

[54] **MODULAR ELECTRICAL ENCLOSURE**

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[22] Filed: June 30, 1970

[21] Appl. No.: 51,238

[52] U.S. Cl. 52/79, 52/220, 52/262

[51] Int. Cl. E04h 9/00, E04b 1/348, E04b 5/48

[58] Field of Search 52/79, 220, 221, 270, 262, 52/263, 264, 36

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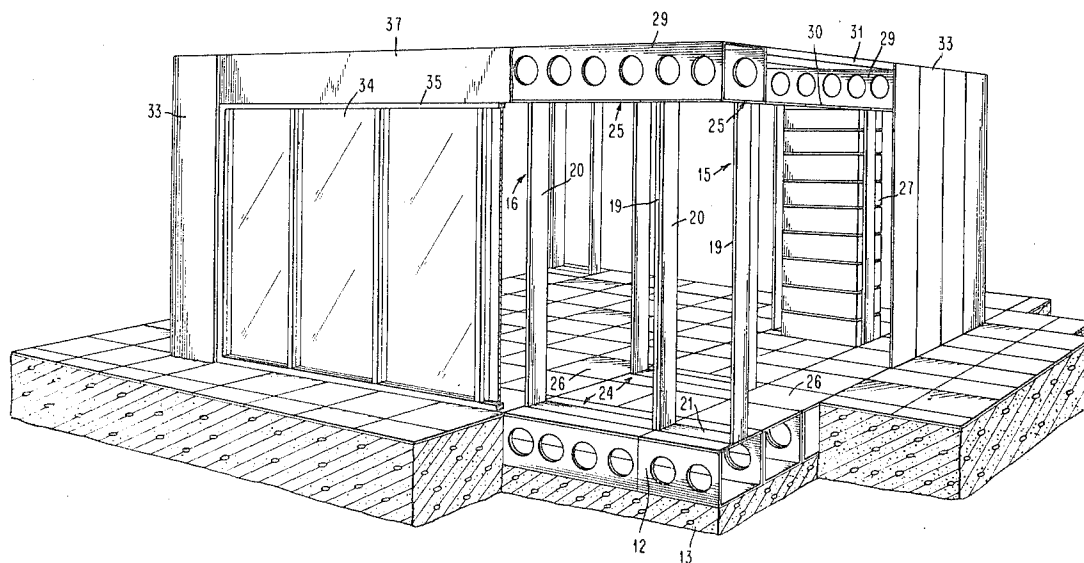
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[57]

ABSTRACT

Modular frames are provided that support electrical components and other apparatus of a data-processing system. The frames are open at their front and back and are partially open along the two sides so that the components are easily accessible for maintenance and operation and are accessible for cooling and for wiring connections. The frames are combined with other components to form a room size, walk-in, enclosure.

7 Claims, 5 Drawing Figures



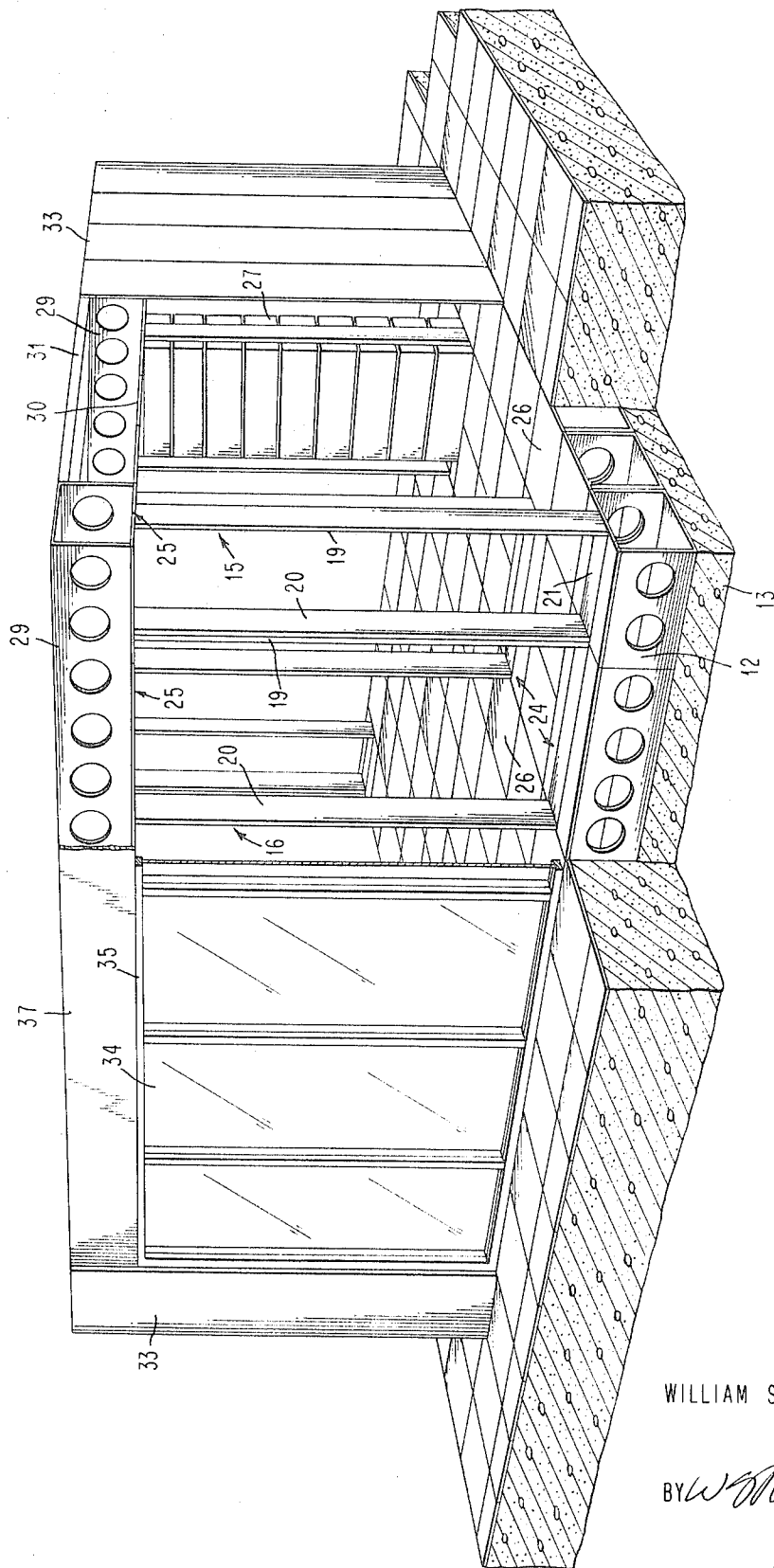


FIG. 1

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FIG. 2

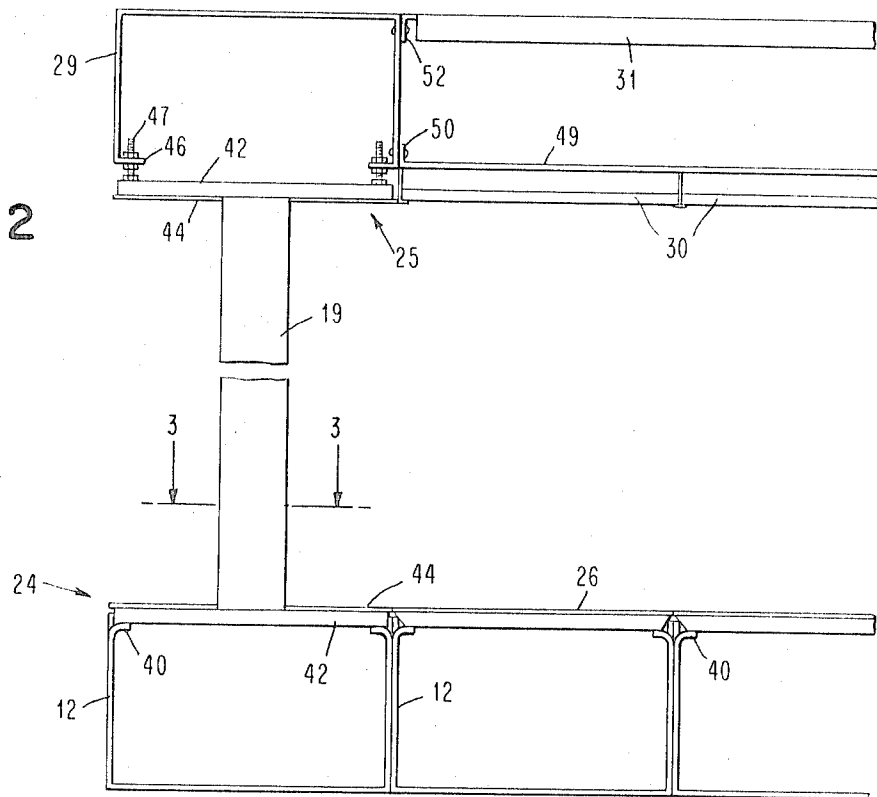


FIG. 3

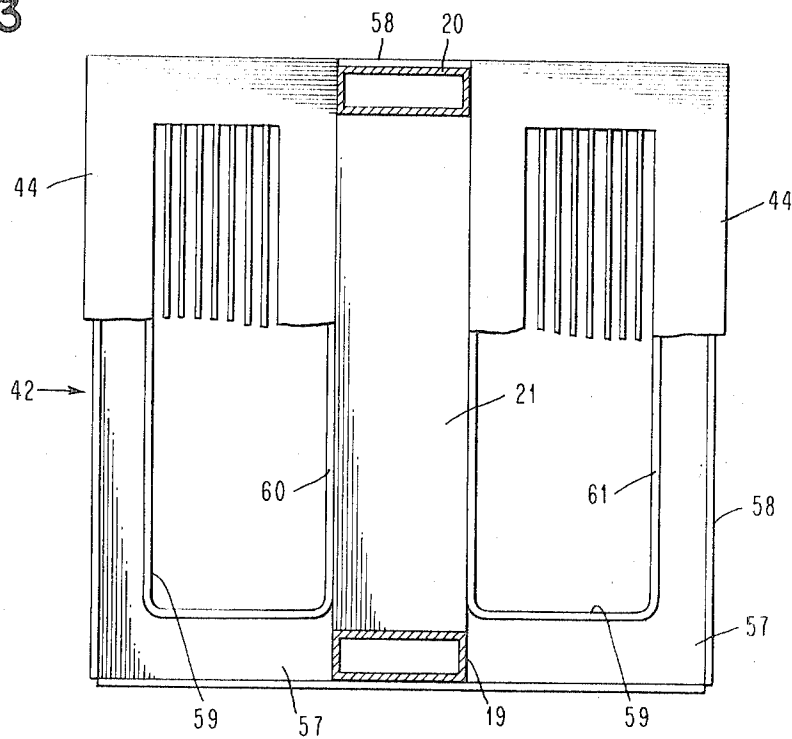


FIG. 4

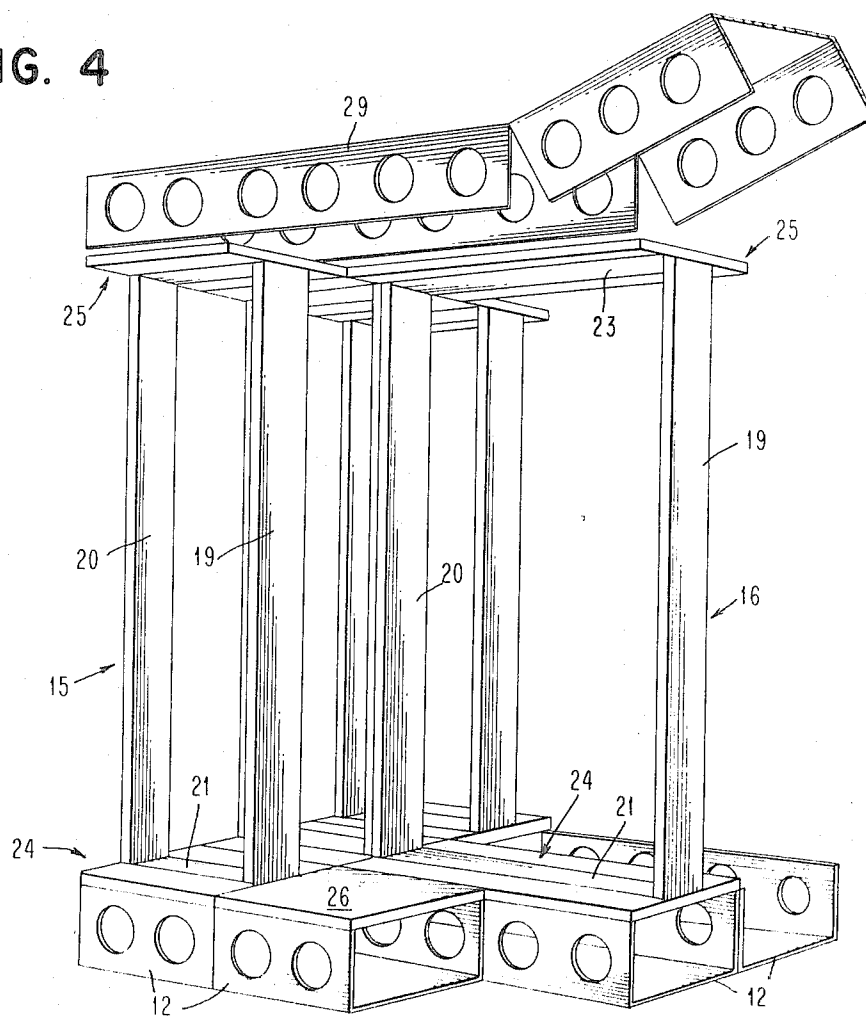
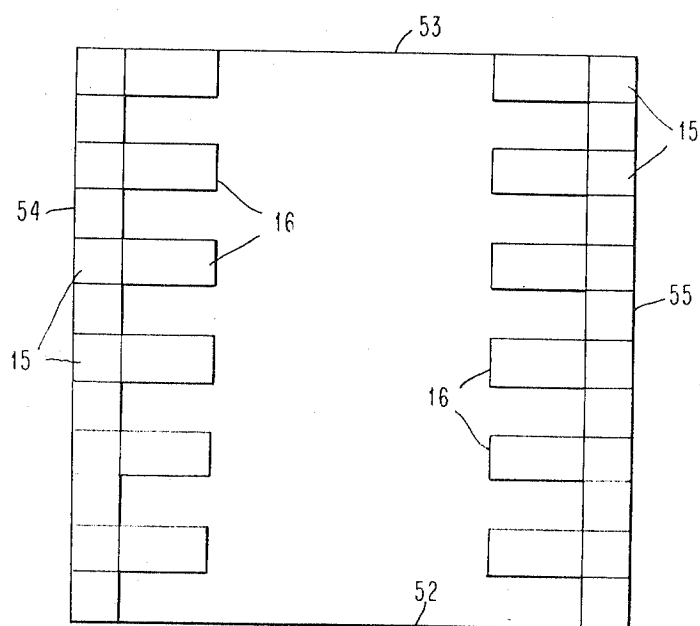


FIG. 5



MODULAR ELECTRICAL ENCLOSURE

THE INVENTION

According to this invention, electrical and other components of a data-processing system are mounted between a pair of vertically extending side members of a modular frame. Each frame is of a standard height such as 80 inches. A lower support member of the frame is combined with a floor panel forming member that is one of several sizes, preferably 24 by 24 and 24 by 48 inches. An upper frame member is combined with a ceiling panel forming member that is the same size as the floor panel forming member. Preferably, the two vertical members of the frame are spaced apart the width of the floor and ceiling panel so that frame units can be placed side by side with vertical members approximately in contact. The frame members are narrower than floor and ceiling panels so that frame units can be placed front to back with access space between the vertical members of the two units. Preferably, the frame units are positioned at selected locations on a base, and commercially available floor panels cooperate with support frame floor panel members to form a continuous floor. Preferably, the base is made of channel-shaped members that carry wiring between frame units and carry cooling air.

Joists are located between corner frame units. Commercially available ceiling panels are mounted on the joists and with the ceiling panel forming members of the frame units form a continuous inner ceiling. Outer ceiling panels are mounted over the tops of the joists. The space between the inner and outer ceiling panels can be used for carrying cooling air and electrical wiring to the components mounted in the frame units. Side and end panels are arranged to enclose the sides and ends of the enclosure.

Thus, the invention provides a new and improved electrical enclosure that is particularly advantageous for the components of a data-processing system. Other advantages and features of the invention will be apparent from the following description of the preferred embodiment of the invention.

THE DRAWING

FIG. 1 is a simplified perspective of the preferred enclosure with parts broken away to show the interior of the enclosure.

FIG. 2 is a side view of a frame unit and an associated joist and base frames.

FIG. 3 is a section along lines 3—3 of FIG. 2 and shows the relationship between a frame and its floor panel member.

FIG. 4 is a perspective of several support frames and associated joist and base frames.

FIG. 5 is a typical floor plan of frame units for an enclosure.

THE ENCLOSURE OF THE DRAWING

Introduction

FIG. 1 shows the general arrangement of the enclosure of this invention. Some of the components of the enclosure are shown in simplified form in FIG. 1 and are shown in detail in other parts of the drawing. Channel-shaped base frames 12 are positioned side by side over a supporting foundation 13. The foundation may be made of concrete as the drawing represents, or of any suitable material. In contrast to the arrangement shown in the drawing, the base frames may be spaced above the foundation by screws for vertical adjustment. The base frames are of a modular width, preferably 24 inches, and may also be of one or more modular lengths, preferably 24 inches and 48 inches to provide squares and rectangles. The base frames are set on the foundation and are fastened to each other by suitable means such as mechanical fasteners. Holes are provided in the sides of the base frames, and the base frames function as an inner plenum and cable trough for signal and power conductors.

Narrow support frames 15 and wide support frames 16 are positioned on the base at selected locations. The frames are essentially identical except for their width. Each frame has a pair of vertically extending side members 19, 20, a lower frame member 21, and an upper frame member (23, hidden in

FIG. 1 but shown in FIG. 4). Each frame has a floor panel forming member 24 attached to the lower frame member 21 and a ceiling panel forming member 25 attached to the upper frame member 23. Conventional floor panels 26 are positioned on base frames 12 to cooperate with floor panel forming members 24 to form a continuous floor.

Components of the data-processing system are mounted in individual enclosures 27 that are mounted between side members 19, 20 of a frame. An enclosure 27 is narrow enough to fit between either the narrow frames 15 or the wide frames 16. An enclosure 27 can have any desired front-to-back length but it is a feature of this invention that an enclosure 27 can contain relatively few components for easy replacement of an enclosure 27. An enclosure 27 provides mechanical support for its components and electrical safety for operating personnel, but is otherwise open for circulating cooling air past the components. As FIG. 1 shows, the enclosures 27 are fully accessible from the front and back of a frame and they are partially accessible along the sides of a frame unit.

Joists 29 are mounted between the two front corner frames and the two back corner frames of the enclosure. Joists are mounted between intervening frames as desirable. Commercially available ceiling panels 30 are mounted on the joists and cooperate with the frame ceiling panel members 25 to form an interior ceiling. Exterior ceiling panels 31 are mounted on the joists. The space between the interior and exterior ceiling can carry cooling air and wiring between frame units.

The walls of the enclosure are formed in part by side and end panels 33. The walls may also include sections 34 of glass mounted in a suitable frame 35 with a facade 37 covering the joists above the frame. A door of sliding or hinged glass or panel is provided but is not shown in FIG. 1.

The Components of FIG. 2

FIG. 2 shows the right-hand front corner frame unit 15 of FIG. 1 and associated components. The side member 20, the floor member 24 and ceiling member 25 of the frame and the base frame 12 and joist 29 are readily recognizable from FIG. 1. In addition, FIG. 2 shows the arrangement of tabs 40 formed by bending short corner sections of the sides of base frames 12. Tabs 40 support the conventional floor panel 26 and the floor panels 24 of the frames. The floor panel 24 which is shown as a single element in FIG. 1 is shown in more detail in FIG. 2 as having two components, a lower base 42 and an upper two-part cover 44. Base 42 is supported partially within base frame 12 on tabs 40 and cover 44 extends over base 42 to provide continuous surface with the adjacent floor panels 24 or 26. The frame upper panel 25 is identical to the floor panel 24 and similarly includes a base 42 and a two-part cover 44.

As FIG. 2 shows, joists 29 includes a lower fold 46 along each edge and adjusting screws 47 are located in fold 46 for vertically positioning joist 29 on an upper frame panel 25. The spacing between joist 29 and panel 25 provides for extending an interior ceiling support 49 between any intervening joist and frame. Frame 49 is suitably attached to joist 29 by a bracket 50. Ceiling panels are attached to support 49 to provide a ceiling that is flush with the ceiling panel 25. The exterior ceiling panel 31 has a bracket 52 at its end for attaching the panel to a joist. Panel 31 is essentially a flattened channel shape.

The Ceiling or Floor Panel of FIG. 3

The frame side members 19, 20, the lower frame member 21 (and equivalently, the upper frame member 23), the base 42 and the cover 44 shown in FIG. 3 have been introduced in the description of the other figures. The base 42 is formed with a horizontal surface 57 and is folded to form a vertically extending rim 58 which can be seen in FIG. 2. The lower frame member 21 (or upper member 23) is mounted along a centerline of the base. Two holes 59 are formed in base 42. The lower surface 57 around holes 59 is extended to form two vertical inner rims 60, 61. Rims 60, 61 help to strengthen the base and to support and position the frame with respect to the base. The frame is attached to the base by suitable means not shown.

Holes 59 in the base admit cooling air and wiring from either the base frame 12 or from the space between the interior and exterior ceilings or the joists. FIG. 3 shows a cover 44 arranged with a grill for admitting air. Covers 44 may be solid for limiting the airflow to certain locations. Wiring access holes may be provided in either type cover. Covers 44 are attached to a base 42 by screws or other suitable means not shown.

The Apparatus Shown in FIG. 4

Many of the components that have been described already are shown from a different point of view in FIG. 4. FIG. 4 shows frames 15, 16 with the floor panels 24 shown in the simplified form of FIG. 1. The ceiling panels 25 are shown in their simplified form as in FIG. 1, but the spacing between the panels 25 and joists 29 is shown. The detail of the vertical adjusting means 46, 47 is shown only in FIG. 2. FIG. 4 also shows a hinged construction of joists 29 that is advantageous for transporting a disassembled enclosure.

The Floor Plan of FIG. 5

In the floor plan of FIG. 5, the lower edge 52 corresponds to the front of the enclosure in FIG. 1. Thus, joists which are not shown extend across the lower edge 52, the upper edge 53, and at intervening points as required. Narrow frames 15 are located across the sides 54 and 55. Wide frames 16 are located adjacent alternate ones of the narrow frames 15. Electrical apparatus and other components of a data-processing system are located in the wide frames 16 and, if desirable, in narrow frames 15 to provide easy access for repair and operating personnel.

From the description of a preferred embodiment of the invention and a typical floor plan of the enclosure, those skilled in the art will recognize various modifications within the spirit of the invention and the scope of the claims.

What is claimed is:

1. An enclosure for a data-processing system or the like, comprising,
 - frames each having a generally rectangular lower floor panel member and a generally rectangular ceiling panel member and a pair of side members mounted on said floor panel member and extending vertically to support said ceiling panel member, said frames being open at the front and back and said side members extending from front to back less than the distance of the sides of said

floor and ceiling panel members, whereby said frames are partially open along the sides, the horizontal dimensions of said floor and ceiling panel members being substantially equal, selected ones of said floor panel members having openings providing access for air and wiring, said vertically extending side members being adapted to hold individual enclosures of components of said system therebetween,

exterior wall panels and exterior ceiling panels, and

a foundation supporting a plurality of said frames to hold said system and providing horizontal pathways for cooling air and electrical wiring to said selected floor panel members and mounting said exterior panels on selected ones of said frames to form a room-sized, walk-in, enclosure.

2. The enclosure of claim 1 in which said ceiling and floor panel horizontal dimensions are approximately equal to the horizontal dimensions of said individual enclosures.

3. The enclosure of claim 2 in which the vertical dimensions of said individual enclosures are small in relation to the height of said side members whereby a plurality of individual enclosures are mountable in a frame.

4. The enclosure of claim 3 in which said vertically extending side members are substantially centered with respect to the front and back edges of said floor and ceiling panels.

5. The enclosure of claim 1 in which said means mounting said exterior panels includes joists supported between pairs of frames and providing a space between said ceiling panel members and said exterior ceiling panels for carrying wiring and cooling air to selected ones of said frames.

6. The enclosure of claim 5 in which said panel member horizontal dimensions are in two sizes, a square and a rectangle the size of two adjacent of said squares and in which said joists are mounted between frames having square panel members.

7. The enclosure of claim 6 in which said frames include upper and lower frame members similar in construction to said side members and connecting said side members, and said floor and ceiling panel members each comprise a first member having a vertically extending outer rim and having one of said openings on each side of said upper or lower member of said frame and a vertically extending rim adjacent to and supporting said member and a second member forming a two-part panel flush with said member.

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