 11, a roof 11a  
and three intermediate levels of floor 11b. Each layer  
of the double thickness floor 11, the roof 11a and the  
floors 11b are of identical open octagonal-shaped con-  
struction, but for clarity are provided with different refer-  
ence characters.

The floors and roof are fastened adjacent the edges  
thereof to vertically extending side walls designated gen-



erally by the reference numeral 12. The side walls 12 comprise a plurality of square-shaped building units 13 which are suitably joined together, and to the floors and roof of the building. An underground passageway 14, having a floor, roof and side walls made of the square-shaped building units 13 is attached to the building structure at the lower end thereof adjacent an opening 16 formed in one of the walls 12 by the removal of one of the square-shaped building units from the wall. A ladder 17 extends from the floor 11 of the building up through openings in the intermediate floor levels 11b, to the roof 11a. The openings in the floors and in the roof are adapted to be closed, or substantially closed, by sliding doors or panels, designated 19. While the building illustrated in Figure 1 is four (4) stories in height, it will be understood that our novel building structures may be erected to any desired height.

The octagonal shape of the building 10 is best shown in the horizontal sectional view of Figure 2. Referring to Figure 2, it will be seen that the floor 11b comprises eight (8) right isosceles triangular-shaped building units 21 fastened together in an open octagonal shape. Each triangular-shaped building unit in the floor is joined to the adjacent triangular-shaped floor units; the long diagonal side of each floor unit being fastened to a short-length side of the adjacent floor unit in a manner wherein a portion of the long diagonal side of the units form an octagonal-shaped opening designated 22 in the floor. The outside peripheral edge of the resulting octagonal-shaped floor comprises the other short-length sides of each triangular-shaped building unit, which sides are joined to the side walls 12.

As seen in Figure 2, the building doors or panels 19 comprise two triangular-shaped building units 21 which are slidably mounted adjacent short-length sides designated 23, to the floor 11b adjacent the connection between triangular-shaped floor units. The two triangular-shaped units 21 of the sliding doors 19, slide in parallel directions on the floor 11b in the directions indicated by arrows 24. The ladder 17 prevents the doors 19 in the intermediate floor levels 11b from completely closing the openings 22 therein. It will be understood, that upon removal of the ladder, the doors 19 in the floors 11b may be completely closed in an abutting manner. Further, the doors 19 may be slidably attached adjacent any parallel joints in the floors or roof (the doors 19 on the floor 11 and roof 11a being shown joined thereto in a manner wherein the abutting joint between members 21 of the doors is at right angles to the long diagonal sides of the triangular-shaped units 21 in the doors 19 on the intermediate floor levels 11b).

All of the building units, including the square-shaped units 13 and triangular-shaped units 21, may be provided with elongated edge grooves 26 and elongated face grooves 27 on both faces thereof a spaced distance from the edges. Although not shown in the drawings, the elongated grooves are provided with enlarged bottomed portions. The building units are joined together by elongated spline, or binder members 28 having enlarged edge portions (not shown in the drawings); the binder members being snugly slidably receivable in the enlarged bottomed grooves in adjacent building units. The sliding connection for the doors 19 may be provided by the use of members 28' which are similar in construction to the binder members 28, except that the members 28' have one enlarged edge which is easily slidable in the groove in the floor. All of the connecting means are diagrammatically illustrated in the drawings. Details of connecting means which are suitable for use in the construction of the octagonal-shaped structures are shown and described in our above-mentioned co-pending United States patent application.

When the triangular-shaped members 21 of the doors 19 are closed in an abutting manner, as illustrated by the doors 19 on the floor 11 and roof 11a, the two units may be joined together with a binder member 28. A

large square-shaped door, the size of one of the square-shaped members 13, results when the triangular-shaped members 21 are joined along their long diagonal edges.

It will be understood, if the intermediate floor levels 11b are not needed, or are undesired, that the wall members 12 may be made of elongated panels of any desired height, rather than being made of a plurality of square-shaped members 13 joined together in an abutting manner, as shown. The elongated wall panels are preferably (but not necessarily) one short-length side of a triangular-shaped building unit 21 in width, and any multiple integral of such short length in height. If desired, the elongated members may be provided with face grooves at any desired level, or levels, for the attachment of intermediate floors 11b.

The building units of which our novel building structures are constructed may be made of metal, wood, plastic or other suitable material, but are preferably made of plastic having many desirable properties, which properties include a high strength to weight ratio and excellent durability. When the building units are used for the erection of buildings of the type illustrated in Figures 1 and 2, they are made relatively large in size; the triangular-shaped units 21 being preferably seven (7) feet long at the short-length sides thereof and approximately two inches thick. Because of the large size, relatively few building units are needed to form a completed building structure of the type illustrated in Figures 1 and 2. Despite the large size, the building units are easily handled manually in the erection of a building structure when the units are made of relatively light-weight material, such as plastic.

In the building structure 10, illustrated in Figures 1 and 2, it will be seen that only two basic sizes and shapes of building units are utilized; the triangular-shaped building units, and the square-shaped building units 13. For this reason, the building units are easily packed for shipment to the building site. Also, after the units are unpacked at the site, a minimum of time is necessary to erect the building, due, both to the large size of the units, and to the interchangeability of the identical shaped units.

Reference is now made to Figures 3, 4 and 5 of the drawings, wherein there are shown various views of a pontoon bridge, designated generally 31, which bridge incorporates octagonal-shaped members 32 made of a plurality of triangular-shaped members 21a. The bridge comprises, generally, a plurality of pontoon members 33 upon which a roadway structure 34 is positioned. The pontoon members 33 include the octagonal-shaped end members 32, joined together by elongated side members 36. The triangular-shaped members 21a, which are used in the end members are joined together in the manner described above in the construction of the floor and roof of the building 10 of Figures 1 and 2, thereby resulting in the open octagonal-shaped end member. End cap members 37 are suitably secured to the outer-most side of the open octagonal-shaped end members 32, over the openings therein. Rods 38, having an eye member 39 formed on one end and having threads at the other end, extend through holes 41 in the end caps 37. Annular sealing members 42 provide a water tight seal between the rods and the end cap members. As seen in Figure 5, a turnbuckle 43 couples the threaded ends of the rods together inside the pontoon structure. As will be well understood, when the turnbuckle 43 is rotated in one direction, the rod members 38 are drawn together thereby tightly securing the end cap members 37 to the open octagonal end members 32. Access to the turnbuckle is had by removal of one of the side walls 36 from the pontoon. All of the joints between the building units in the pontoons are of the water proof type whereby the pontoons are bouyant.

The roadway structure 34 comprises a plurality of vertically positioned triangular-shaped building units 21a joined together along adjacent short-length sides, thereby



forming plane beam members 46 between adjacent pontoons. The ends of the beams terminate in forty-five (45) degree inclined edges which are suitably fastened to a side wall 36 of a pontoon 33. As seen in Figure 3, five (5) triangular-shaped building units 21a are shown joined together to form the beam member 46 between pontoons 33. If the bridge is to support greater weight, the pontoons may be positioned closer together by using shorter length beams 46 made by employing only three triangular-shaped building units 21a in each beam member 46, for example. The number of triangular-shaped members 21a used to form a beam 46 is, obviously, not restricted to five (5), as shown.

A roadway surface is formed by a plurality of large rectangular-shaped plate members 47 supported upon, and suitably attached to, the pontoons and the beam members 46 between pontoons. The adjacent plate members 47 are joined together in an abutting edgewise manner to form a level roadway surface. Side walls, or safety-rail members 48, are attached to the side edges of the plate members 47 and extend vertically upwardly therefrom. Added support for the vertical side walls 48 is provided by transverse, and vertically positioned, supporting members 49 fastened to the upper-most side wall 36 of the pontoons 33, and to the outside face of the side walls 48. The supporting members 49 may comprise triangular-shaped members 21a of the type used in the construction of the ends 32 and beams 46.

After the bridge is assembled, it may be anchored in place by the use of lines 51 suitably secured at one end to the hook eyes 39 at the end of the rod members 38. The other end of the lines 51 are suitably fastened under the water, as to a post 52 driven into the ground, as seen in Figure 5.

The pontoon bridge is made of building units which are easily assembled. The connection, or joints, between building units may be formed in the manner described above for use in the building 10 shown in Figures 1 and 2; or any other suitable joint construction may be used. The component parts of the bridge are preferably shipped to the site in disassembled condition.

The bridge of our invention is not confined to use on water as illustrated in the drawings. It will be understood that the bridge is also suited for use in marshland and mire, thereby providing a smooth roadway over the adverse land conditions.

Reference is now made to Figure 6 of the drawings wherein there is shown a vertical sectional view of a building structure 53 erected upon an ice mass 54. The building structure 53 is a modified form of structure which utilizes only a portion of the novel octagonal-shaped construction of our invention in the side walls thereof. The building structure includes a double-thickness floor 56 made of a plurality of square-shaped building units 13 of the type used in the construction of the building 10, shown in Figures 1 and 2, and described above. The floor is made of six (6) of the square-shaped units in length and may be made of any suitable width. The lower layer of the double-thickness floor 56 is provided with teeth members 57 which extend in both longitudinal directions of the building, thereby preventing longitudinal movement of the building on the ice mass 54. A pair of vertically extending side walls 58 (only one of which is visible in the sectional view of Figure 6) are attached to the longitudinal edge of the floor 56. The side walls 58 are made of a plurality of triangular-shaped building units, designated 21 and 21c through 21i, of the type used in the construction of the building 10 shown in Figures 1 and 2, and described above. The building units 21 and 21c through 21i are of identical construction, but are provided with different reference characters for purposes of discussion and identification. It will be noted that the building units designated 21c through 21g, at opposite ends of the building, are connected together to form a portion, or part, of an octagonal-shaped struc-

ture; the octagonal, or partially octagonal structure being common to all of the buildings of our invention.

Beginning adjacent the ends of the building, the triangular-shaped building units 21c are attached to the floor 56 along one short-length side of the unit. End walls 59, which may comprise one or more square-shaped units 13, are attached to the vertical short-length side of the units 21c. One short-length side of the building units 21d is fastened to the long diagonal side of the units 21c whereby the other short-length side of the units 21d provide inclined roof supporting portions for the support of inclined roof portions 61. The inclined roof portions 61 may also be made of one or more square-shaped building units 13. One short-length side of the building units 21e is fastened to the long diagonal side of the units 21d whereby the other short-length side of the units 21e provide a portion of a support for a flat-top roof, designated 62; the roof 62 comprising a plurality of square-shaped building units 13 positioned a spaced distance apart. One short-length side of the building units 21f is fastened to the long diagonal side of the units 21e. A triangular-shaped building unit 21h connects the two building units 21f; the two short-length sides of the building unit 21h being fastened to the other short-length sides of the units 21f. One short-length side of the building units 21g is fastened to the long diagonal side of the units 21f, and the other short-length sides thereof are fastened together along the vertical center of the side wall 58 on a line designated 63. It will be seen, then, that the building units 21c through 21g, at each end of the building form portions of octagonal-shaped upwardly arched structures, which structures are incorporated in the side walls 58 of the building. The side walls are completed by the use of triangular-shaped members 21i fastened along their long diagonal sides to the long diagonal sides of the units 21g. Sliding doors, designated 19, each comprising a pair of building units 21 fastened together along their long diagonal sides, are mounted for longitudinal movement adjacent the side walls 58; the door 19 to the left in Figure 6 being shown in an open position; and the door 19 to the right being shown in a closed position.

Additional support is provided to the building by means of interior bulkheads 64 fastened between the side walls 58 adjacent the roof 62. Vertically sliding doors 66 are slidably mounted on the bulkheads 64.

As mentioned above, the roof 62 of the building comprises a plurality of spaced units 13. The spaces between the roof units 13 may be covered over by use of units 13' slidably mounted on the flat-top roof portion. The units 13' may be slid away from the openings in the roof thereby providing ventilation means through the roof.

The building 53 is provided with a second floor level designated 67, and comprising building units 13 suitably joined together, and to the side walls 58. Ladders 68 provide access to the second floor from the floor 56. The second floor level 67 also adds support to the building.

Storage units, designated generally 69, are provided at each end of the building 53. The storage units comprise triangular-shaped side wall members 21 fastened to the end walls 59. The said walls are provided with an inclined storage unit roof 71 pivotally attached to the end wall 59. Canvas members 72 may be used to complete the storage unit enclosure. Supplies, designated 73, are shown in the storage units.

Having now described our invention in detail in accordance with the patent statutes, various changes and modifications will suggest themselves to those skilled in this art, and it is intended that such changes and modifications shall fall within the spirit and scope of the invention as recited in the following claims.

We claim:

1. A component of a building structure comprising, a plurality of plane right isosceles triangular-shaped build-



ing units joined together in an edgewise abutting manner in the form of an open octagonal-shape, one short-length side of each of the said triangular-shaped building units forming one outer peripheral edge of the said component, and a portion of the long diagonal side of each of the said triangular-shaped building units forming an inner peripheral edge thereof.

2. An octagonal-shaped building structure comprising: a floor and a roof which are of substantially identical construction and each comprising a plurality of plane right isosceles triangular-shaped building units joined together in an open octagonal shape, the said building units in both the said floor and roof being connected together in an edgewise abutting manner whereby one short-length side of each of the said building units forms an outer peripheral edge of the said floor and roof; and side wall members connected between the outer peripheral edge of the said floor and roof.

3. The invention as recited in claim 2 including a pair of plane right isosceles triangular-shaped building units slidably mounted on the said roof and forming sliding cover members over the opening therein, the said sliding cover members being slidable in parallel paths and adapted to abut along adjacent edges in the closed position thereof.

4. A building structure comprising; a floor and roof of substantially identical construction, each comprising a plurality of plane right isosceles triangular-shaped building units joined together in an open octagonal shape in a manner wherein one short-length side of each of the said triangular-shaped building units forms an outer peripheral edge of the said floor and roof, a portion of the long-diagonal side of each of the said triangular-shaped building units forming an inner edge of the said floor and roof, and side wall members connected between the outer peripheral edge of the said floor and roof.

5. A building structure, comprising: a floor, a roof and a plurality of intermediate floors spaced between the said lower floor and roof, the said lower floor, intermediate floors and roof being of substantially identical construction and each comprising eight (8) plane right isosceles triangular-shaped building units of uniform size joined together in an octagonal-shaped manner wherein one short-length side of each of the said triangular-shaped building units forms an outer peripheral edge thereof; building side walls, the said side walls comprising a plurality of plane square-shaped building units, the length of the sides being substantially equal to the short length side of the said triangular-shaped building units, the said square-shaped building units being connected adjacent the edges thereof to the outer peripheral edges of the said floors and roof.

6. A building structure having a floor member, a pair of vertical side walls extending upwardly from the said floor member at opposite sides thereof, and a roof member interconnecting the said side walls over the said floor member, the said side walls comprising a plurality of plane right isosceles triangular-shaped building units joined together in an edgewise abutting manner in an open upwardly extending arch shape, a portion of the long diagonal side of a plurality of the said triangular-shaped building units forming a doorway in the said side walls.

7. The invention as recited in claim 6 including door members made of a pair of plane right isosceles triangular-shaped building units joined together in an abutting relation along their long diagonal edges, and means slidably mounting the said door members on the said wall

members for closure of the said doorway in the said side walls.

8. A building structure comprising a floor member; a pair of vertically extending side walls attached to the said floor member adjacent the edges thereof, the said side walls each comprising a plurality of plane right isosceles triangular-shaped building units joined together in an edgewise abutting manner and forming a pair of upwardly arched structures, the building units in each of the said arched structures being joined together wherein one short-length side abuts the long diagonal side of the adjacent triangular-shaped building unit, the said pair of arched structures in each side wall being joined together along a vertically extending edge; and means forming a roof over the said floor member between the said side walls.

9. The invention as recited in claim 8 wherein the said upwardly-arched structures form doorways; and including doors slidably mounted on the said wall members for closure of the said doorways.

10. A pontoon for use in a pontoon bridge comprising: a pair of spaced end members of substantially identical construction, each of the said end members comprising a plurality of plane right isosceles triangular-shaped units joined together in an edgewise abutting manner in the form of an open octagonal-shape, one short-length side of each of the said triangular-shaped units forming one outer peripheral edge of the said end members; elongated side members extending between the said outer peripheral edges of the said end members; and plane end cap members adjacent the end members and covering the openings in the said open octagonal-shaped end members.

11. The invention as recited in claim 10 including means forming holes through the said end cap members; rod members extending through the said holes, turnbuckle means threadedly coupling the said rod members together within the said pontoon; means forming a seal between the said rod members and end cap members adjacent the holes therein; and hook eye members on the outer ends of the said rod members, the hook eye members being of greater dimension than the said holes in the end caps.

12. A pontoon bridge comprising: a plurality of pontoon members positioned a spaced distance apart, each of the said pontoon members comprising a pair of spaced end members, the said end members including a plurality of plane right isosceles triangular-shaped units joined together in the form of a plane open octagonal shape, end cap members covering the openings in the said open octagonal-shaped end members, elongated side members fastened between the outer peripheral edge of the said end members; elongated plane vertical beam members fastened to the said pontoon side members thereby connecting adjacent pontoon members together, each beam member comprising a plurality of plane right isosceles triangular-shaped units joined together along adjacent short-length sides thereof; and rectangular plate members supported upon the said pontoons and interconnecting beam members, the said plate members forming a roadway thereon.

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