

Dec. 10, 1935.

S. R. LINDSEY

2,023,814

METAL BUILDING CONSTRUCTION

Filed March 6, 1933

3 Sheets-Sheet 1

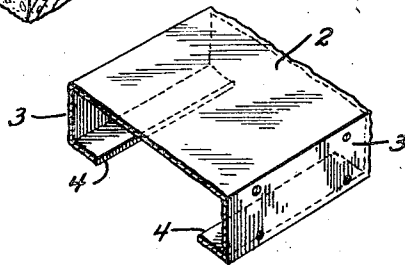
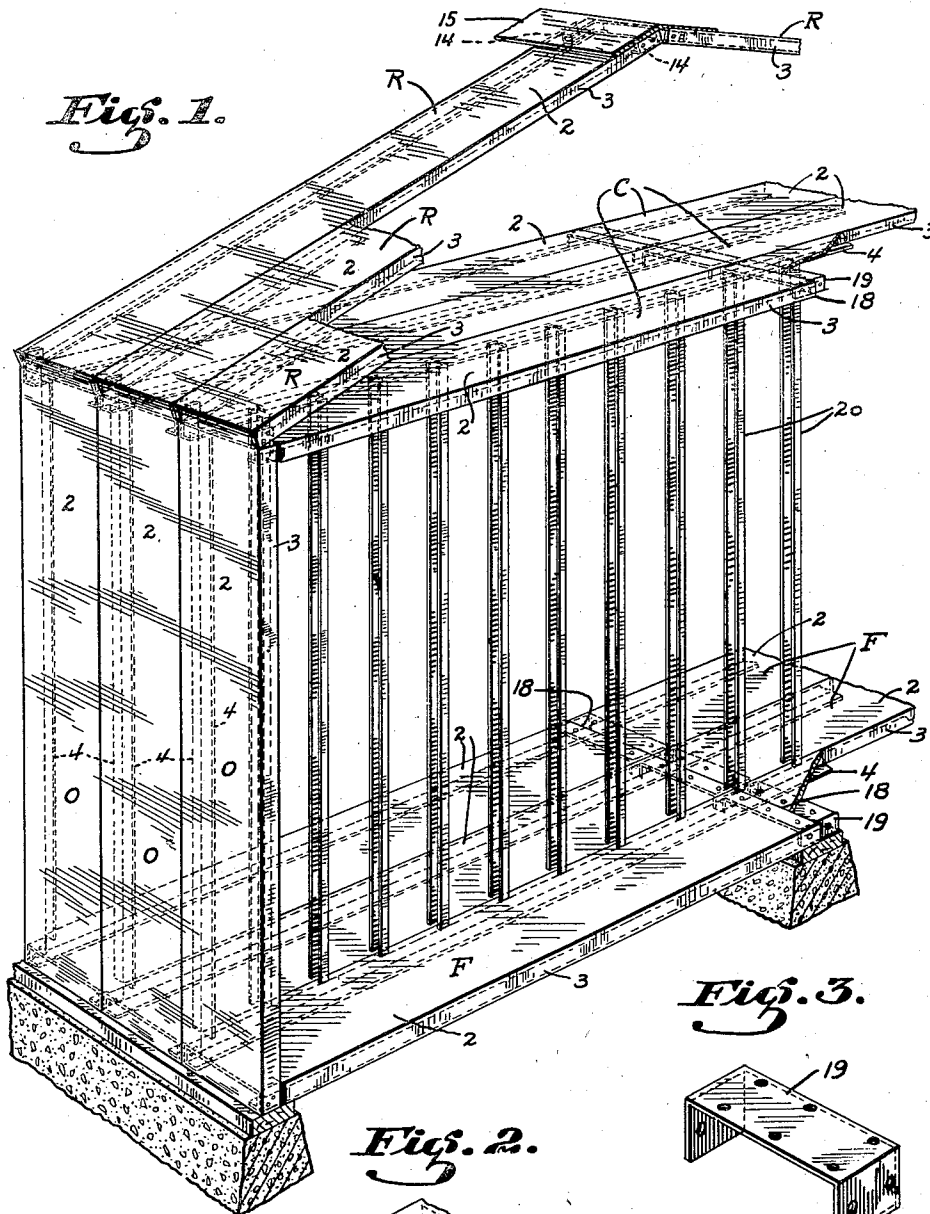
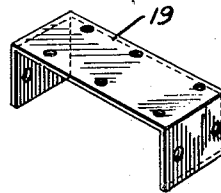


Fig. 3.



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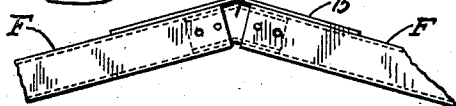
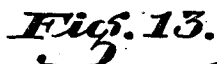
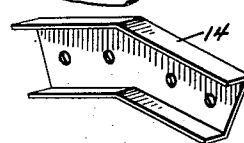
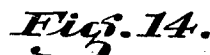
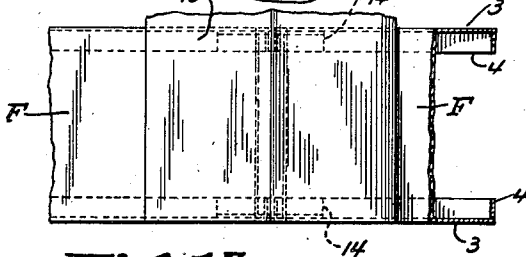
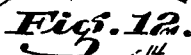
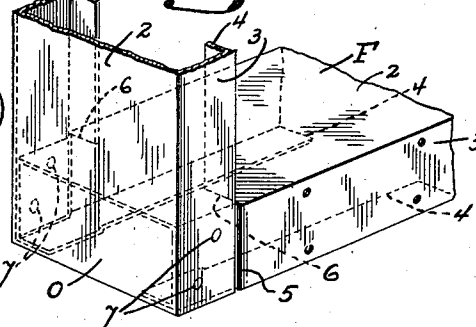
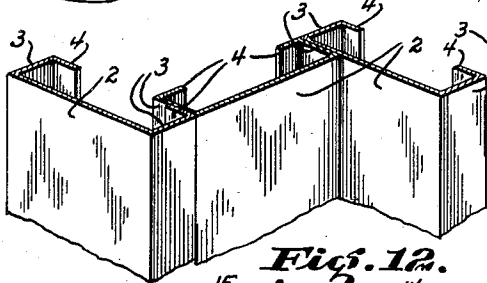
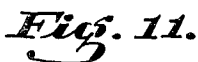
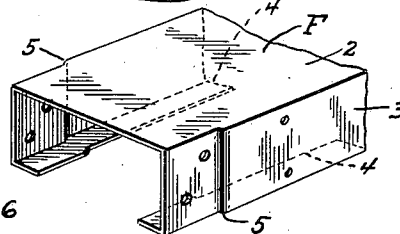
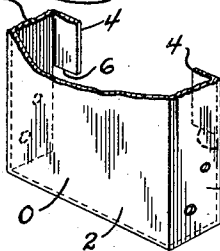
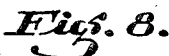
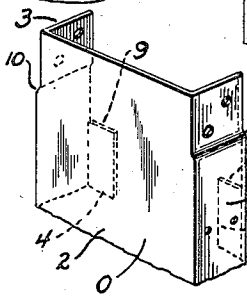
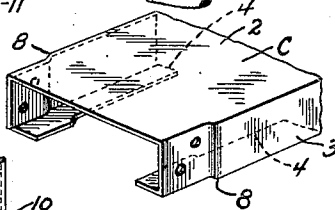
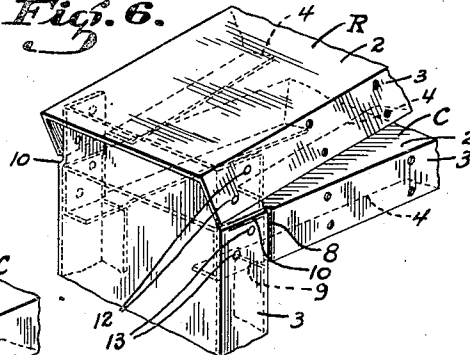
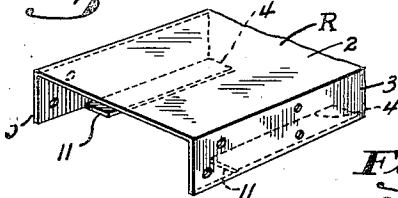
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METAL BUILDING CONSTRUCTION

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METAL BUILDING CONSTRUCTION

Samuel R. Lindsey, Oakland, Calif.

Application March 6, 1933, Serial No. 659,624

5 Claims. (Cl. 189—1)

This invention relates to a metal building construction, and particularly to a standardized form of metal lumber or building material for constructing the floor, walls, ceiling and roof of a building, and further to means for securing the material when erected and assembled.

There is a general trend at the present time to resort to metal construction when structures, such as homes and like buildings are to be constructed, this being largely due to the advantages of greater strength and durability, fire proofing, sanitation, and better opportunity for insulation, etc.

Many attempts have been made to standardize the material employed in metal building structures but, as a rule, such attempts have failed, as one form of material is usually required for the frame of the building, another material for the flooring, still another material for walls, ceiling, and so on, and in addition thereto, special fittings are usually required to secure the material in place when assembled and it might further be stated that the architectural finish or appearance is more or less limited, as such materials do not readily lend themselves to change without resorting to special cutting, fitting, etc.

The object of the present invention is to generally improve and simplify the construction and operation of metal building materials; to provide a standardized metal building material which may be employed throughout an entire building, that is, to form the frame, the floors, walls, ceiling and roof; to provide a material of this character which lends itself to almost any finish or type of architecture without resorting to special fitting, cutting, etc.; to provide a material of the character described which permits floor, walls, ceiling and roof material to be directly joined and rigidly connected without resorting to fittings of any character; to provide a material which insures a rigid well braced structure; to provide a material whereby double walls for the reception of plumbing, pipes, electric wiring, conduits, etc., is obtained; to provide a material which can be easily and quickly assembled and erected without resorting to skilled labor; and further, to provide material whereby the advantages of strength, durability, sanitation, fire proofing, insulation, etc., are secured.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a perspective view of a portion of a building showing the manner in which the material forming the floor, walls, ceiling and roof is assembled and secured.

Fig. 2 is a perspective view in section showing the cross sectional formation of the material employed.

Fig. 3 is a perspective view showing one of the floor brackets whereby floor sections are joined.

Fig. 4 is a perspective view of the lower end of one of the roof sections.

Fig. 5 is a perspective view of the outer end of one of the ceiling sections.

Fig. 6 is a perspective view showing the assembly of a wall section, a ceiling section, and a roof section.

Fig. 7 is a perspective view of the upper end of a wall section.

Fig. 8 is a perspective view of the lower end of a wall section.

Fig. 9 is a perspective view of the outer end of a floor section.

Fig. 10 is a perspective view showing a floor and a wall section assembled.

Fig. 11 is a perspective view showing the manner in which the wall sections may be positioned with relation to each other to obtain breaks or offsets of the wall structure.

Fig. 12 is a plan view of the peak of two roof sections and showing the flashing plate placed above the same.

Fig. 13 is a side elevation of Fig. 12.

Fig. 14 is an edge and side elevational view of the brackets whereby the peak ends of the roof sections are joined and connected.

Fig. 15 is a perspective view showing the assembly employed in a two story structure.

Fig. 16 is a perspective view of the lower end of a second story wall section.

Fig. 17 is a perspective view of the outer end of a second story floor section.

Fig. 18 is a perspective view of the upper end of a first floor section used in connection with a two story structure.

Referring to the drawings in detail, and particularly Figs. 1 to 10, it might be stated that the metal material employed in the construction of a building, such as shown in Fig. 1, is a standardized material of channel-shaped cross section and uniform width. The numeral 2 indicates the face portion of the channel, the numeral 3 the side flanges of the channel, and the numeral 4 intumed flanges which will hereinafter be referred to as sub-flanges. The sub-flanges are important as they materially increase the rigidity and strength of the material. They form flanges to which wire lath and the like may be attached, and they are also employed in forming the connections between the different members

during assembly. The material shown in Fig. 2 is employed to construct the floor, the walls, the ceiling and the roof. As previously stated, it is of uniform width but the gauge of metal employed and the depth of the side flanges 3 may be changed to suit varying conditions and load. The heaviest material employed may be that used in the floor construction as the floor will support the heavier loads such as the interior partitions, and the ceiling, hence the gauge of the material forming the floor may be increased or the side flanges 3 may be increased in depth or both may be resorted to. The material employed in the flooring serves two functions, first that of forming the floor joists, and secondly that of forming the sub-flooring of the building. In this instance the faces of the channels form the sub-flooring while the side flanges 3 form the joists. The flooring may be placed on any suitable foundation. The floor members are placed side by side and they are connected and secured with relation to each other by welding, riveting, or bolting through the adjacent or contacting side flanges 3; knock-outs or perforations being provided at suitable intervals, as indicated, for this purpose. The material forming the floor section will be referred to by the reference character F.

The material forming the exterior side walls of the building is generally indicated at O. It has the same cross section as the material forming the floor but it may be formed of a lighter gauge material or the side flanges 3 may be reduced in depth, as the supported load would require. The faces of the channels form the sheathing or outside wall and the side flanges 3 form the studding of the wall structure.

The material forming the ceiling is indicated at C. This is identical to the floor and wall material but as the load carried by that is comparatively little, it is possible to both reduce gauge of material and depth of the side flanges 3. The material indicated at C, nevertheless, forms a sub-ceiling surface and it also forms the ceiling beams.

The material forming the roof is generally indicated by the reference character R. It is of the same cross section as the material heretofore described, and it forms the sheathing for the roof and the roof rafters.

The method of connecting, assembling and securing the several members will now be described. The outer ends of the floor sections F are best shown in Figs. 9 and 10. It will there be noted that the outer ends are slightly reduced in width to form shoulders 5. Reduction in width may be obtained by brake or press operation. The reduction in width is very slight as it is only necessary to make the reduction such that the end of each floor beam may be inserted between the side flanges 3 of the lower ends of the wall sections O. The lower ends of the wall sections are shown in Figs. 8 and 10. In order to receive the outer ends of the floor sections it is only necessary to cut away the sub-flanges 4 to form shoulders 6. These shoulders will engage the upper surfaces of the floor sections when they are inserted and the complete assembly of a floor section and an outside wall section is clearly shown in Fig. 10; the two sections being secured with relation to each other by bolting, riveting, welding, or the like, through the side flanges at the points indicated at 7. Hence, it is possible to rigidly connect and directly join the outside wall sections without resorting to brackets, special fittings, or like devices.

The outer ends of the ceiling sections are shown in Figs. 5 and 6. They are reduced in width at their outer ends to form shoulders 8, as shown, and the reduction in width is such as to permit the outer ends of the ceiling members to be inserted between the side flanges of the upper ends of the wall sections, the upper ends of the wall sections being shown in Figs. 6 and 7. The sub-flanges 4 are cut away at the upper ends of the wall sections to form shoulders 9 to temporarily receive and support the outer ends of the ceiling members. The extreme upper ends of the outside wall sections are reduced in width to form shoulders 10 and the reduction in width is such that the eave ends of the flanges 3 of the roof members may pass over the same; the sub-flanges 4 on the roof sections being cut away to form shoulders 11, see Fig. 4, to temporarily secure the roof members against outward movement during assembly. The assembly of the three members, 20 to-wit, a wall section, a roof section, and a ceiling section is shown in Fig. 6, and when they are assembled they are secured by bolts, rivets, welding, or the like, at the points indicated at 12 and 13. It will again be noted that the upper ends 25 of the outside wall members and the outer ends of the ceiling members are joined without brackets or special fittings, and so are the lower ends of the roof members.

The upper ends of the roof members substantially abut each other, as shown in Fig. 1, and they are here secured by inserting channel-shaped bracket plates 14, see Figs. 12, 13 and 14. These brackets are riveted, welded, or otherwise secured and a rigid ridge pole structure is thus obtained. A gap will be left between the upper ends of the roof members and this is covered in the present instance by a longitudinally extending flashing plate or strip 15. The only connecting brackets so far required are the brackets 14 employed in conjunction with the joining and connection of the ridge ends of the roof members. There is only one other type of bracket employed and that is shown in Fig. 3, and this is only employed where the floor and ceiling span is so great that two or more sections are employed. Where floor members join each other, as shown at 18 see Fig. 1, brackets 18, such as shown in Fig. 3, are inserted and riveted, or otherwise secured, in place. All members, whether floor, wall, ceiling, or roof, when assembled will be bolted or riveted together through the side flanges and they will naturally be bolted or riveted at the ends where they are joined or connected with adjacent members. A rigid structure is thus obtained which eliminates longitudinal bracing of any character.

The ceiling and roof structure does not require bracing as this forms a natural truss and it will thus be seen that rigidity is secured not only longitudinally but also in a lateral direction. When the several members have been assembled and erected as described, interior partitions may be installed, channel bars, such as shown at 20 in Fig. 1, may be employed for this purpose or any other suitable material. If the interior finish of the building is to be plaster, wire laths or expanded metal will be secured to the sub-flanges 4 of the several members and plaster or like material may then be applied. A double wall structure is thus obtained which first of all forms dead air spaces insuring good insulation against temperature changes, and secondly the dead air spaces may be employed to receive plumbing pipes, electric wiring conduits, and so on.

The structure when completed has great strength and rigidity. It is fire proof. It is exceedingly well insulated against temperature changes, and it is economical in construction as with the use of unskilled labor, erection costs are reduced to a minimum.

The type of material employed lends itself to a great variety of architectural designs or changes, as the walls may be offset or broken as shown in Fig. 11. Window and door openings are not shown in the present instance but it will be understood that where window and door openings are required, short wall members will be employed to form such openings and metal window and door frames may be inserted in these openings, but, as a great variety of metal window and door frames are obtainable, illustration and construction thereof is thought unnecessary. The specification heretofore submitted describes the use of a plaster finished interior. This may obviously be applied to the exterior and any roofing material may be employed, and if plaster may be employed it is obvious that wall-board and similar materials may also be employed, and while certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Fig. 1 shows the type of construction employed in one story buildings. The material, however, lends itself to two story construction as shown in Fig. 15. In this instance, the floor sections employed are identical to the floor sections in a one story building. The ceiling sections and the roof sections are also identical but the eave ends of the roof sections may overhang, as shown in Fig. 15, if desired. The wall sections are also substantially identical, the only difference being that shown in Figs. 16, 17 and 18, as the wall section forming the second story must telescope with relation to the upper end of the wall section forming the first story.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a structure of the character described a floor, a wall, a ceiling and a roof member, all of said members being channel-shaped in cross section and all being of the same width and aligning in a vertical plane, the outer ends of the floor and ceiling members being reduced in width, to be received and secured between the side flanges of the channel-shaped wall member, and a reduced portion on the upper end of the wall member to be received and secured between the

side flanges at the eave end of the channel-shaped roof member.

2. In a structure of the character described a wall, a ceiling and a roof member, said members being channel-shaped in cross section and all being of the same width and aligning in a vertical plane, a reduced portion on the outer end of the ceiling member to be received and secured between the side flanges of the channel-shaped wall member and a reduced portion on the upper end of the wall member to be received and secured between the side flanges at the eave end of the channel-shaped roof member.

3. In a structure of the character described, a pair of vertically disposed wall members, a horizontally disposed ceiling member, a pair of roof members disposed on acute angles with relation to the ceiling member, all of said members being channel-shaped in cross section and being of the same width and disposed in a common vertical plane, a reduced portion on each end of the ceiling member to be received and secured between the side flanges of the channel-shaped wall members, a reduced portion on the upper end of each wall member to be received and secured between the side flanges at the eave ends of the roof members, and a bracket member connecting the inner ends of the roof members, said roof members and ceiling member forming a truss.

4. In a structure of the character described, a plurality of metal floor, wall, ceiling and roof members, disposed parallel and side by side, each of said members being a unit formed single piece of metal capable of carrying loads and all being of channel shape in cross section and being of the same width, the outer ends of the floor and ceiling members and the upper ends of the wall members being formed with a reduced portion, means for securing the reduced portion of the outer ends of the floor and ceiling members to the wall members, means for securing the reduced portions of the upper ends of the wall members to the roof members, and means for securing the side flanges of all the members with relation to each other.

5. In a structure of the character described, a plurality of floor, wall and ceiling members, disposed parallel and side by side, each of said members being a unit formed single piece of metal capable of carrying loads, and all being of channel-shaped in cross section and being of the same width, the outer ends of the floor and ceiling members being formed with a reduced portion, means for securing said reduced portions to the wall members, and means for securing the side flanges of all the members with relation to each other.

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