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King et al.

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[54] **FLOOR FRAME STRUCTURE**

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[52] **U.S. Cl.** ..... **280/106,** 296/28 F

[51] **Int. Cl.** **B62d 21/00**

[58] **Field of Search** 280/106

[56] **References Cited**

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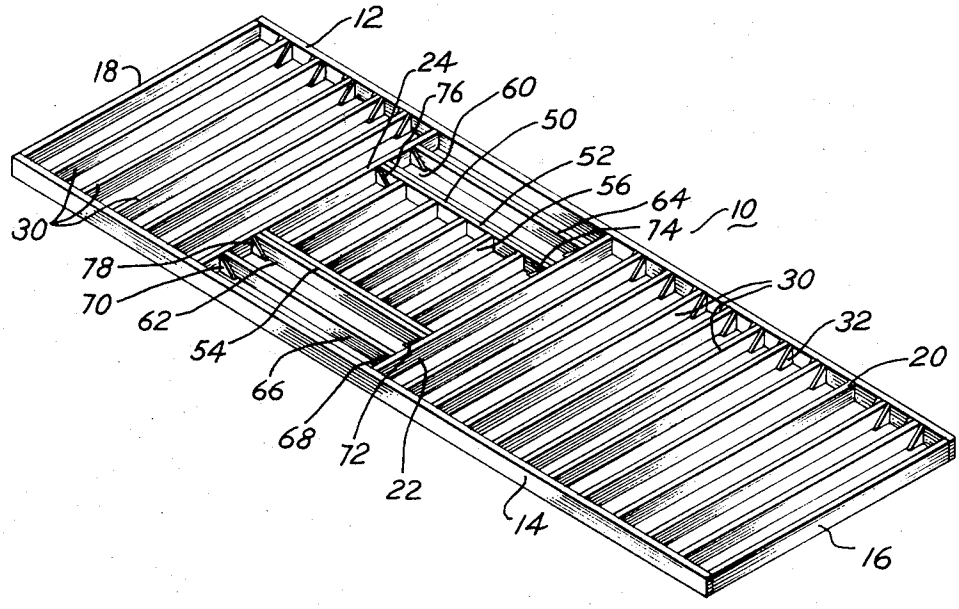
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[57] **ABSTRACT**

A floor frame structure for mobile or modular homes, trailers, and similar buildings, having a section constructed of steel perimeter side members and front and rear cross members and intermediate cross members. The perimeter and intermediate cross members contain hangers for receiving wooden joists inserted in the steel frame section when the building structure is constructed. The members between said cross members are so positioned as to form pockets for wheels of the vehicle.

8 Claims, 5 Drawing Figures



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SHEET 1 OF 2

Fig. 1

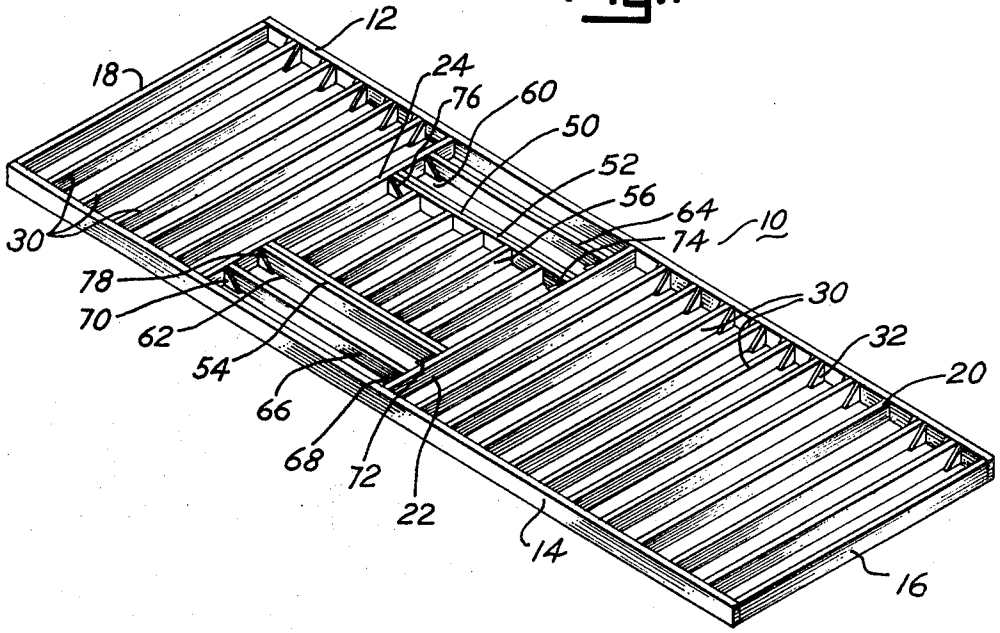
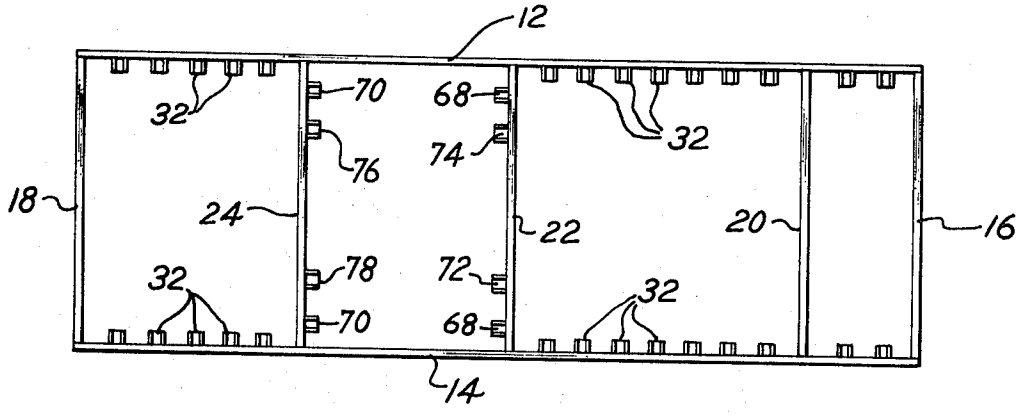
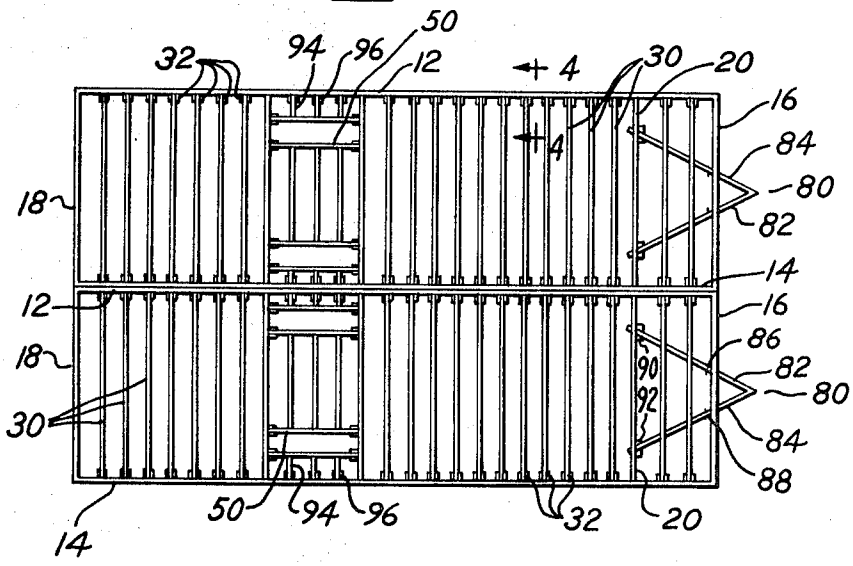


Fig. 2



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Fig. 3



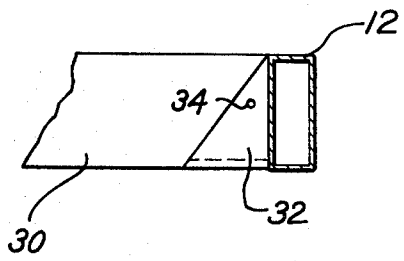


Fig. 4

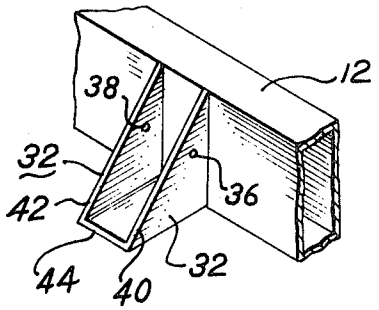


Fig. 5

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FLOOR FRAME STRUCTURE

Mobile and modular homes are normally constructed at one location and transported over the highway to another location where they are often permanently installed on pillars or on a complete foundation. Since homes are subjected to substantial strain while being transported over the highway or otherwise being moved, these portable homes use a floor structure of steel members, including two side perimeter beams and a series of steel cross members interconnecting the two perimeter members forming a rigid structure to which the floor and walls are secured. While this conventional type of construction is satisfactory for the floor structure, it is relatively expensive, heavy, and difficult to adapt to variations in home design, and lacks the versatility of conventional wooden sill and joist structures of a conventional frame house. The wooden sill construction, however, is unsatisfactory for mobile and modular homes in that the homes are too long to utilize wooden structural members in a single piece, and the composite wooden structural members are too heavy and bulky for use in the portable home structures. It is therefore one of the principal objects of the present invention to provide a floor frame structure for mobile and modular homes, and similar structures, in which the perimeter beams and several cross members are constructed of steel and joined together to form a rigid structure, and in which most of the cross members are wood and are inserted between the longitudinal perimeter beams in spaced relation to one another.

Since steel floor frames for mobile and modular homes and trailers are fabricated from structural steel members by welding and/or riveting in one location, and are transported on the highway to customers at other locations, a sturdy but light weight basic floor structure is particularly advantageous in transporting and handling the frames, and is generally more economical to produce and deliver to the customer. It is therefore an additional object to provide a strong floor frame which utilizes steel where its strength and length are necessary for the required rigidity and ruggedness, and which is so constructed and designed that wooden cross members and other structural parts can be readily inserted in the steel frame structure at the places where the mobile or modular homes are constructed.

Another object of the invention is to provide a simple, versatile, and economical floor frame construction which can be used in and efficiently adapted to a variety of different types of building structures, and which lends itself to rapid production practices and to different types of building uses.

Further objects and advantages of the present floor frame structure will become apparent from the following description and accompanying drawings, wherein:

FIG. 1 is a perspective view of a completed floor frame structure embodying the present invention;

FIG. 2 is a top plan view of a basic portion of the floor frame structure shown in FIG. 1;

FIG. 3 is a top plan view of the floor frame structure of the type illustrated in the preceding figures, showing the use of two of the floor frame structures in combination in a modular home;

FIG. 4 is a fragmentary cross sectional view of the floor frame structure, the second being taken on line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary perspective view of a portion of the frame structure, similar to that shown in FIG. 4.

Referring more specifically to the drawings, numeral 10 indicates generally a floor frame structure embodying the present invention, the structure illustrated being intended for use in either a mobile or modular home and normally being twelve to fourteen feet wide and forty to seventy feed long. The structure involving the present invention is readily adaptable to floor structures for a variety of different types of mobile and modular homes, trailers, campers, and the like.

The basic frame structure consists of two side perimeter beams 12 and 14 and front and rear perimeter beams 16 and 18, the four perimeter beams preferably being formed of tubular members of rectangular cross section, and joined to one another by welding at the four corners of the frame. In the particular embodiment of the invention illustrated in the drawings, three intermediate cross members 20, 22, and 24 are interposed in the frame between the two side perimeter beams and are joined thereto by welding, and are likewise preferably formed of tubular material of rectangular cross section. These cross members may be of the same size as the perimeter beams; however, normally they would be somewhat smaller in horizontal thickness. The four perimeter beams and the three cross members when welded form a rigid basic steel frame which is sufficiently strong to maintain its structure while being transported from one location to another and being used in the construction of a mobile or modular home or the like.

In the use of the basic metal structure, cross members or joists 30 are inserted between the two perimeter beams 12 and 14 in spaced relation to one another, and between and parallel with the steel cross members 16, 20, and 22 and cross members 18 and 24. The wooden cross members are supported at each end on hangers 32, each consisting of a sheet or plate metal pocket-like structure secured by welding at its vertical edge to the inside surface of the perimeter beams. These hangers are open at the top, thus permitting the precut cross members to be dropped into place between two respective hangers on the opposite side perimeter beams. While the wooden cross members 30 will remain in place in the hangers, they are preferably secured therein by one or more nails or screws 34 extending through holes 36 and 38 in the sides 40 and 42, respectively, of the hangers, the two sides being connected to one another by a bottom plate 44 formed integrally with the two sides of the hanger.

Most of the joists extend transverse with respect to the frame, and since the frame is mounted on an undercarriage normally having two or more wheels on each side, pockets which extend into the underside of the floor are preferably used to permit the body of the mobile or modular home to have the lowest center of gravity possible. The pocket for the wheels is obtained by utilizing a prefabricated section 50 having longitudinal members 52 and 54 joined by cross members 56. Section 50 would normally be constructed of wood; however, beams 52 and 54 may be of metal, and support hangers similar to those shown at numeral 32 would support cross members 56 in the same manner as cross members 30 are supported by hangers 32.

In order to give adequate support to the flooring secured to the upper side of the frame, longitudinal members 64 and 66 are preferably mounted in the pockets and held therein by hangers 68 and 70 on the facing

sides of steel cross members **24** and **22**, on each side of section **50**. Section **50** is likewise supported at each end by hangers **72**, **74**, **76**, and **78** secured to steel cross members **22** and **24**. The size and shape of pockets **60** and **62** may be varied, depending on the construction of the undercarriage on which the frame structure is mounted.

The basic frame structure shown in FIG. **2**, and the completed frame structure shown in FIG. **1**, may be used for either a mobile or modular home and would normally contain a tongue **80** such as that shown in FIG. **3**, consisting of angularly extending metal members **82** and **84**, rigidly secured to the underside of front perimeter member **16** and cross member **20**. If the floor frame is to be used in the construction of a mobile home, the tongue **80** is normally permanently secured by welding to the perimeter and cross members; however, if the frame is to be used for transporting a section of a modular home to a location where it will be permanently placed, the tongue is preferably secured to the perimeter beam **16** and cross beam **20** by bolting, the bolts extending through plates **86** and **88** on the perimeter beam and plates **90** and **92** on the cross member **20**. A hitch part is secured to the apex of the tongue for connecting the completed trailer or half sections of a modular home to a towing vehicle, such as a truck or automobile.

In order to give the floor structure further strength and support, short transverse members **94** may be inserted between the longitudinal members **66** and **64**, and the corresponding side perimeter beams, the members being supported on the beams by hangers **96**, similar to those identified by numeral **32** and described herein with reference to the longer cross members or joists.

A modular home is normally constructed as two longitudinal units which are transported separately on the highway and then joined to one another at the building location, often on a permanent foundation. The side perimeter member of one modular section is normally bolted or otherwise permanently secured to the adjacent side perimeter beam of the other modular section.

In the construction of a mobile or modular home, trailer, or like vehicle, the basic steel frame structure illustrated in FIG. **2** is mounted on an undercarriage at the vehicle fabricating plant, and cross members **30** are dropped into opposed hangers and secured therein by nails **34** extending through holes **36** and **38**, and section **50** is constructed separately and dropped in place in hangers **72**, **74**, **76**, and **78**. The remaining beams **66**, **64**, and **68** are assembled in the frame and secured in place. With the floor frame structure constructed in this manner, plywood sheeting is secured to the upper surface of the frame structure using case-hardened nails for securing the plywood to the steel members, and standard nails for the wooden members. The walls are mounted on the plywood and secured to the frame structure, and the body is then completed in the conventional manner.

One of the particular advantages of the present floor frame structure is the face that the metal portion can be fabricated in one location where maximum efficiency obtains, and then transported to the manufacturers of mobile and modular homes. Since the steel frame members have been reduced to a minimum, the handling and transporting can be done on an economical basis, and the wooden cross members can conveniently be inserted in the steel frame structure at the time the mobile or modular home is constructed. Since modular homes are often placed on foundations above basements, the wooden cross members form, in effect, standard joists to which basement ceiling members and materials can easily be connected with nails or screws, and lighting conduits and water pipes can easily be installed through and between the wooden members. The present concept is particularly advantageous in the construction of mobile or modular homes; however, it is readily adaptable to campers, trailers, and similar vehicles.

While only two embodiments of the present floor frame structure have been described in detail herein, various changes and modifications may be made without departing from the scope of the invention.

We claim:

1. A floor frame structure comprising two spaced side perimeter members of steel construction disposed in spaced parallel relationship to one another, forwardly and rearwardly disposed cross members of steel construction rigidly connected to said side members forming a rigid frame and being disposed in parallel relationship with one another, a plurality of hangers on the inner side of two of said members of parallel relationship for receiving the ends of additional members for supporting a floor on said frame structure, and wooden cross members seated between said side members principally below the upper surface thereof and having an exposed upper surface for supporting flooring and receiving flooring securing means.

2. A floor frame structure as defined in claim **1** in which said hangers on two of said members of parallel relationship are disposed along the inside surface of said side members for receiving the ends of cross members between said side members.

3. A floor frame structure as defined in claim **1** in which said hangers on two of said members of parallel relationship are disposed along facing surfaces of said forwardly and rearwardly disposed cross members.

4. A floor frame structure as defined in claim **2** in which a front cross member and a rear cross member are connected rigidly to the ends of said side members.

5. A floor frame structure as defined in claim **4** in which a cross member is disposed between said front cross member and said forwardly disposed cross member and being rigidly connected at its ends to the inner side of each of said side members.

6. A floor frame structure as defined in claim **2** in which wooden cross members are supported by said hangers on said side members in parallel relationship to said cross members between said side members.

7. A floor frame structure as defined in claim **2** in which wooden members are disposed in opposed hangers on said cross members in parallel relationship with said side members.

8. A floor frame structure comprising two spaced side perimeter beams of steel construction, front and rear cross members connected to said side beams forming a rigid frame construction, a plurality of hangers of each side beam along the inside surface thereof for receiving the ends of cross members between said side beams, two cross members disposed in spaced relationship to one another between said front and rear cross members, hangers on said two cross members facing one another, and wooden members in opposed hangers on said beams and on said last mentioned cross members forming a structure for supporting flooring.

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