

May 3, 1938.

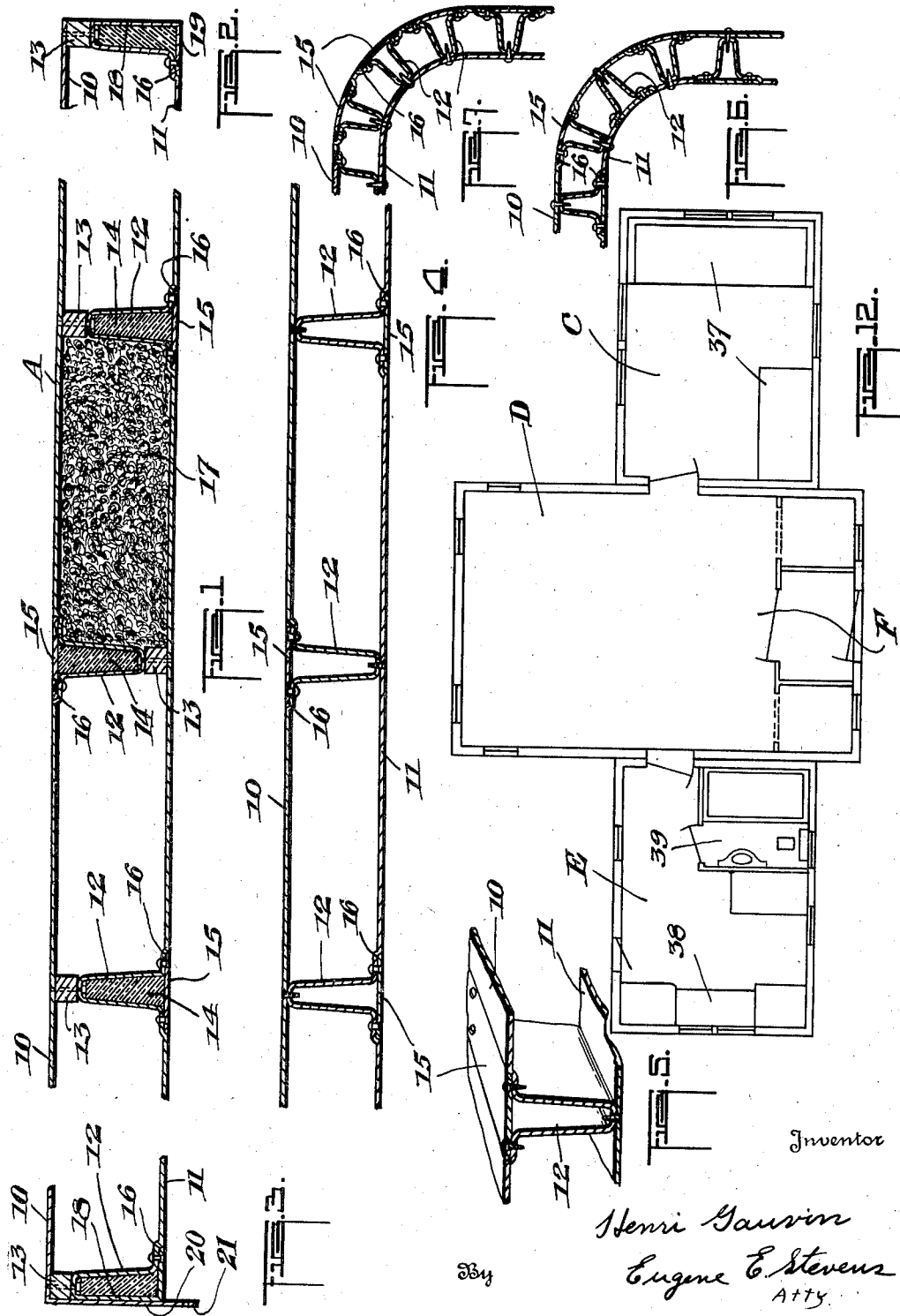
H. GAUVIN

2,116,021

BUILDING CONSTRUCTION

Original Filed Jan. 25, 1937

2 Sheets-Sheet 1



Inventor

Henri Gauvin  
Eugene E. Stevens  
Atty.

May 3, 1938.

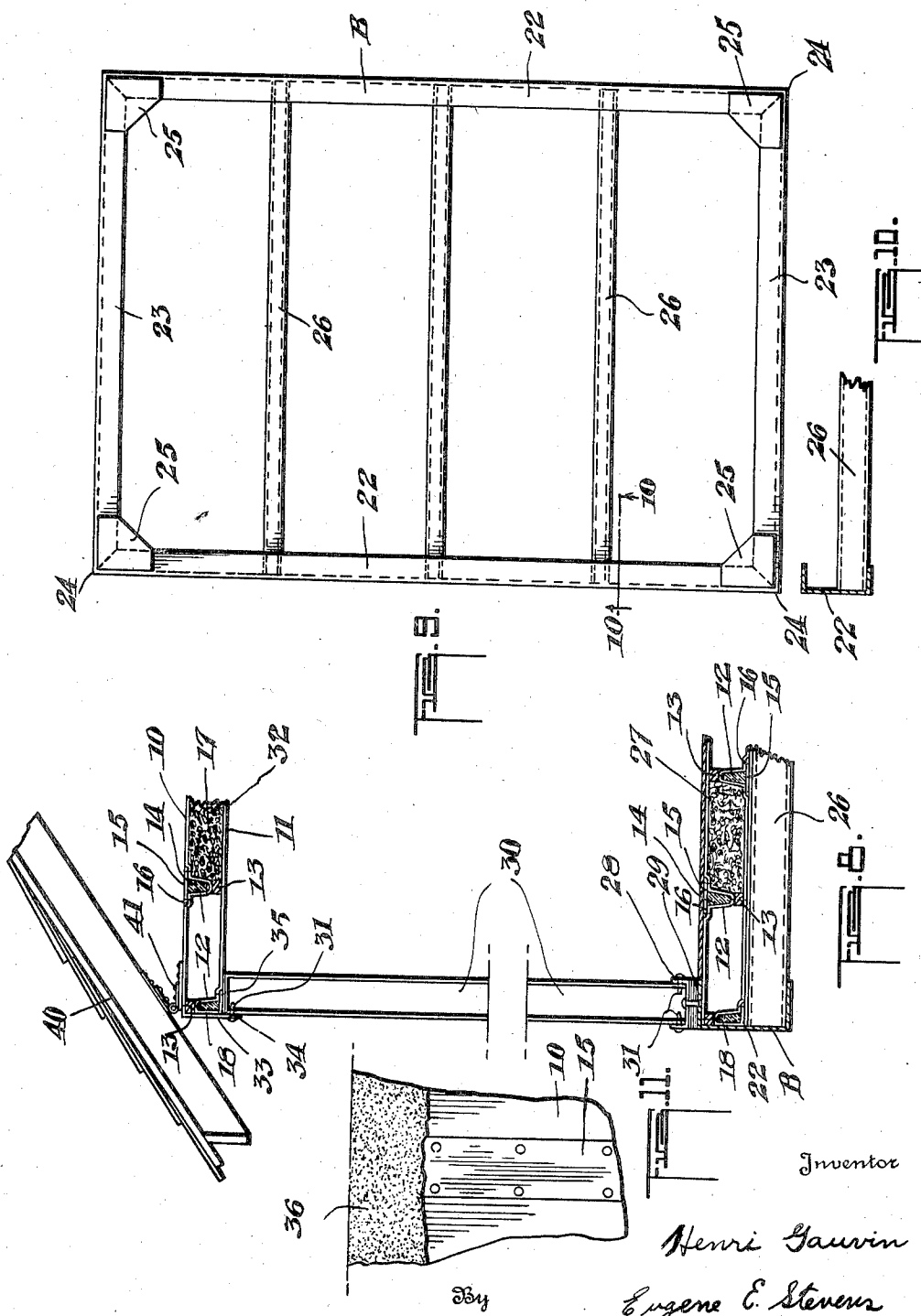
H. GAUVIN

2,116,021

BUILDING CONSTRUCTION

Original Filed Jan. 25, 1937

2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

2,116,021

## BUILDING CONSTRUCTION

Henri Gauvin, Ottawa, Ontario, Canada

Original application January 25, 1937, Serial No. 122,303. Divided and this application June 16, 1937, Serial No. 148,599

## 3 Claims. (Cl. 189—1)

This invention relates to building construction and is a division of my co-pending application Serial No. 122,303, filed January 25, 1937.

It has been the practice over the past number of years to provide steel parts for houses, buildings and the like wherein the various parts making up the constructions are pre-fabricated in the factories, labelled and sent in knocked-down condition to the site where the parts are erected to provide the desired type of construction.

While this provides for a relatively strong construction which may or may not be erected more quickly than ordinary constructions, it still provides for a great deal of work in erecting the framework of joists, studs and the like and the application of various elements for completing and insulating the structure requiring representatives of the various building trades. Moreover, in a construction of this type to produce a strong, well constructed and insulated building, the cost is necessarily high.

According to the present invention, and preferably through the use of a new type of building element through which strong unitary and insulated walls may be produced, it is possible to manufacture houses, buildings and the like resulting in strong durable and attractive structures at a low cost, as for instance, substantially half the cost of comparable structures at present produced. This is made possible through the use of uniform building elements which may be connected and arranged in units according to the present invention to form variable types of building structures with a minimum amount of labour.

The elements involved preferably consist of pairs of steel sheets with reinforcing ribs in between connected with each sheet to form a double walled unit, the ribs being preferably pressed from each sheet and connected to the opposite sheet when the element is formed and preferably a filling of insulating material is disposed between the sheets and ribs.

The elements employed may be fabricated in the factory in quantity, the construction being such that strong durable insulating elements are provided in general production at comparatively low cost, all of the elements being preferably uniform in character and suitable for use as wall, floor, or ceiling units whereby houses or other building construction can readily be made. The structure is so designed that these elements can be easily put together in the factory, in units such as individual rooms, by any suitable method such as welding, riveting, bolts or screws to provide a strong, durable construction which may be trans-

ported bodily in a completed state to the site where the building is to stand, each unit being based by a suitable chassis and requiring but a simple joining operation to unite the units together to form a building made up of a number of rooms, if a multiple room structure is desired.

The invention will be clearly understood through a consideration of the detailed construction as described in the following specification and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a fragmentary transverse section taken through a preferred form of the building element according to the present invention.

Figure 2 is a fragmentary sectional view of the manner in which the end of the element may be sealed.

Figure 3 is a fragmentary sectional view of another manner in which the element may be sealed.

Figure 4 is a similar view taken through an alternative form of construction.

Figure 5 is a fragmentary sectional perspective of the type of construction illustrated in Figure 2.

Figure 6 is a fragmentary sectional detail of a rounded or curved element.

Figure 7 is a similar view to Figure 4 showing alternative construction of this character.

Figure 8 is a fragmentary sectional elevation of a house construction involving the building element according to the present invention, illustrating a manner in which the sections may be united together to form a house section or the like.

Figure 9 is a plan view of a preferred form of chassis upon which the building construction may be mounted.

Figure 10 is a fragmentary section taken through the line 10—10 of Figure 9.

Figure 11 is a fragmentary elevation of part of a building element according to the present invention showing the manner in which its surface may be coated to provide an interior finish as desired, and

Figure 12 is a plan of a three-unit house constructed to form a multiple room house, according to the present invention.

Referring to the drawings, and particularly to Figure 1, A indicates a general construction of building element according to the present invention, which comprises opposed sheets 10 and 11 preferably of steel from which integral reinforcing ribs 12 have been pressed. According to the preferred form of construction, the ribs are integral and are disposed so that they will be in

staggered relation with the ribs of the opposite sheet when they are positioned in opposed relation to be assembled into a complete building element.

5 The ribs are preferably uniformly spaced apart along each sheet any suitable distance from one another according to the strength desired. For instance, they might be spaced apart on each sheet a distance of, say, two feet so that in the  
10 completed element, having regard to the ribs of both sheets arranged in staggered relation, there will be reinforcing ribs spaced one foot apart throughout the width of the complete element.

The sheets 10 and 11 formed with the ribs are  
15 united together to form an element, and in the case of an insulated element, insulating strips 13 made from any suitable insulating material, such as wood, asbestos, building board, etc., are positioned between the end of each rib and the oppo-  
20 site sheet, the ribs of each sheet being constructed of a suitable depth so as to provide a desired thickness of building element when the insulating strips 13 are positioned as described. The ends of the ribs are then secured to the opposite sheet  
25 with the insulating material 13 interposed, the securing means being of any suitable character such as rivets, screws, bolts or the like. Assuming, for instance, that bolts are employed, they might be projected from the sheet through the  
30 insulating material and through the end of the rib so that the screw-threaded end projects within the hollow interior of the rib. Nuts are then applied so that the opposed sheets are securely connected together as a unit. Insulating material  
35 14 of any suitable character, such as rock wool, cork, etc. is then introduced to the hollow interior of the ribs 12 and the open mouth of the ribs is then closed by sealing plate 15 which may be secured in position in any suitable manner, such  
40 as by screws, bolts, rivets or welding. In this connection it will be noted that each sheet 10 or 11 is formed with a shallow depression 16 on each side of the open mouth of the rib, the depression being of a depth to correspond with the width  
45 of the sealing plate 15 so that when the latter is placed in position its outer surface lies flush with the outer surface of the sheet on which it is disposed, thus forming in the finished product a continuous smooth surface.

50 Suitable insulating material 17 such as rock wool, cork or the like is disposed between the sheets in any suitable manner, as for instance, filled in after the sheets have been united together, or disposed on one sheet prior to uniting  
55 the other sheet to it, so that as a result a strong, durable insulated building element is produced which can be manufactured economically in production and is light in comparison with other types of wall construction of corresponding area  
60 and depth. The sheet employed may be as thin as 20-gauge, which due to the general construction of the element is reinforced to provide as strong a construction as required.

The ends of the elements may be sealed if  
65 desired in various ways. Two different ways are illustrated in Figs. 2 and 3. In the case of Fig. 2, the end may be formed with a flat surface 18 and bent inwardly as at 19 so that the free edge of the metal lies in the end depression 16. In the  
70 case of Fig. 3 a similar construction is employed but in addition the sheet 10 is formed longer than sheet so that it may be bent to provide an end sealing plate 20 with a projecting skirt 21 if de-  
75 sired to overlap with other elements in building construction.

It will be realized that the element produced is thoroughly insulated having regard to the filling of insulating material 14 in the ribs and 17 between the sheets, while the positioning of the insulating strips 13 between the ends of the ribs  
5 and the opposite sheet prevents the transmission of any small degree of heat or cold that might be transmitted from the ribs to the opposite sheet, as in the case where the ribs were connected in direct contact with the opposite sheet.  
10

It is possible, of course, to provide an insulated construction wherein the interior of the element is not filled with insulating material, as for instance, the interior of one or both sheets making  
15 up the building element may be sheeted with insulating material to produce satisfactory results. It is also possible to produce a strong and durable structure of this nature without pressing the ribs from the sheets but by interposing ribs preferably of this general construction between the  
20 sheets and securing them to each sheet, although such a construction is not as desirable and as simple to manufacture.

In Fig. 4 there is illustrated an alternative construction preferably employed where insulation  
25 is not desired, although good insulating properties can also be obtained in this type of element. According to the construction in Fig. 4, the sheets 10 and 11 are formed with integral ribs 12 disposed so that ribs from opposite sheets occur al-  
30 ternatively throughout the width of the element, the ends of the ribs being directly connected to the opposite sheet, as clearly illustrated and the open mouth of the ribs being closed by a sealing plate 15 as previously described. In Fig. 4, the  
35 plates 15 are shown as riveted, whereas the ends of the ribs are shown connected to the opposite plate by means of metal screws, it being realized of course, that the construction lends itself to securing means of various characters throughout,  
40 as desired.

In Fig. 5 the plates 15 are shown connected by metal screws, while the ends of the ribs are shown  
45 connected to the opposite sheet by means of metal screws, this being a very simple manner of obtaining a very strong and simple connection.

In Figs. 6 and 7 curved construction is illustrated. In Fig. 6 the ribs are shown projected from each sheet disposed alternately with respect  
50 to each other, whereas in Fig. 7 the ribs project from one sheet only and their ends are connected to the opposite sheet. It will be realized that these types of building element, while very particularly adapted for house construction and the like may also be employed for other purposes  
55 such as construction of storage tanks where a strong body is required and in which insulating properties may also be desired. It is also adaptable to the construction of truck tanks whether or not an insulated body is required, while it is  
60 also very applicable to automobile trailer construction, etc. and it lends itself to suitable interior and exterior finishes as will be described hereinafter.

A salient feature of the invention consists in  
65 the assembly of building elements of this character to form building units and the production of buildings made up of said units. The preferred form of this general construction is illustrated in Figs. 8 to 12 wherein a series of uniform building  
70 elements comprising the floor, walls and ceiling united together to provide a weatherproof, durable, easily constructed building or unit thereof is illustrated.

In addition to the building elements described, 75

there is provided for building construction such as houses or units thereof, a chassis B which is preferably made up of a strong, durable frame having marginal channel beams 22 and 23, the ends of which are mitred and welded or otherwise secured together as at 24 with brace plates 25 secured at the points of union. Extending across the framework, lying upon one flange of the channel members 22 and spaced apart from one another are steel box beams or the like 26 which are secured in position by welding or the like, it being noted particularly from Fig. 10 that the channel beams 22 and 23 are of such a depth that the depth of the box beams 26 is only substantially one-half that of the channels, thereby providing a space between the top of the box beams and the underside of the top flange of the channel beams substantially equal to the depth of the box beams and equal to the thickness of the building element of the character described. Consequently, one or more of said elements as desired may be disposed to lie upon the box beams 26 so that the edges of said element or elements are engaged by the channel beams, as illustrated for instance in Fig. 8, thus providing a firm floor for the building or building unit, constructed in a simple manner.

An important factor in respect to the preferred type of construction is that the building or building units making up the building are formed according to predetermined standard dimensions so that one whole building element forms the floor, one for each of the walls and one for the ceiling. Thus, a unitary small building may be easily formed while, in the case of a building made up of a series of units forming multiple rooms, the units are of the same size and may be fabricated completely in the factory so that the finished unitary building or the units to make a larger building can then be readily transported to the building site on trucks or the like. It is therefore proposed to describe the construction having this in view, it being realized, however, that, if desired, the elements may be employed in any number to make up the desired construction.

Referring particularly to Fig. 8, it will be realized that with the floor element 27 mounted on its chassis B, the wall sections may then be mounted and according to the preferred construction the channel member 28 is riveted or otherwise secured to the upper flange of each channel 22 or 23, as the case may be, of the chassis with insulating material, such as a pad of felt impregnated with asphalt or the like 29 interposed between to break the steel to steel contact. The wall elements 30 are then mounted, the lower edges thereof being disposed within the channel of the channel beam 28 with suitable securing means, such as metal screws or the like 31 being projected through the flanges of the channel into the wall elements. The ceiling element 32 is then mounted. This may be so constructed, if desired to provide for a skirt 33 comprising an extension of the upper sheet of the element which is bent down to overlap the wall elements 30, the skirt being secured in any suitable way, such as at 34 to the wall elements, while an intermediate layer of insulating material as indicated at 35 such as asphalt impregnated felt, is positioned between the ends of the wall elements and the abutting surface of the ceiling element. On the other hand, it is apparent that instead of employing an overlapping skirt other facing means for the joint may be employed, such

as separate L or T beams, whereas union may be effected along the joints by welding very readily.

By employing and uniting elements of this character, therefore, certain of which have been formed with openings to provide for any doors and windows that may be required, a strong, compact and insulated house or house unit may be produced in the factory in a very simple manner, and at the same time provided with any suitable finish desired. For instance, preferably after the elements have been united to form small buildings or building units, the walls may be sprayed with metal, for instance, to produce a type of finish desired. For example, as shown in Fig. 11, a substantially roughcast interior finish such as indicated at 36 may be provided through metal spraying, and it will be realized that the sealing plates are immediately covered to provide a wall of decorative and uniform appearance, while at the same time by employing a metal spray, the building or building unit is reinforced, as such a spray coat would have a welding effect. On the other hand, the structure lends itself readily to enamel coating which might preferably be employed in kitchen sections, bathrooms and the like. As a matter of fact, such coatings are equally applicable to the outside of structure so as to produce an extremely weather-proof finish that will not readily deteriorate.

After each unit is completed, the floor may be covered with a suitable covering such as a durable linoleum which might be conveniently laid in usual manner by means of a cementing agent such as a hot asphalt.

A typical form of house constructed according to the invention is illustrated in Fig. 12 wherein uniform house units are illustrated at C, D, E, and F. These units are constructed in the factory in a manner such as described and transported bodily to the site for assembly of the complete house as shown. For instance, unit C has its interior walls finished as desired, such as by spraying, painting and the like and provided with bunks or the like 37 if desired. Unit D and unit F are finished interiorly in an identical manner and are adapted to be joined together to form one large unit to provide a living room. In this connection, the open side of the units D and F may be fitted with a suitable, light, skeleton framework for the purposes of bracing the structure during transport, the framework being readily removed when the two sections are to be joined together.

Each of the units C, D, E, and F are wired completely in the factory for the necessary electric outlets and fixtures, and unit E is in addition provided with the necessary plumbing fixtures to accommodate the sink 38 and the bathroom 39 which is disposed within section E and partitioned off in a suitable manner. The kitchen and bathroom housed in section E may readily be finished with porcelain in well known manner in the factory.

In uniting the sections together on the site where the house is to stand, the sections may be mounted in any suitable manner, such as by mounting them on a prepared foundation, if this is desired, mounting them on posts or pillars or disposing them in level arrangement on the ground. In this connection the outer surface of the floor element 27 and the chassis may be coated with a suitable cementitious waterproofing compound such as asphalt or the like which may be conveniently applied if desired during the manufacture of the units by tipping up the floor and

chassis when assembled and spraying the base. Thus, the base is readily protected from deterioration. The units when brought to the site and placed in position are then secured together in a very simple manner, such as by bolting, welding or the like, requiring but a minimum number of workers, an insulating padding or the like being disposed between all joints to eliminate metal to metal contact, where this is found desirable.

The exterior of the sections are either surfaced with suitable finishing material in the factory, such as a metal spray finish, porcelain finish or the like, and the joints when the sections are assembled, may be similarly coated, or on the other hand the exterior may take place, if desired, after the sections have been assembled together, so that a completely weatherproof, highly insulated, clean, up-to-date construction is provided. If, in addition, particularly for the purpose of appearance, it is desired a roof illustrated in Fig. 8 may be supplied and readily mounted on the top of the section such as by hinges 41. Such a roof would preferably be constructed from hollow metal elements such as illustrated in Fig. 4, insulation not being required, whereas the exterior finish of the roof might merely be the outer metal sheets of such elements which could be suitably coated, sprayed or the like or have applied thereto a shingle simulating structure, if desired.

A construction of this character lends itself to many varying types of house structure, as the units may be variously arranged and the buyer may from time to time readily add to his house by obtaining additional sections to be joined to the structure already obtained. Moreover, it will be apparent that the structure is one which can be moved from place to place without a great deal of difficulty, as the units would only have to be disconnected and transported to any site, the work required for securing the units together being of minor character. It will be apparent also that a structure of this character, due to the type of construction employed, will withstand the most severe usage and severest kind of weather.

It is of course manifest that the structure produced is fireproof in addition to being compact and strong. Moreover, it will be realized that the structure can be completely factory built along similar lines as the manufacture of automobiles, thus to fill a long-felt need, namely, a low priced, respectable dwelling for the workman of low

means. The structure also is very suitable for summer cottages and camps.

Various modifications may be made in this invention without departing from the spirit thereof or the scope of the claims, and therefore the exact forms shown are to be taken as illustrative only and not in a limiting sense, and it is desired that only such limitations shall be placed thereon as are disclosed in the prior art or are set forth in the accompanying claims.

What I claim is:

1. In building construction, a building unit comprising a metal chassis having marginal channel beams and a plurality of cross beams carried thereby, said channel beams projecting above said cross beams, a floor composed of spaced apart metal sheets with reinforcing members disposed therebetween and secured to said sheets, supported on said cross beams, the marginal edges of said floor being housed within the projecting portions of the channel beams, a plurality of walls of corresponding construction to the floor mounted on the upper face of the channel beams, a ceiling of corresponding construction to the walls and floor supported on the upper edges of the walls and secured thereto and means for rendering the joints effected by the walls, floor and ceiling, weatherproof.

2. A device as claimed in claim 1 in which one of the sheets of the ceiling is extended beyond the edges of the other sheet and bent down to project past said other sheet in the form of a depending skirt, said skirt overlapping the walls of the unit and forming a means through which the ceiling is connected to the walls of the unit.

3. In building construction, a building unit comprising a metal chassis having marginal channel beams and a plurality of cross beams carried thereby, said channel beams projecting above said cross beams, a floor composed of spaced apart metal sheets with reinforcing members disposed therebetween and secured to said sheets, supported on said cross beams, the marginal edges of said floor being housed within the projecting portions of the channel beams, secondary channel beams mounted on the first mentioned channel beams, a plurality of walls of corresponding construction to the floor mounted in the secondary channel beams, a ceiling of corresponding construction to the walls and floor supported on the upper edges of the walls and secured thereto in weatherproof relation.

HENRI GAUVIN.