

Sept. 22, 1936.

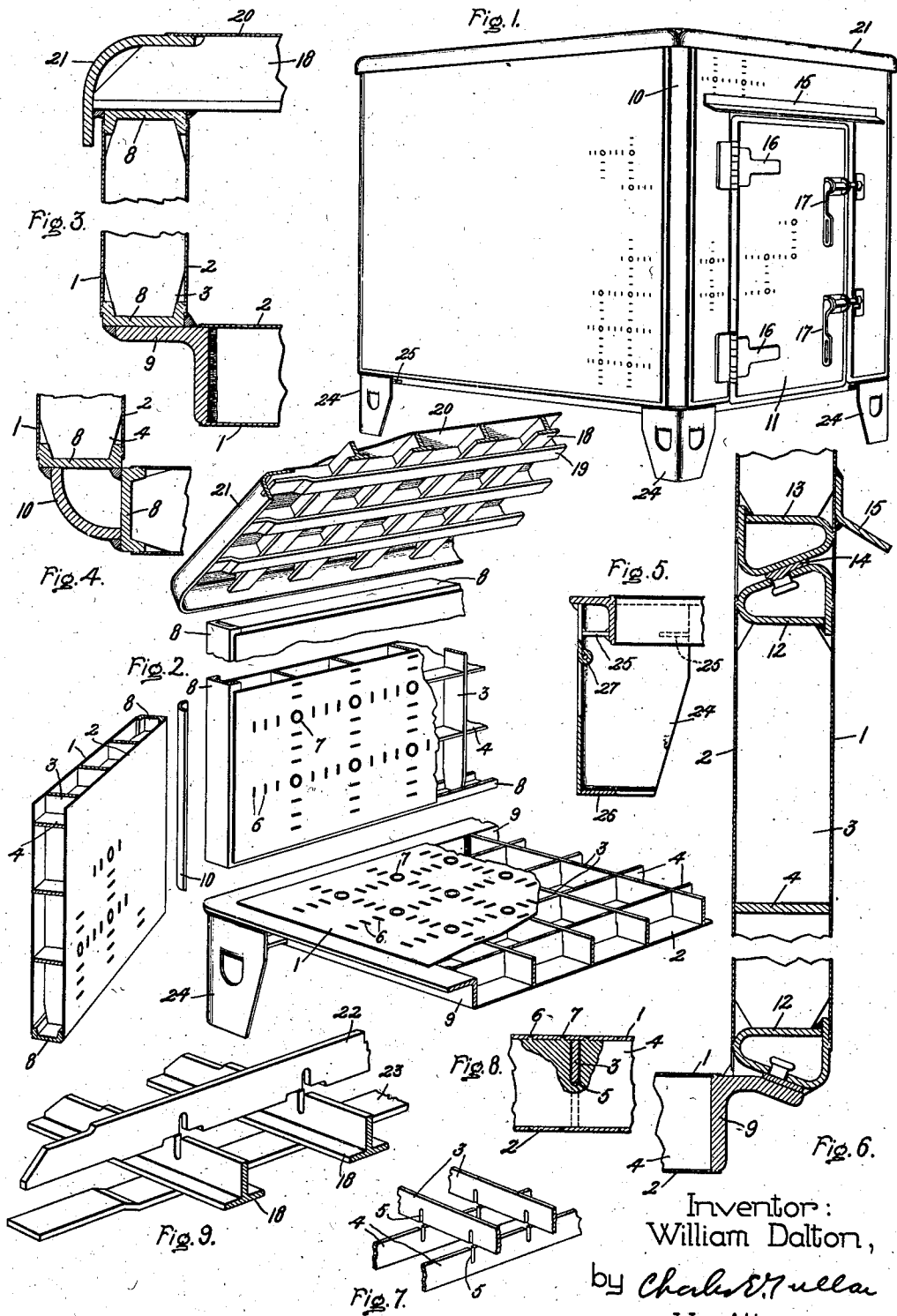
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FABRICATED STRUCTURE

Filed April 1, 1933

2 Sheets-Sheet 1



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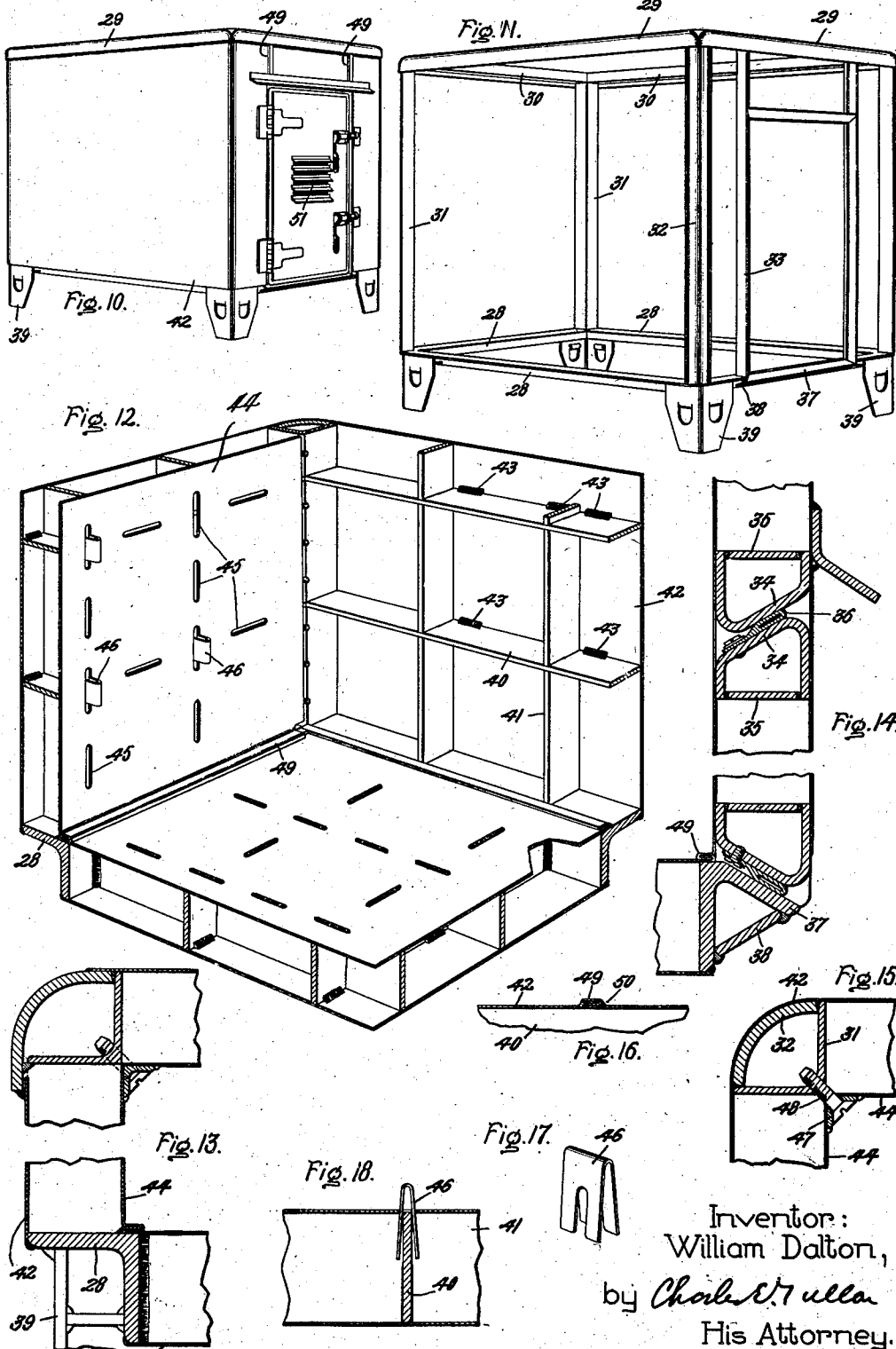
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## FABRICATED STRUCTURE

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2 Claims. (Cl. 220—83)

My invention relates to fabricated structures.

It is an object of my invention to provide structures whose strength for a given weight of material is greatly increased by reason of the arrangement of parts employed.

It is a further object of my invention to provide a slab or panel construction having more strength per pound of material than such constructions have had heretofore.

Further objects of my invention will become apparent from a consideration of the constructions illustrated in the accompanying drawings in which I have illustrated my invention as applied to containers used for transporting merchandise by rail or truck which are commonly referred to as less than carload lot containers.

Fig. 1 shows a perspective view of such a container, and Figs. 2 to 9 inclusive show details of its construction. Fig. 2 is an exploded view with parts broken away showing the construction of the container; Fig. 3 is a sectional view of a wall of the container illustrating its attachment to the roof and floor; Fig. 4 is a sectional view illustrating the corner construction between adjacent side walls; Fig. 5 is a sectional view of a foot of the container; Fig. 6 is a sectional view of the side wall of the container in which the door is located; Figs. 7 and 8 show details of the panels employed, and Fig. 9 shows in detail the construction of the grid forming part of the roof of the container.

Fig. 10 shows a container of modified construction embodying my invention, the details of which are illustrated in Figs. 11 to 18 inclusive. Fig. 11 is a view of the framework of the container; Fig. 12 is a sectional view showing the method of assembly; Fig. 13 is a sectional view of a side wall of the container; Fig. 14 is a sectional view of the side wall of the container including the door; Fig. 15 is a sectional view illustrating the corner construction employed; Fig. 16 is a view illustrating the manner of joining the sheets; Fig. 17 illustrates a positioning clip several of which are shown in Fig. 12, and Fig. 18 illustrates its manner of use.

The walls and floor of the container illustrated in Fig. 1 are formed of cellular panels the edges of which are closed by members constituting the framework of the container. These panels comprise spaced imperforate sheets 1 and 2 attached by welding to the opposite sides of a grid formed of strips 3 and 4. As shown in Fig. 7 this grid is formed by the assembly of transverse and longitudinally disposed strips 3 and 4 which are slotted at 5 to accommodate their intersection and permit the edges of the strips to lie flush with one another.

The strips 3 and 4 constitute stiffening ribs for the sheets 1 and 2 and the structure formed of these sheets and strips although light in weight is remarkably strong both laterally and longitudinally and free from plate weaknesses.

When the panels are assembled by resistance welding, this operation is facilitated by providing the sheets 1 and 2 with a plurality of projections 6 and 7 which have an arrangement corresponding to that of the strips in the grid. It will be noted that the strips are welded to the plates at their points of intersection to strengthen the strips which would otherwise be weakened by slots 5. Alternately the strips may be provided with projections. These projections are employed for localizing the flow of welding current thus facilitating the welding operation. The welding operation may also be facilitated by inserting a sheet of paper between each of the sheets 1 and 2, and the grid formed of strips 3 and 4 prior to the welding operation. The paper should initially insulate each of the sheets from the grid, except where the welding operation is begun.

The edges of the wall panels are closed by channels 8, and the edges of the floor panel are closed by angles 9. The flanges of the channels 8 are turned inwardly and welded to the sheets 1 and 2. One leg of the angles 9 is welded to each of the sheets 1 and 2, and the other leg extends outwardly to form a support for the side walls of the container. The end-portions of the strips 3 and 4 of the grid structure should be welded to the channels 8 and 9. The welding is most conveniently performed by the metallic arc process although other methods of gas or arc welding may be employed.

The side walls of the container are supported on and welded to the extending legs of the angles 9 forming part of the floor of the container, and are welded to one another by welding the channels 8 to one another directly and through the agency of quarter round sections 10 which are welded to each of these channels. This construction is illustrated in Fig. 4.

One of the walls of the container is provided with a door 11. This door is of the same cellular construction as the floor and side panels and comprises sheets 1 and 2 connected by intersecting interlocking strips 3 and 4 whose edges are integrally united throughout their lengths to the sheets 1 and 2. The edges of the door panel are formed of a strip of metal 12 bent into a triangularly shaped section the edges of which are welded together. The frame of the door is likewise formed of a strip of metal 13

bent into a triangularly shaped section the edges of which are welded together. The triangular sections formed by the strips 12 and 13 are so shaped as to form complementary bevels, and one of these parts preferably the door is provided with a flexible gasket 14 rendering the connection between the door and its frame weather proof when the door is closed. A deflector 15 located above the door is also provided for preventing rain or condensed moisture from running into the joint between the door and its frame. The door is also provided with hinges 16 and latches 17. The angle member 9 forming the edge of the floor panel at the door may be deformed in order to form a bevel complementary to the level on the door as illustrated in Fig. 6 in which case the door frame formed of strip 13 will extend only about the top and sides of the door.

The roof of the container comprises a grid of T-shaped ribs 18 and 19 covered by a sheet 20. The heads or cross-pieces of the ribs 18 and 19 are located on the same side of the grid and the sheet 20 is attached to the other side thereof. The edges of the roof sheet may be rounded or formed by rounded sheets 21 the depending edges of which extend over the top edges of the walls of the container and are spaced therefrom a sufficient distance to form a vent for the container. The roof structure when constructed as illustrated forms a spacing member and buffer for adjoining containers which may be loaded on the same truck or car. The roof grid may be made as illustrated in Fig. 9. As there illustrated, one set of rib members 18 is of T cross-section, and the other set of ribs 19 of Fig. 2 is formed of strips 22 and 23. The ribs 18 and strips 22 are notched so that the strips 22 and 23 may be assembled to form a grid of T-shaped ribs.

The container may be provided with legs having the construction illustrated. These legs are formed of a bent sheet of metal 24 which is attached to the flanges 9 forming part of the floor panel of the containers. Braces 25 are provided for strengthening the attachment of these legs to the container. A metallic insert 26 may be provided at the foot of each leg in order to increase its bearing surfaces. A portion of the metal of the leg may be cut away and bent upon itself as at 27 to form a reinforcement at the opening produced thereby which may be used for accommodating lifting hooks by means of which the container may be transported from place to place as the occasion may require. By providing the container with supporting legs a lift truck may be run under the container and handling operations thus greatly facilitated.

Where part of the welding operations are performed by the resistance welding method it is often necessary to provide machines that are large and expensive because of their size. The panel construction of my invention may be completely assembled by fusion welding operations and the container shown in Figs. 10 to 18 of the drawings has been made of panels which can be assembled by fusion welding which entails only the use of hand-tools. Either gas or arc welding may be employed. I prefer to use metallic arc welding. This container also embodies characteristic novel features which distinguishes it from a container of the construction shown in Figs. 1 to 9 inclusive.

In manufacturing the container shown in Figs. 10 to 18 inclusive, a framework such as illus-

trated in Fig. 11 is first constructed. The base frame of this framework is composed of angles 28 and the top frame of rounded sections 29 and angles 30 welded together at their edges to form a hollow structure as shown in Fig. 13. The top and bottom frames are connected at their corners by posts formed by the assembly of angles 31 and quarter round sections 32 which are welded together at their edges to form a hollow structure as shown in Fig. 15. The top and bottom frames and posts are welded together to form the framework. The door frame 33 is formed, as shown in Fig. 14 of sheets 34 bent into the form of a channel which is closed by sheet 35 welded thereto. The framework of the door is of like construction, and the channels formed of sheets 33 have complementary beveled surfaces between which a weather-tight joint is obtained by means of a flexible gasket 36 which is preferably attached to the beveled surface of the door. The outwardly extending leg of the base angle at the door may be bent downwardly to form a complementary bevel to that of the door as illustrated at 37 in Fig. 14. The angle may be strengthened by a sheet 38 welded between its legs to form a hollow structural member. The framework is provided with legs 39 having a construction like that shown in Fig. 5. These legs may be attached to the base of the framework in like manner to that described 30 above, and such attachment is shown in Figs. 10, 11 and 13.

The container is completed by hollow cellular slabs or panels the edges of which are attached in the above framework. The panels preferably comprise a plurality of spaced metallic sheets connected by a plurality of intersecting interlocking metallic strips whose edges are integrally united throughout their length by fusion welding to said sheets. In order to strengthen the interlocking strips they are preferably joined to the cover plates at their points of intersection. Additional joints may be made between these points of intersection if the construction of the container requires this. In order that the welding operation may be performed by fusion welding apparatus, the parts are assembled as follows: A grid formed of intersecting strips 40 and 41 is supported on an imperforate sheet 42 and welded at points 43 throughout their length. The number and size of the welds 43 is determined by the shear strains that will be encountered in the use of the structure. The grid is then covered by a perforated sheet 44 in which the perforations have the same arrangement as the arrangements of the strips 40 and 41 in the grid which they form. The number of perforations depends on the shear strains to which the assembly is subjected. They may be of any suitable size and shape. The perforations 45 in the sheet 44 are held in registry with the strips 40 and 41 by means of clips 46. The construction of these clips is shown in Fig. 17, and their cooperation with the parts illustrated in the sectional view of Fig. 18. Referring to these figures it will be noted that the clip comprises a bent strip of metal the end-portion of which are slotted so that the clip may straddle the grid strips at their points of intersection. The sheet 44 is attached to the strips of the grid by depositing metal on the grid and in the perforations. The clips 46 are withdrawn from the perforations 45 as the welding operation proceeds. The floor panel illustrated in Fig. 12 illustrates the completed panel structure, and the side walls of this figure illustrate

the panel in the above recited stages of construction.

The side walls of the container may be formed of sheets 42 of sufficient length to form an exterior wall for more than one side of the framework and a plurality of grid structures separated from one another to accommodate the wall members of the framework which may be integrally united to the inside surface of the sheet in the manner described above. The sheet 42 may then be wrapped about the vertical posts of the framework and attached thereto by clamping the edges of the inner walls 44 by angles 47 which are attached to the vertical posts by screws 48. The edges of these angles may also be welded to the sheets 44. This construction is shown in Fig. 15. Like means are provided for positioning the roof in the frame formed of angles 29 and rounded sections 30, as illustrated in Fig. 13.

The adjacent edges of sheets forming the inner walls of the container may be joined by a lock seam 49, as illustrated in Figs. 12, 13 and 14, and a plurality of sheets may be joined by like seams, as illustrated in Fig. 16, in order to form a sheet 42 of sufficient length to completely cover the sides of the framework in forming the exterior walls of the container. As illustrated in Fig. 16 the lock seams 49 may be strengthened by welds 50. These welds may be continuous or discontinuous as required.

The roof and floor panels are of cellular construction and may be fabricated in the same manner as the side walls. The outside wall will not, however, extend beyond the edges of the top and bottom frames. The base angles 28 are used to close the edges of the floor panel as described above in connection with the container of Figs. 1 to 9 inclusive.

The container just described is conveniently ventilated by providing suitable openings 51 in its door, although ventilating openings may be provided in any wall of the container.

The floors of the containers are preferably surfaced with rubber or other suitable wear-resisting materials which may be periodically replaced when destroyed through wear or disintegration. In large containers this floor covering is desirable in that it facilitates loading operations by furnishing a suitable footing for the workmen who are engaged in loading the container.

The intersecting strips and cover plates of my improved panel form when integrally united a plurality of intersecting H-sections or beams, in which the longitudinal and transverse beams mutually stiffen and strengthen the resulting structure. The plates form the flanges of the H-sections and the grid strips form the webs of the sections. By attaching the intersecting strips at their points of intersection to the cover plates by joints that bridge the slots, the weakened condition of the strips due to the slots therein is eliminated. A panel of my construction may be made of equal strength both laterally and longitudinally, and by reason of the cross rib construction is also free from plate weaknesses between parallel ribs.

It is to be noted that the interior walls of the container of my construction are smooth imperforate walls which facilitate the maximum storage of articles for a given size of container. The exterior walls are also smooth and imperforate and facilitate handling operations since the containers will not engage one another in

locking relation when moved relative to one another as is the case of containers in which the side walls have been strengthened by ribs and have protruding rivets or bolts.

By reason of the construction employed the weight of the container is greatly reduced. A container of standard size, 7 feet by 9 feet by 8 feet, having a construction such as illustrated in Figs. 10 to 18 weighs approximately 2,400 pounds. A container of like size constructed by previously proposed methods weighs approximately 3,000 pounds. The decrease in weight of the container obtained by applicant's method of construction is of importance since it enables greater pay-loads to be carried without increasing the size of the equipment.

Hollow slabs or panels constructed in accordance with my invention are capable of many uses. For example, they may be used as freight car ends, freight car doors, floors, ship's hatches, fire doors, partitions, airplane wings and the like. Slabs or panels constructed in accordance with my invention have more strength per pound of material than any now in use. The strength of the panel is greatest when the cells are cubical. It is not necessary, however, to use such a construction since the desired strength may usually be obtained with non-cubical cells. It is not necessary that the strips of the grid intersect one another at right angles as in the constructions illustrated and described above, since these strips may intersect one another in any desired manner to form prismatic cells so long as the edges of the strips are integrally united throughout their length to the sheets which form the ends of the cells. Although welding has been specifically referred to above for joining the parts into an integral structure, it is to be understood that other means such as soldering or brazing may be employed to accomplish the same result. The cells may be filled with fireproof or insulating material whenever such a construction is desired.

While I have shown and described several embodiments of my invention, it is to be understood that other embodiments thereof may be made without departing from my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A container the side walls and floor of which are formed of cellular panels the edges of which are closed by members which are attached to one another to form the framework of said container and the roof of which comprises a plurality of intersecting T-irons having the cross-pieces of each T-iron located on the same side of the grid formed thereby and on the inside of said container and a cover sheet attached to the opposite side of said grid throughout the length of each of said T-irons, said cover sheet having down-turned edge portions and said roof being attached to said framework and being of sufficient size that the down-turned edges of said cover sheet extend beyond the side walls of said container to form a vent for said container and act as a spacer and buffer for adjacently positioned containers of like construction.

2. A metallic structure comprising a plurality of intersecting T-irons having the cross-pieces of each T-iron located on the same side of the grid, and a sheet integrally attached to the opposite side of said grid throughout the length of each of said T-irons.

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