J. D. WAERN.

METAL BUILDING UNIT.

APPLICATION FILED OCT. 7, 1919.

1,336,324.

Patented Apr. 6, 1920.

2 SHEETS—SHEET 1.

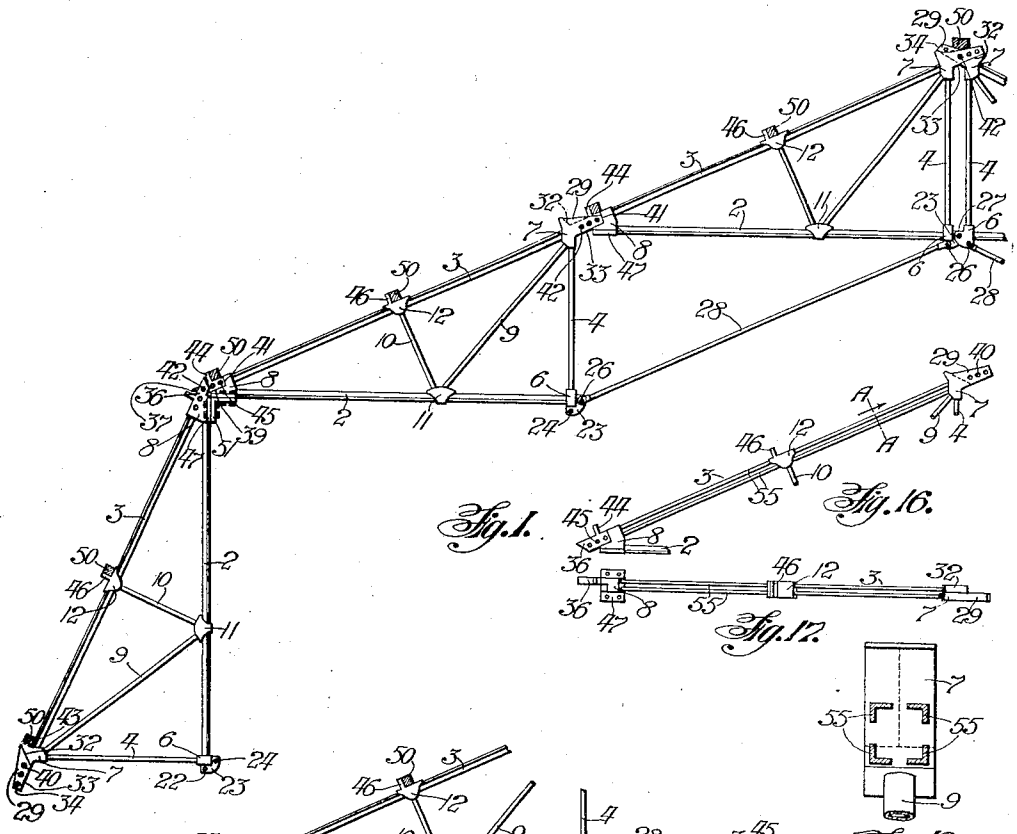


Fig. 1.

Fig. 16.

Fig. 17.

Fig. 18.

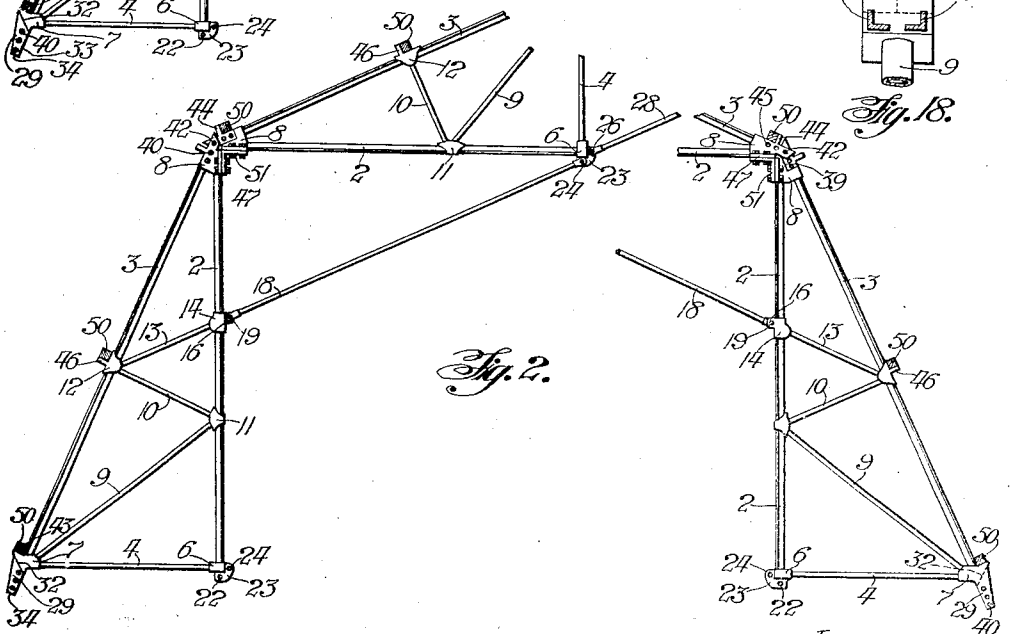


Fig. 2.

Inventor
J. D. Waern
by
Attorney

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2 SHEETS—SHEET 2.

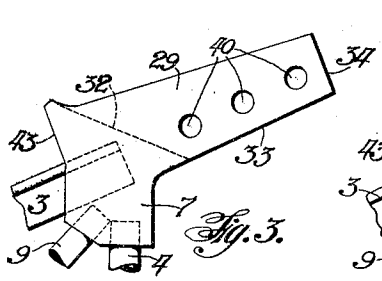


Fig. 3.

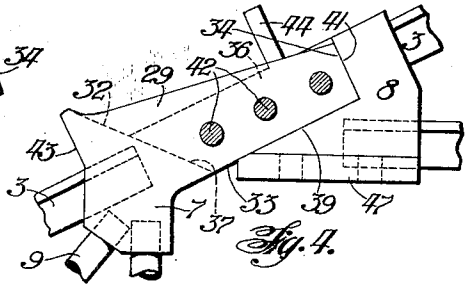


Fig. 4.

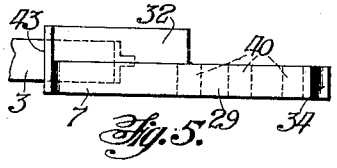


Fig. 5.

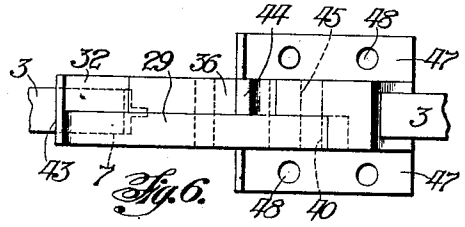


Fig. 6.

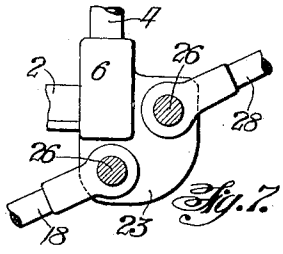


Fig. 7.

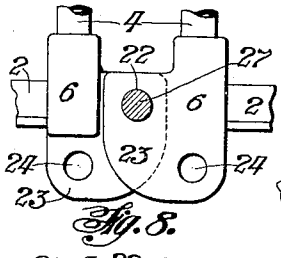


Fig. 8.

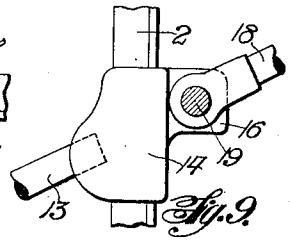


Fig. 9.

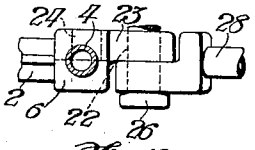


Fig. 10.

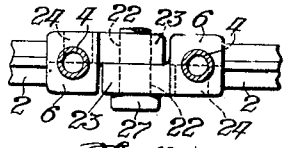


Fig. 11.

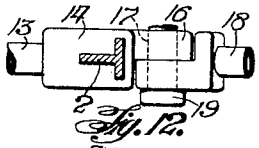


Fig. 12.

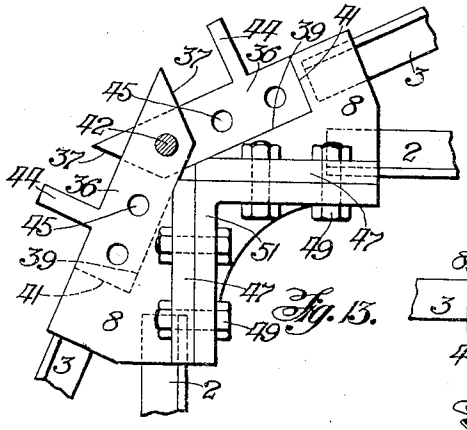


Fig. 13.

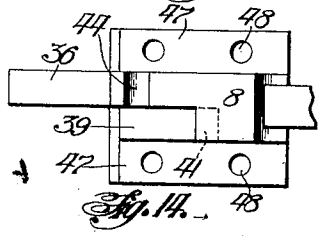


Fig. 14.

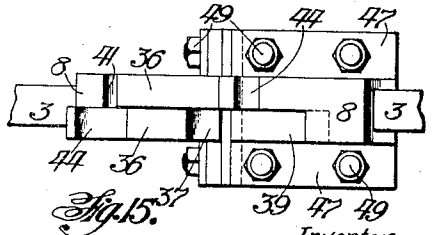


Fig. 15.

Inventor
J. D. Waern
by
Attorney

UNITED STATES PATENT OFFICE.

JAMES DICKSON WAERN, OF SOUTH MELBOURNE, VICTORIA, AUSTRALIA.

METAL BUILDING UNIT.

1,336,324. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed October 7, 1919. Serial No. 329,045.

To all whom it may concern:

Be it known that I, JAMES DICKSON WAERN, a subject of the King of Sweden, and a resident of the city of South Melbourne, a suburb of the city of Melbourne, in the county of Bourke, State of Victoria, Commonwealth of Australia, (whose post-office address is corner of City Road and Cecil street, in the said city of South Melbourne,) have invented certain new and useful Improvements in and Connected with Metal Building Units, of which the following is a specification.

This invention relates to the known type of standardized metal building unit consisting of a triangular metal frame which may be used in various different positions in a building structure whereby a series of such units may be readily fitted together to form a complete wall and roof framework. Such units are particularly adapted for the rapid and economical erection of sheds, industrial buildings and like structures, and are usually provided with jointing or connecting plates which are riveted or similarly attached to the corners of the triangular frame to permit of a series of the units being bolted together to form a complete structure.

The primary object of the present invention is to provide a standardized building unit of the above general type, in which special cast metal junction pieces are cast onto the corners of the triangular frame for the purposes of uniting the side members thereof and connecting the corners of a series of the units together. Castings are also used to secure the ends of the internal stays of the triangular frame to its side members thus forming a strong and efficient unit at low cost. The junction pieces are moreover specially shaped to provide a strong and effective interengaging joint between the corners of adjoining units, and means are also provided on the unit for supporting the longitudinal purlins or rafters to which the walls and roof of a building are attached.

Referring to the drawings which form part of this specification:—

Figure 1 is a view of portion of a complete wall and roof framework constructed in accordance with the invention.

Fig. 2 shows the two sides of a complete wall and roof framework in which the lower units forming the wall frames are of slightly modified construction and additional tie rods are employed.

Fig. 3 is an enlarged detail view of a junction piece which is located at the major acute angle of the unit.

Fig. 4 is an enlarged detail view showing the junction piece seen in Fig. 3 engaged with a minor acute angle junction piece of another unit.

Fig. 5 is a plan of Fig. 3.

Fig. 6 is a plan of Fig. 4.

Fig. 7 is a detail view of a right angle junction piece disposed at the third corner of the triangular unit. The ends of tie rods are also shown connected to the junction piece.

Fig. 8 shows two of the junction pieces seen in Fig. 7 connected together.

Fig. 9 is a detail view of a connecting piece which may be attached to one side of the unit to receive the end of a tie rod.

Fig. 10 is a plan of Fig. 7.

Fig. 11 is a plan of Fig. 8.

Fig. 12 is a plan of Fig. 9.

Fig. 13 shows two of the minor acute angle junction pieces joined together with a right angle corner piece.

Fig. 14 is a plan of the minor acute angle junction piece.

Fig. 15 is a plan of Fig. 13.

Fig. 16 shows a modification in which the second side member is formed of a series of angle iron bars instead of a single bar.

Fig. 17 is a plan of Fig. 16.

Fig. 18 is an enlarged section on line A—A of Fig. 16.

The invention includes a triangular metal frame having a first side member 2, a second side member 3 and a third side member 4, said members being constructed preferably of wrought iron or steel of desired lengths. The side members 2 and 3 are preferably of T section and the member 4 of tubular section as shown, but metal of other suitable cross section may obviously be employed.

The side members of the unit are united by a right angle junction piece 6, a major acute angle junction piece 7 and a minor acute angle junction piece 8. Said junction pieces are cast onto the ends of the side members preferably by the chill casting process, the ends of the side members being placed in the metal molds after being assembled in their proper relative positions.

Extending across the interior of the triangular frame are first and second diagonal

stays 9 and 10 which are attached to the frame members 2 and 3 by chill castings at 11 and 12 respectively. A third stay 13 may also be employed as seen in Fig. 2, this stay being attached to the side member 2 by a connecting piece 14 which is cast onto the member 2 and is provided with a lug 16 to receive the lower end of a tie rod 18. Said lug is provided with a pin hole 17 to accommodate a pin 19, whereby the end of the tie rod is held in place as seen in Figs. 9 and 12.

The right angle junction piece 6 is provided with a lug 23 having pin holes 22 and 24. Pins 26 are adapted to connect the ends of tie rods 28 and the upper ends of the tie rods 18 to the right angle junction pieces, while a pin 27 is adapted to connect two of said right angle junction pieces together where they meet at the upper part of the structure as seen in Figs. 1 and 8.

The major acute angle junction piece 7 is provided with a projecting coupling cheek 29 which is offset to one side of the triangular frame as seen in Figs. 5 and 6. The junction piece 7 is stepped or recessed at the inner or abutting side of the cheek 29 thereby forming a shoulder having an inclined thrust surface 32. The cheek 29 has a lower face 33 which is disposed parallel to the side member 3 or the hypotenuse of the triangle, and is adapted to engage either the inclined thrust surface 32 or the surface 39 (hereinafter described) of an adjoining unit. The cheek 29 is also provided with an end face 34 disposed at right angles to the face 33 and adapted to engage the face 41, (hereinafter described) of an adjoining unit.

The minor acute angle junction piece 8 is provided with a coupling cheek 36 which is off-set from the plane of the triangular frame members 2, 3 and 4 in an opposite direction to that of the cheek 29. The cheek 36 is provided with an inclined end face 37 which is disposed parallel to and is adapted to engage the thrust surface 32 of an adjoining unit as seen in Figs. 1 and 4. The junction piece 8 is stepped or recessed on the inner or abutting face of the cheek 36 thereby forming a shoulder having an upper face 39 which is parallel to the side member 3 and is adapted to engage the face 33 of an adjoining unit as before mentioned and as seen in Figs. 1 and 4. Said shoulder is also provided with a thrust face 41 disposed at right angles to the face 39 and adapted to engage the end face 34 of an adjoining unit as seen in Figs. 1 and 4.

Formed through the coupling cheeks 29 and 36 are coinciding bolt holes 40 and 45 respectively to accommodate holding bolts 42 by which the abutting cheeks of adjoining units are coupled together as shown.

The junction pieces 7 and 8 are provided with outstanding purlin supports 43 and 44 respectively. Another purlin support 46 outstands from the casting 12 near the middle of the side member 3 as shown. These purlin supports are adapted to carry the wooden purlins or rafters 50 to which the walls and roof of the building are attached.

The minor acute angle junction piece 8 is also provided with flanges 47 which project at both sides of the triangular frame and are provided with bolt holes 48 to accommodate bolts 49 by which they are secured to a right angle corner piece 51 as seen in Figs. 1 and 13.

It will be seen from the foregoing that the major and minor acute angle junction pieces are each adapted to interengage with the corresponding junction piece and also the other acute angle junction piece of an adjoining unit, so that a series of the units may be assembled and fitted together as in Figs. 1 and 2. The right angle junction pieces 6 are adapted to receive the tie bars 28 and 18 and also interengage with each other at the center of the roof structure as seen clearly in Figs. 1 and 8.

The tie rods 18 are preferably employed as in Fig. 2 in which case the two lowermost units forming the wall frames may be of larger dimensions than the upper units so that a sufficiently high wall may be formed. In such cases the additional stays 13 and castings 14 are introduced to connect with the tie rods 18 as shown. On the other hand the building frame may be formed of a series of identical units as seen in Fig. 1 in which case the tie rods 18 may be omitted.

In Figs. 16 to 18 a modification particularly suitable for large units is shown. In this case the second side member 3 of the frame is composed of a series of angle iron bars 55 arranged to form the four corners of a rectangle as clearly seen in Fig. 18. These bars pass through the intermediate casting 12 and their ends extend to a suitable distance inside the junction pieces 7 and 8. Preferably the ends of the two bars which are in line with the coupling cheeks 29 and 36 extend some distance into said cheeks above and below the bolt holes 40, 45. The cheeks are thus effectively reinforced by the ends of the bars.

The invention provides a cheap, strong and effective standardized building unit and a building frame which may be readily assembled and also dismantled in a minimum of time and without specially skilled labor.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A building unit consisting of a triangular metal frame having two acute angle junction pieces, one of which is provided with a projecting coupling cheek hav-

ing a lower face and an end face at right angles to said lower face, a shoulder projecting from the inner or abutting face of said cheek and having an inclined thrust surface, the other junction piece having a coupling cheek which is provided with an end face disposed parallel to said inclined thrust surface, a shoulder projecting from the inner or abutting side of the latter cheek, and having an upper face disposed parallel to said lower face and a thrust face parallel to said end face of the first mentioned cheek for the purpose set forth.

2. A building unit consisting of a triangular metal frame forming a major and a minor acute angle, said frame having angle junction pieces having coupling cheeks through which are formed coinciding bolt holes, said cheeks being off-set toward opposite sides of said frame and shoulders projecting in opposite directions from the inner or abutting sides of said cheeks and a right angle junction piece secured to the third corner of said frame, said right angle junction piece having an integral projecting lug through which pin holes are formed for the purpose specified.

3. A junction piece for frame sections of a building unit, comprising members to be secured to such frame sections, each member being formed with relatively offset portions adapted to interfit in the connection of said members, each member having shoulders to relatively position said members and take up the end thrust of said frame sections.

4. A building unit comprising a triangular metal frame having at two of its corners acute angle junction pieces each of which is secured to the adjoining ends of the side members of said frame and is shaped to receive the corresponding junction piece shaped to receive both the corresponding junction piece and the other acute angle junction piece of another of said units, a right angle junction piece secured to the adjoining ends of the side members at the third corner of the frame said right angle junction piece having means to receive the end of a tie bar and to interengage with the corresponding junction piece of an adjoining unit, and a connecting piece secured to one of said side members intermediate its ends, said connecting piece being adapted to receive one end of a tie rod for the purpose set forth.

5. A building unit comprising a triangular metal frame having at two of its corners acute angle junction pieces each of which is secured to the adjoining ends of the side members of said frame and is shaped to receive the corresponding junction piece of another of said units, a right angle junction piece secured to the adjoining ends of the side members at the third corner of the frame said right angle junction piece having means to receive the end of a tie bar and to interengage with the corresponding junction piece of an adjoining unit, diagonal stays extending between said side members, means uniting said stays to the side members and outstanding purlin supports formed integral with the acute angle junction pieces and one of said stay uniting means for the purpose set forth.

6. A building unit consisting of a triangular metal frame having two acute angle junction pieces one of which is provided with a projecting coupling cheek having a lower face and an end face at right angles to said lower face, a shoulder projecting from the inner or abutting face of said cheek and having an inclined thrust surface, the other junction piece having a coupling cheek which is provided with an end face disposed parallel to said inclined thrust surface, a shoulder projecting from the inner or abutting side of the latter cheek, and having an upper face disposed parallel to said lower face and a thrust face parallel to said end face of the first mentioned cheek, flanges projecting sidewardly from said acute angle junction pieces and a right angle junction piece attached to the third corner of the frame, and having an outstanding lug and pin holes through said lug substantially as described.

7. A building unit consisting of a triangular metal frame having two acute angle junction pieces, one of which is provided with a projecting coupling cheek having a lower face and an end face at right angles to said lower face, a shoulder projecting from the inner or abutting face of said cheek and having an inclined thrust surface, the other junction piece having a coupling cheek which is provided with an end face disposed parallel to said inclined thrust surface, a shoulder projecting from the inner or abutting side of the latter cheek, and having an upper face disposed parallel to said lower face and a thrust face parallel to said end face of the first mentioned cheek, purlin supports formed integral with said acute angle junction pieces and projecting outward substantially at right angles to the hypotenuse of the triangle and a right angle junction piece secured to the third corner of the frame and having transverse pin holes therein.

8. A metal building unit comprising first, second and third side members which form a triangular frame, said second side member constituting the hypotenuse of the triangle and being composed of a series of angle iron bars arranged to form the four corners of a rectangle, major and minor acute angle junction pieces secured to the ends of said bars and uniting them to the adjoining ends of the first and third side members, said junction pieces being provided with coupling cheeks which are offset toward oppo-

site sides of said frame and shoulders projecting in opposite directions from the inner or abutting sides of said cheeks, a member embracing said angle iron bars intermediate their ends and a right angle junction piece secured to the adjoining ends of the first and third side members, and having an outstanding lug and pin holes through said lug for the purpose set forth.

9. A junction piece for frame sections of a building unit, comprising members to be secured to such frame sections, each member being formed with relatively offset portions adapted to interfit in the connection of said members, each member having shoulders to relatively position said members and take up the end thrust of said frame sections, and purlin supports projecting from each of said members.

In testimony whereof I affix my signature.

JAMES DICKSON WAERN.

Witness:
CECIL W. J. CLESTREER.