

July 12, 1960

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2,944,478

BUILDING AND AIR DISTRIBUTING STRUCTURE

Filed March 14, 1957

5 Sheets-Sheet 1

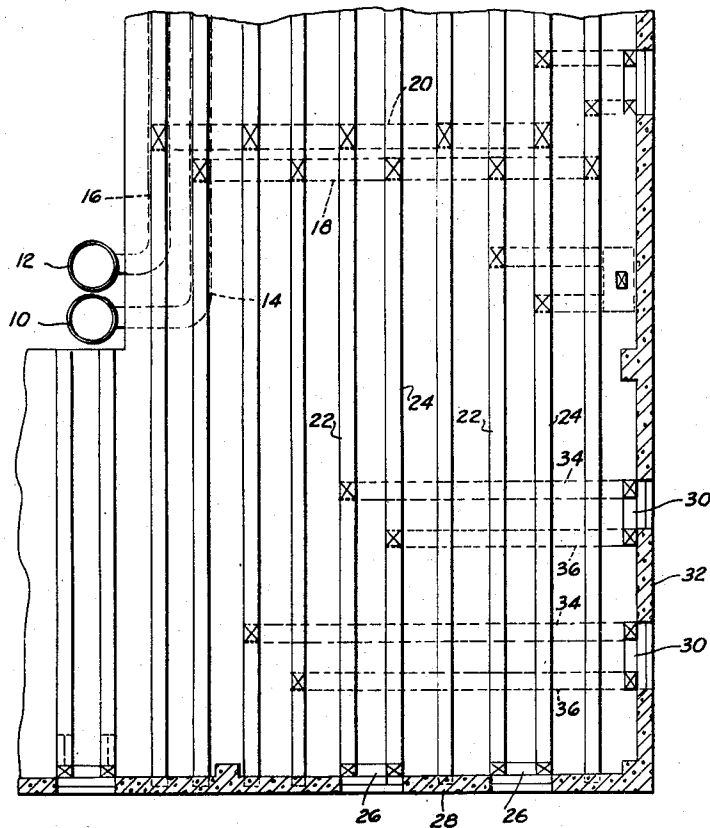


FIG. 1

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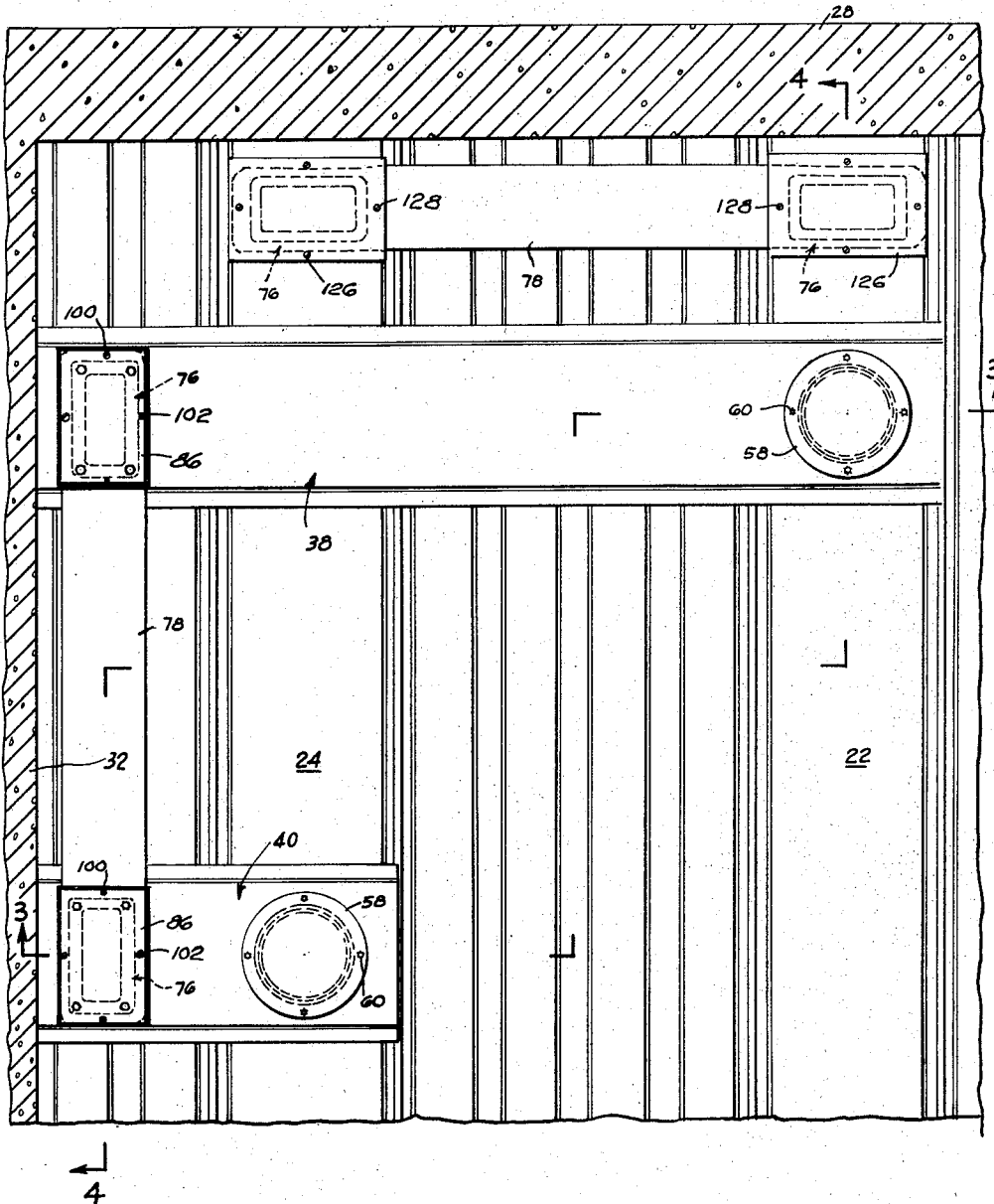


FIG. 2

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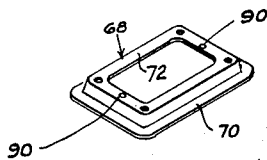


FIG. 5

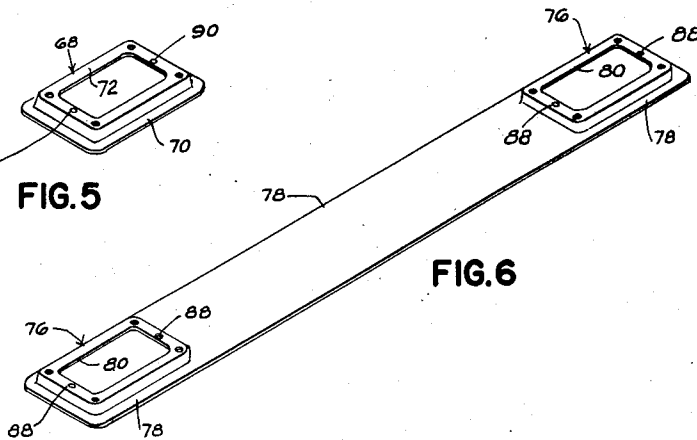


FIG. 6

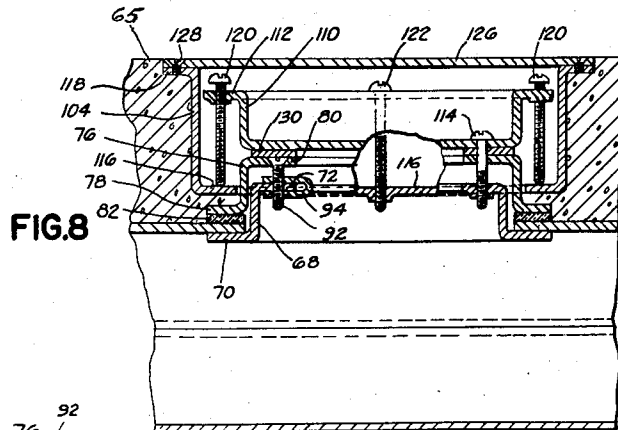


FIG. 8

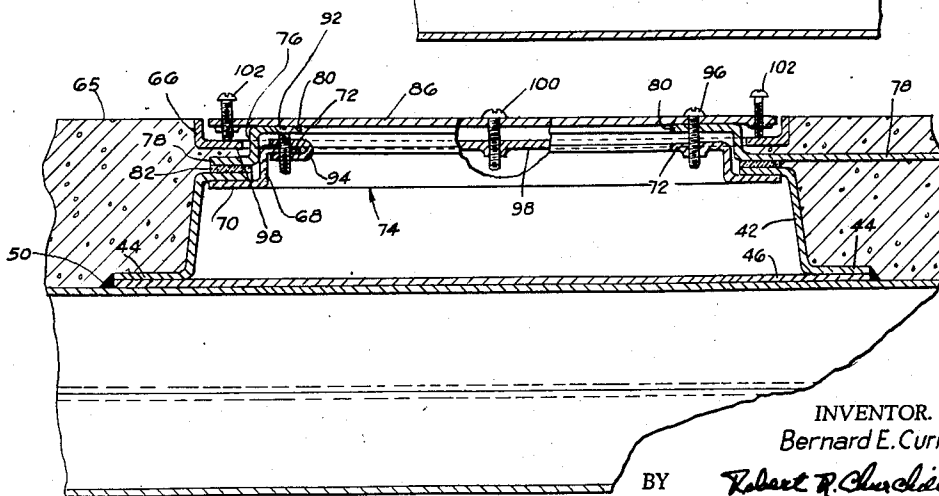


FIG. 7

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BUILDING AND AIR-DISTRIBUTING STRUCTURE

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4 Claims. (Cl. 98—38)

This invention relates to a building and air distributing structure and more particularly to a building and air conditioning structure of the type forming the subject matter of United States patent to R. P. Goemann, No. 2,729,429, dated January 3, 1956.

The Goemann patent discloses a building and air conditioning and distributing system and apparatus wherein cellular metal floors form the load supporting structure at each of selected stories of a multi-story building, and the present invention has for an object to provide novel apparatus for conducting air from one or more of the air conducting floor cells to an outlet or discharge unit.

Another object of the invention is to provide novel connecting apparatus which may be used with advantage in connecting an air outlet or discharge unit to an air conducting cell of a multicellular floor wherein the discharge unit extends along a side wall of the building parallel to and spaced laterally from the run of the longitudinally extended air conducting cell of the multicellular floor.

A further object of the invention is to provide novel connecting apparatus which may be used with advantage in connecting an outlet or discharge unit to an air conducting cell of a multicellular floor which includes provision for temporarily supporting and adjusting a relatively shallow screed box in surrounding relation to the outlet connecting apparatus during the pouring of a cementitious floor fill over the multicellular load supporting floor.

With these general objects in view and such others as may hereinafter appear, the invention consists in the outlet connecting apparatus for the purpose described and in the various structures, arrangements and combinations hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a diagrammatic plan view of a portion of a cellular metal floor wherein air is conducted through selected floor cells as shown in said Goemann patent above referred to;

Fig. 2 is a plan view detail of one corner of a building embodying the present air distributing structure;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2 illustrating the crossover ducts and the outlet connections to an air distributing outlet arranged along a wall parallel to the air conducting cells;

Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 2 showing the crossover ducts and outlet connections to air distributing outlets arranged along walls parallel to and at right angles to the longitudinally extended air conducting cells;

Figs. 5 and 6 are perspective detail views of connecting members forming a part of the present outlet connecting apparatus;

Fig. 7 is a detail view in cross section of apparatus for temporarily supporting and adjusting a shallow screed box; and

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Fig. 8 is a detail view in cross section of apparatus for temporarily supporting and adjusting a relatively deep screed box.

The building and air conditioning and distributing structure forming the subject matter of the Goemann patent, above referred to, embodies a cellular metal floor of the type illustrated in the patent in Young, No. 1,867,433, and wherein a multiplicity of air conducting cells form a part of the structural load supporting cellular metal floor itself. As illustrated in the Goemann patent, provision is made for supplying air, particularly conditioned air, to selected and a number of spaced air conducting floor cells, and the present invention is particularly concerned with novel connecting means for conducting air from one or more of the air conducting cells to outlets spaced laterally from and parallel to the particular air conducting cells. Preferably, provision is made for connecting the top of the air conducting cell with an outlet unit mounted upon the upper side of the floor and spaced laterally a substantial distance from the air conducting cell. In the illustrated embodiment of the invention the connection comprises a crossover duct extended transversely of and over the top of the floor cells and includes novel connecting elements between the air conducting cell and the crossover duct, and between the crossover duct and the outlet unit. The individual components of the connecting duct system and apparatus lend themselves to economical factory production and are designed to facilitate assembly and minimize erection costs.

Referring now to the drawings, Fig. 1 illustrates in plan a portion of one story of a multi-story building embodying the air conditioning and distributing system shown in the Goemann patent wherein hot and cold air ducts 10, 12 respectively are extended through the service core of the building and are connected by longitudinally extended ducts 14, 16 and transversely extended ducts 18, 20 beneath the cellular metal floor to alternate air conducting cells 22, 24 of the floor which in turn communicate directly with sill box outlets 26 arranged at right angles to the air conducting cells or parallel to the end wall 28 of the building, the sill box outlets 30 arranged along the side wall 32 of the building being connected to the air conducting cells 22, 24 by transverse ducts 34, 36 which extend beneath the multicellular floor, the connections being extended upwardly through openings in the non-air carrying portions of the multicellular floor.

In accordance with the present invention provision is made for connecting the sill box outlets 30 which extend along the side wall 32 parallel to the run of the air carrying cells 22, 24 by crossover ducts 38, 40 respectively which extend transversely of and on top of the multicellular floor, thus eliminating the labor and expense of cutting through the non-air carrying cells of the floor to make connections to the sill box outlets and also eliminating the exterior duct connections beneath the floor, thereby substantially reducing the amount of space required for ducts beneath the floor between the floor and the ceiling.

As illustrated in cross section in Figs. 3 and 4, each crossover duct 38, 40 may comprise an upper inverted U-shaped section 42 having laterally extended flanges 44 at the lower ends of the legs of the U and a flat lower plate 46 which may be seam welded or otherwise secured to the flanges 44 of the upper section 42 to form an enclosed airtight air carrying duct, the ends of the ducts being provided with cup-shaped and airtight end closures 48 as shown. The crossover ducts 38, 40 may be tack welded at suitable intervals, as indicated at 50, to the upper surface of the multicellular floor, and one end of each duct is provided with an opening 52 in its under-

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side for communication with an opening 54 in the top wall of an underlying air conducting cell. In order to provide an airtight seal between the floor cell and the crossover duct at the communicating openings 52, 54, the opening 52 in the crossover duct is preferably made slightly larger in diameter than the opening 54 in the air conducting cell, and the marginal edge of the duct opening 52 may be welded to the underlying top wall of the air conducting cell to provide a sealing bead 55 on the annular wall portion surrounding the opening 54. It will be observed that an access opening 56 is provided in the top wall of the crossover duct immediately above the communicating openings 52, 54 to permit the welding operation to be performed in the field, said opening 56 being provided with a detachable cover plate 58 secured to the top wall of the crossover duct by screws 60 as shown.

The other ends of the crossover ducts 38, 40 are arranged for connection to the upright stacks 62, 64 of the sill box 30, and since the height of the crossover ducts above the multicellular floor provides relatively little space between the top of the crossover duct and the screed line defining the upper surface of the floor fill 65, Fig. 8, a relatively shallow screed box 66 is provided in the floor fill defining the opening in the upper surface of the floor fill to provide an access opening free of floor fill to enable the lower end of the stack to be connected to the upper wall of the crossover duct. As herein shown, the outlet connection includes an annular shoe plate 68 provided with an outwardly extended flange 70 at its lower end and provided with an inwardly extended flange 72 at its upper end. The shoe plate 68 is arranged to cooperate with an opening 74 formed in the upper wall of the crossover duct wherein the lower flange 70 is arranged to engage the underside of the top wall surrounding the opening 74, the shoe plate being shown in detail in Fig. 5. A double base plate, shown in detail in Fig. 6, is provided with an upper shoe plate portion 76 at each end connected by an intervening web 78 which serves as a spacer for registering the openings 74 in the crossover ducts 38, 40 with the predetermined spacing between the stacks 62, 64. As illustrated, each upper shoe plate portion 76 is arranged to cooperate with its respective lower shoe plate 68 and is also provided with an outwardly extended lower flange 78 and an inwardly extended upper flange 80. The lower flange 78 is arranged to rest on the upper wall surface surrounding the opening 74 of the crossover duct with a gasket 82 intervening to render the connection airtight. The upper shoe plate portion 76 is of a size such as to fit over the upwardly extended portion of the shoe plate 68 in nesting relation, as shown in Figs. 7 and 8, and the inwardly extended flanges 72, 80 are provided with openings for the reception of fastening elements so that when the flanges 72, 80 are drawn together by the fastening elements the lower flanges 70, 78 will be drawn into tight clamping engagement with the upper wall surrounding the opening 74 in the crossover duct. Gasket 82 is firmly compressed between flange 78 and the upper wall to form a seal therebetween. As herein shown, the flanged lower end of the stack 62 rests on the upper flange 80 with an intervening gasket 84 to make an airtight joint and is connected to the outlet connections by screws 85, one in each corner of the stack flange, which extend through clearance openings in the stack flange and in the shoe flange 80 of portion 76 and into threaded openings in the shoe plate flange 72.

Referring now to Fig. 7, the present outlet connecting structure is preferably connected to the upper wall of the crossover duct prior to pouring the floor fill and may be conveniently used as a support for a flat upper plate 86 adapted to temporarily and adjustably support the shallow screed box 66 during the pouring operation. In order to initially retain the upper and lower shoe plate portions 68, 76 in assembled relation to the cross-

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over duct immediately disposed openings are provided in the flanges 72, 80 comprising countersunk openings 88 in the flange 80 and clearance openings 90 in the flange 72 and through which flat head screws 92 are extended. A looped fastening member 94, of the type known commercially as a "Tinnerman nut," is provided for each screw 92, each nut 94 having a clearance opening in its upper leg and a threaded opening in its lower leg. The legs are arranged to embrace the flange 72, as shown, with the screws 92 extended through the clearance openings and cooperating with the threaded openings in the lower legs of the nuts 94. The flat plate 86 may then be secured to the upper flange by screws 96 which extend through clearance openings in the plate, the clearance openings in the corners of the flange 80 and into threaded openings in the flange 72. As illustrated in Fig. 7, the shallow screed box 66 is provided with an inwardly extended lower flange 98 and is arranged to be adjustably supported by the flat plate 86 by the provision of a pair of height adjusting screws 100 extended through clearance openings in opposed marginal side portions of the plate 86 and engaged with threaded openings in the flange 98 of the screed box, and by the provision of a second pair of screws comprising leveling screws 102 which extend through threaded openings in opposed marginal end portions of the flat plate 86 with the ends of the screws bearing against the screed box flange 98 as shown. As thus arranged, it will be seen that by rotating the screws 100, the height of the screed box may be adjusted to present the upper edge thereof in alignment with the screed line 65, and by adjustment of the screws 102 the screed box may be leveled with respect to the screed line, the screws 102 also serving to lock the box in its adjusted position. After the floor fill has been poured and hardened, the screws 96 and the plate 86 may be removed and the sill box may be connected to the shoe flanges, as above described, using the same corner flange openings to which the flat plate 86 was connected. It will be observed that when the flat plate 86 is removed the shoe plate members 68, 76 are retained in their assembled relation by the temporary fastening elements 92, 94 and that the screws 85 securing the sill box to the outlet structure provide a permanent and airtight connection.

The structure shown in Fig. 8 illustrates the arrangement for temporarily supporting and adjusting a relatively deep screed box 104 defining the access openings in the floor fill in which the stacks 106, 108 of the directly connected sill box 26 are subsequently inserted and secured to a similar outlet connecting structure including the lower shoe plates 68 and upper shoe plate portions 76 of the double base plate. As shown in Fig. 8, the shoe plate members 68, 76 may be first connected by the temporary fastening elements 92, 94 through intermediate openings in the shoe plates. An inverted shoe plate 110 having a closed bottom wall and an outwardly extended upper flange 112 is then secured to the outlet flanges 80, 72 by corner screws 114. The screed box 104 is provided with an inwardly extended lower flange 116 and an outwardly extended upper flange 118, and adjusting and supporting screws 120, 122 cooperate with the flanges 112, 116 to effect adjustment of the screed box relative to the screed line of the subsequently poured floor fill as previously described. As shown in Fig. 8, the upper flange 118 of the screed box 104 is preferably disposed a short distance below the screed line 65 and may be provided with a cover member 126 having its upper surface flush with the screed line and secured to the flange 118 by screws 128. A gasket or filler member 130 may be inserted between the upper flange 80 of shoe plate member 76 and the bottom wall of the inverted shoe plate 110.

It will be apparent from the foregoing description that the structure illustrated in Fig. 8 is particularly adapted for use in connecting the outlet box 26 directly to the

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underlying air conducting cells of the multicellular floor wherein the connection is made through the full thickness of the floor fill.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In an air distributing and building structure, a cellular metal load supporting floor having longitudinally extended air conducting cells forming a component of the floor, a dual air outlet unit having a pair of air receiving stacks, said outlet unit being spaced from and extended parallel to said air conducting cells, and airtight connections between said air conducting cells and said dual outlet unit including a pair of crossover ducts extended transversely and on top of said cellular metal floor, each crossover duct having communicating openings at one end thereof between the upper wall of an air conducting cell and the lower wall of a crossover duct, and means providing an airtight connection between said air cell and crossover duct and a flanged outlet connection at the other end thereof cooperating with an opening in the upper wall of a crossover duct and to which the lower ends of said stacks are secured, said flanged outlet connections including an individual lower shoe plate for each outlet and having outwardly extended bottom flanges, and an elongated base plate extending between openings in the crossover ducts having a cooperating upper shoe plate formed at each end thereof, said upper shoe plates having outwardly extended bottom flanges cooperating with the bottom flanges of the lower shoe plates to embrace the inner and outer surfaces of the upper wall portions defining said openings, and upwardly extended rim portions and inwardly extended upper flanges, said rim portions of said shoe plates being arranged in substantially nesting relation and also provided with means for securing the inwardly extended upper flanges together to effect clamping of said lower flanges about said openings to form airtight connections therebetween, and said base plate providing means for registering the duct openings and the air receiving stacks of the outlet units.

2. Connecting apparatus for connecting a dual air discharge outlet unit having a pair of spaced air receiving stacks to spaced air conducting cells of a multicellular floor and air distributing structure of a building, said connecting apparatus comprising an individual lower shoe plate having outwardly extended bottom flanges for cooperation with openings in the upper wall of each cell, and an elongated base plate having a cooperating upper shoe plate formed at each end thereof and spaced a distance equal to the spacing of said air receiving stacks for registering and aligning the openings with said stacks, said upper shoe plates having outwardly extended bottom flanges cooperating with the bottom flanges of the lower shoe plates to embrace the inner and outer surfaces of the upper wall portions of the cells defining said open-

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ings, and upwardly extended rim portions and inwardly extended upper flanges, said rim portions of said shoe plates being arranged in substantially nesting relation and also provided with means for securing the inwardly extended upper flanges together to effect clamping of said lower flanges about said openings, the lower ends of said stacks being secured to said inwardly extended flanges.

3. Connecting apparatus for connecting a dual air discharge outlet unit having a pair of spaced air receiving stacks to air conducting cells of a multicellular floor and air distributing structure of a building, said connecting apparatus comprising flanged connecting elements cooperating with openings formed in the upper walls of said cells and forming airtight connections therebetween, said flanged connecting elements comprising upper and lower shoe members, each having outwardly extended bottom flanges arranged to embrace the inner and outer surfaces of the upper wall portions defining said openings, said connecting elements being also provided with inwardly extended upper flanges arranged to be secured together to effect clamping of said lower flanges about said openings, to form airtight connections, said upper shoe plates being formed at the ends of and integrally with an elongated spacing plate for maintaining a predetermined spacing between said dual outlet connecting elements.

4. In an air distributing and building structure, a cellular metal load supporting floor having longitudinally extended air conducting cells forming a component of the floor, a dual air outlet unit having a pair of spaced air receiving stacks, said outlet unit being spaced from and extended parallel to said air conducting cells, airtight connections between said air conducting cells and said dual outlet unit including a pair of crossover ducts extended transversely and on top of said cellular metal floor, each crossover duct having communicating openings at one end thereof between the upper wall of an air conducting cell and the lower wall of a crossover duct, an airtight outlet connection at the other end of each crossover duct cooperating with an outlet opening in the upper wall thereof for securing the lower ends of said spaced stacks in airtight relation to their respective crossover ducts, said outlet connections including an elongated base plate extending between and having openings aligned with said outlet openings, said elongated base plate serving as an aligning and spacing element for assuring registration of the outlet openings with the lower ends of the spaced air receiving stacks.

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