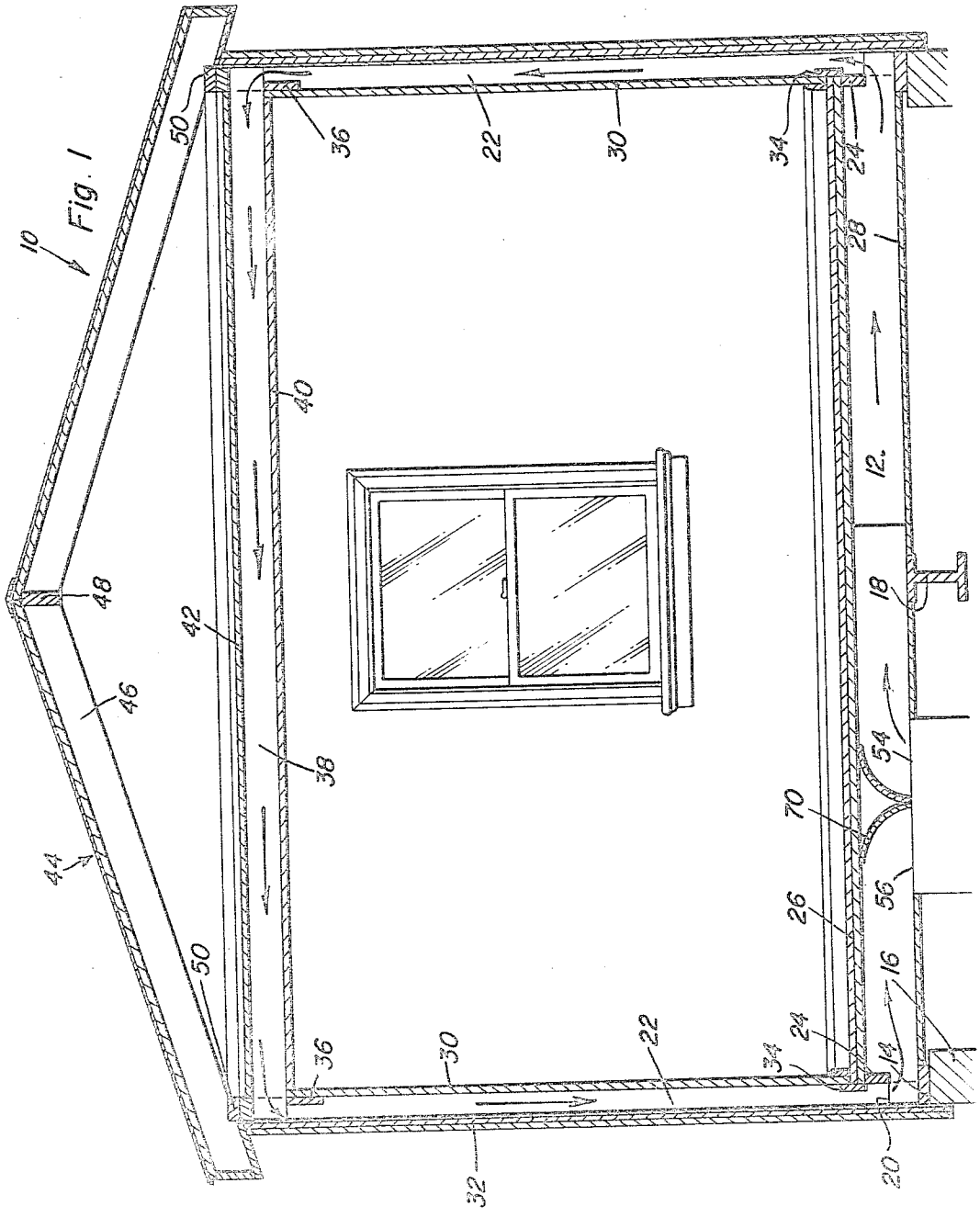
Feb. 14, 1967 J. G. ANTHONY 3,303,770

BUILDING WITH INTERNAL AIR FLOW PASSAGES

Filed Nov. 25, 1964 3 Sheets-Sheet 1

Fig. 1



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BUILDING WITH INTERNAL AIR FLOW PASSAGES

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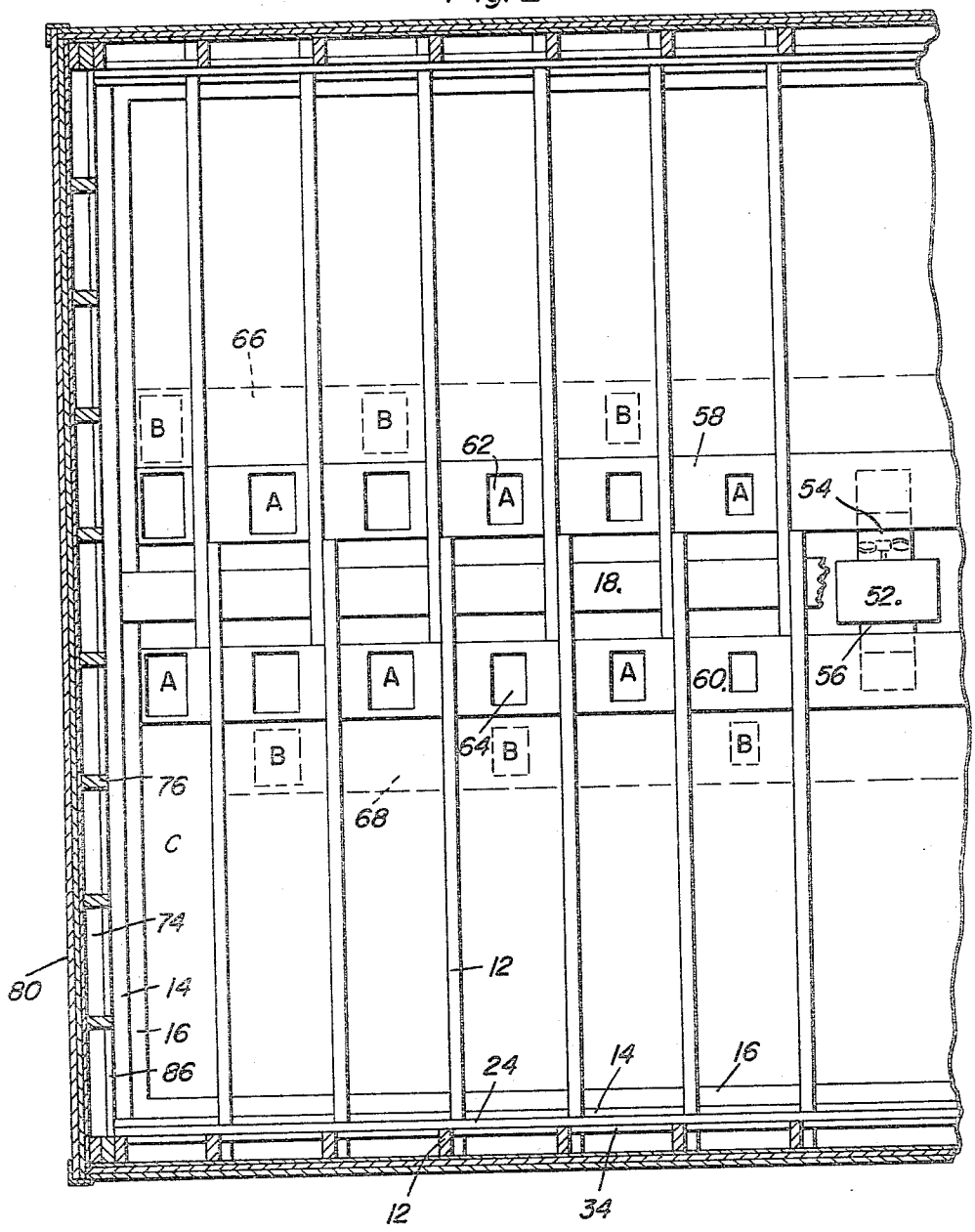
Fig. 2



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BUILDING WITH INTERNAL AIR FLOW PASSAGES

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Fig. 3

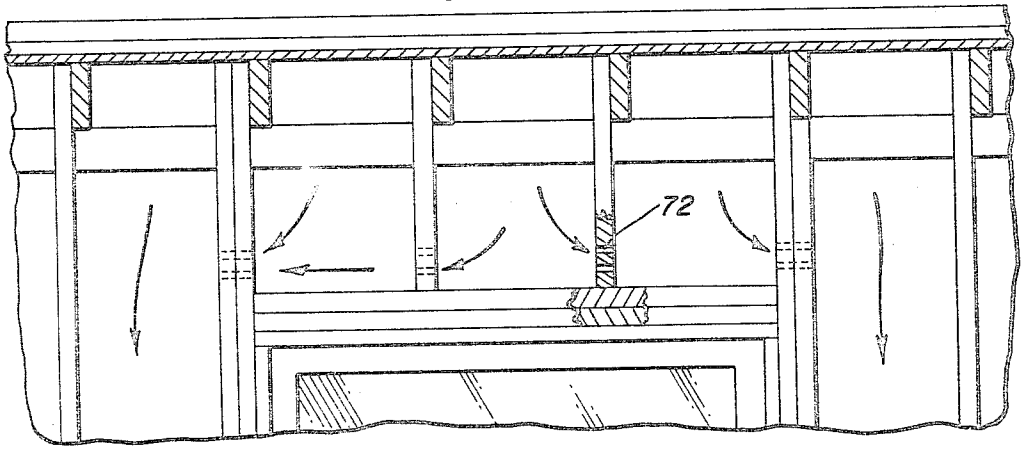


Fig. 4

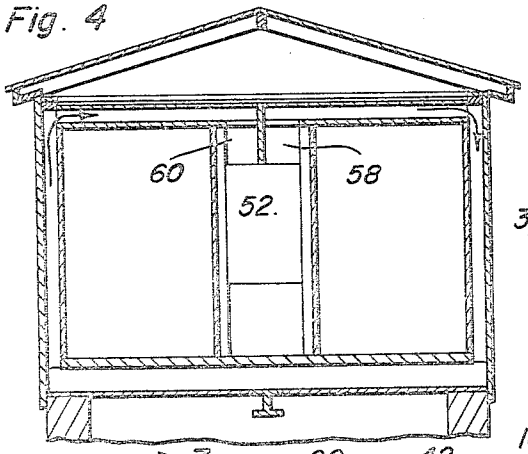
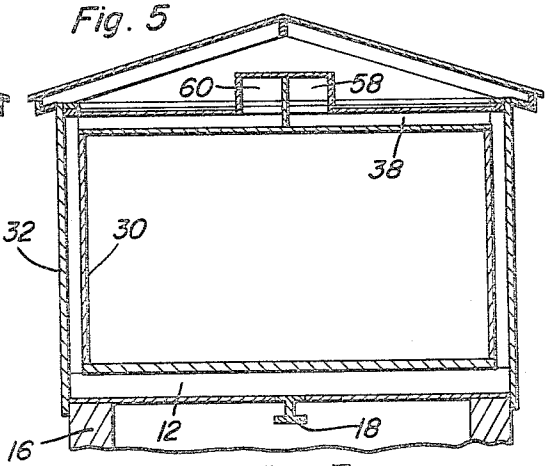


Fig. 5



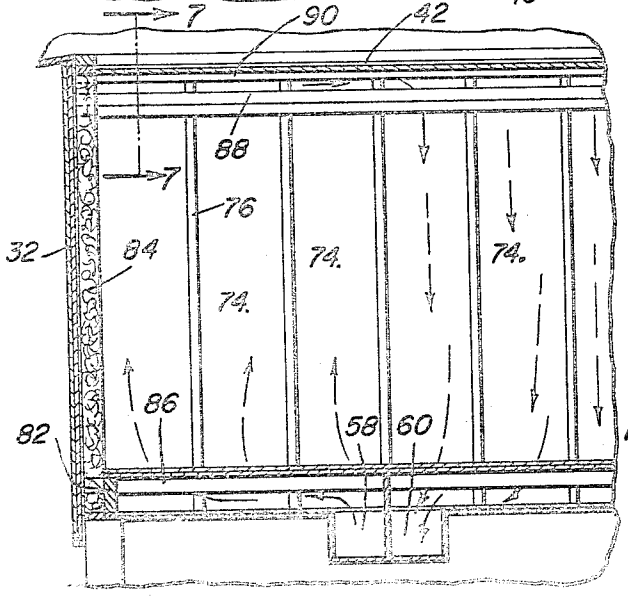
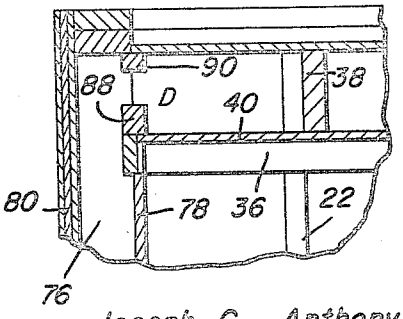


Fig. 6

Fig. 7



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United States Patent Office 3,303,770 Patented Feb. 14, 1967

3,303,770 BUILDING WITH INTERNAL AIR FLOW PASSAGES

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Filed Nov. 25, 1964, Ser. No. 413,738
7 Claims. (Cl. 98—31)

The present invention is generally concerned with building construction, and more particularly relates to building construction incorporating air flow passages integrally therewith, thereby providing for a new and useful manner of distributing conditioned air throughout a building.

One of the primary objects of the instant invention is to provide for a structural system which, while generally corresponding to conventional structural systems, includes small though highly significant modifications which enable the system, in addition to supporting the building, also provide a system of communicating chambers by which conditioned air can be caused to flow completely about the building within the floor, walls and ceiling thereof.

Another highly significant object of the instant invention is to provide a construction for any type of building, either residential or commercial, wherein the flow of treated air is specifically confined between the inner shell of the building and the outer shell, the space between the shells normally being defined by conventional studs, and floor and ceiling joists.

In conjunction with the above object, it is also a significant object of this invention to provide a system for conditioning the air within a building wherein the treated air is not introduced directly into the interior of liveable portion of the building, thereby avoiding any agitation of the air within the living area such as might cause discomfort to the inhabitants.

Further, a highly significant object of the instant invention is to provide for an even distribution of treated air completely about the exterior of a building, thereby providing for an even heating of the air within the liveable area without the creating of "hot spots" and "cold spots" such as is normally achieved by conventional conditioning systems, either heating or cooling.

A further significant object of the instant invention resides in the provision of the air flow passages through the structural arrangement of the structural members themselves in a manner so to provide for a substantially automatic conforming of the heating and/or cooling system in the event that the original building is to be expanded or remodeled.

Likewise, the flow passages can themselves be closed or opened as desired in that no extrinsic duct work need be provided or removed, this elimination of the duct work also substantially reducing building costs in that not only are the ducts themselves eliminated, but no provision need be made for the ducts in erecting the building.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is an enlarged transverse cross-sectional view through a building illustrating one form of the building construction contemplated by the instant invention;

FIGURE 2 is a horizontal cross-sectional view of the building construction of the instant invention illustrating a slightly different positioning of the air flow producing means;

FIGURE 3 is a partial cross-sectional view through a wall illustrating the manner in which the air flow is to be accommodated over doors or windows;

FIGURES 4 and 5 illustrate other possible locations for the air flow inducing means in conjunction with the building construction of the instant invention;

FIGURE 6 illustrates a building end wall and the manner in which the desired air flow occurs therethrough;

FIGURE 7 is an enlarged cross-sectional view taken substantially on a plane passing along line 7—7 in FIGURE 6.

Referring now more specifically to the drawings, reference numeral **10** is used to generally designate a building constructed in accordance with the instant invention. This building **10** basically includes a floor system, a ceiling system and a wall system each, in themselves, provided with elongated non-communicating chambers which in turn communicate with corresponding chambers in the other systems so as to provide in effect laterally arranged elongated passages surrounding the entire interior of the building.

One specific structural arrangement embodying the ideas or concepts of the present invention is illustrated in FIGURE 1. In this embodiment, floor joists **12** are laid in the conventional manner transversely across the building and supported, at the opposite ends thereof, on plates **14** located on top of the side foundation walls **16**. These floor joists **12** are of course laterally spaced from each other, generally at 16 inch or 24 inch centers, for the full length of the building. While a central beam **18** has been illustrated, it will of course be appreciated that the necessity of such a beam depends upon the length of the span. The opposite ends of the joists **12** each have a notch **20** in the upper edge thereof extending longitudinally inward a distance substantially equal to the depth of the wall studs **22** and transversely extending floor braces **24**.

The side wall studs **22**, on equal centers with the floor joists **12**, are each secured to the plate **14** adjacent corresponding sides of the floor joists **12** for the full length of the building **10**, thereby providing in effect a vertical continuation of the joists **12** and the chamber or space therebetween. The floor braces **24** are accommodated by the inner ends of the notches **20** and extend along the inner edges of the studs **22** in spaced relation to the bottom end thereof, thereby stabilizing the studs and providing a support for the flooring **26** in conjunction, of course, with the floor joists **12**. It will be noted that the floor braces **24** are specifically spaced above the lower edges of the joists **12** so as to provide for free communication of the spaces between the adjoining joists **12** and between corresponding adjoining studs **22**.

Incidentally, the bottoms of the spaces or chambers between adjacent floor joists **12** are sealed by suitable insulated sheathing **28**, thereby providing a plurality of laterally adjacent although non-communicating elongated air chambers. The vertical chambers between adjacent wall studs **22** are also of course enclosed by the conventional interior and exterior finishing faces **30** and **32** which may be of any desired or normally used material, such as for example brick, wood, plaster, etc.

With continuing reference to FIGURE 1, it will be noted that lower and upper ribbon strips **34** and **36** are mounted transversely across the studs **22** within notches in the inner edges thereof adjacent the upper and lower ends. These ribbon strips are of assistance in securing the interior wall panels or surfaces **30** with the upper ribbon strips **36** also supporting the transversely extending ceiling joists **38**. These ceiling joists **38** are provided on equal centers with the floor joists **12** and wall studs **22** for the full length of the building **10** with each ceiling joist **38** being positioned against corresponding sides of the wall studs **22** thereby providing an upper horizontal continuation of the wall chambers and completing the circular paths surrounding the interior of the building **10**. The spaces or chambers between the ceiling

joists **38** are also of course enclosed, this being effected by the interior ceiling **40** and upper or exterior insulated sheathing **42**, thereby preventing lateral communication between adjacent ceiling chambers while providing for longitudinal communication with the corresponding vertical wall chambers which in turn communicate with the corresponding floor chambers so as to provide for the desired air flow passage. The above described construction is highly stable in nature, differing only slightly from conventional building construction, but at the same time providing for a highly novel plurality of air flow permitting passages laterally related and adjacent to each other for the full length of the building, while in no way distracting from the structural stability of the building. The roof **44** of the building **10** can of course be finished in any conventional manner, for example utilizing peaked rafters **46** supported centrally by a ridge beam **48** and at the overhang edges thereof by conventional plates **50** on the upper ends of the wall studs **22**.

FIGURES 1, 2, 4 and 5, in addition to illustrating the specifically described construction, are also intended to illustrate the manner in which the source of treated or conditioned air can be communicated with the internal passages at different points thereof. This source **52**, which may be a conventional furnace, air conditioning unit, or combination of both, has a forced air outlet **54** and an inlet **56**, both communicated with elongated ducts **58** and **60** extending longitudinally of the building and having laterally directed outlet openings **62** and inlet openings **64** communicated with the adjacent internal passages. These ducts **58** and **60**, which incidentally form the only duct work within the system, can be positioned at any suitable location, for example along opposite sides of the central beam **18** below the floor joists **12**, as shown in FIGURE 2, to one side of the central beam **18** beneath the floor, as illustrated in FIGURE 1, above the ceiling joists, as illustrated in FIGURE 5, or within a boxed-in portion below the ceiling joists, as illustrated in FIGURE 4. By the same token, the air conditioning unit **52** can also be conveniently located where desired, for example within an interior closet as shown in FIGURE 4.

In operation, the conditioned or treated air is forced through the supply duct **58** for discharge into the enclosure circling passages through the outlet openings **62**, this conditioned air travelling completely about the building and entering the return duct **60** through the inlet opening **64** for subsequent reconditioning or treatment by the unit **52**. Under such an arrangement, it will be appreciated that the air flows in the same direction through each of the passages or passageways. However, if it should become desirable to provide for the flow to travel in opposite directions in adjacent passages, such as would be desirable in larger buildings so as to achieve a more uniform heating of the enclosure, a second pair of ducts **66** and **68** can be provided, one adjacent each of the ducts **58** and **60**. In such an arrangement, the ducts **58** and **60** will both function as supply ducts and have the outlet openings in every other passage with the outlet openings in the duct **58** alternating with the outlet openings in the duct **60**, the reference letter A being used to indicate these alternating outlet openings. By the same token, both of the ducts **66** and **68** are to function as return ducts and have the inlet openings B therein appearing in the alternate passages relative to the opening A in the adjoining ducts **58** or **60**. Thus, under this arrangement, the conditioned air will be discharged in opposite directions in alternating passages through the outlet openings A and encircle the building, travelling in opposite directions, for movement through the corresponding inlet openings B. Incidentally, it will of course be appreciated that suitable blocking or deflector elements **70** are to be provided between the ducts **58** and **60** so as to insure a proper movement of the air completely about the building through the communicating chambers in the floor, side walls and ceiling units.

With reference to FIGURE 3, it will be noted that suitable bores or passages **72** are provided transversely through those studs, which do not communicate with both the ceiling and floor, such as for example, over and under windows and over doors, in order that the flow of air therethrough might be discharged laterally into the adjoining chambers.

The system described thus far, as will be appreciated, does not provide for the introduction of the conditioned air into the end walls. However, the movement of the conditioned air through the end walls is also highly desirable in order to achieve an even and consistent or cooling of the enclosure. Accordingly, the end walls are also provided with vertically extending adjacent chambers **74** defined by spaced vertical studs **76** and inner and outer panel-like facing means **78** and **80**. The air is to be introduced into selected ones of these vertical end wall chambers **74** from the adjacent supply chamber, for example that portion of the end floor chamber, indicated by reference letter C in FIGURE 2, communicated with the outlet opening in the supply duct **60**, assuming a location of the ducts **58** and **60** below the floor unit. The air then travels vertically through the chambers **74** to the upper ends thereof and subsequently into the adjacent ceiling chamber, indicated by reference letter D in FIGURE 7, which in turn conducts the flow to selected ones of the end wall vertical chambers **74** which communicate, at their lower ends, with that portion of the adjacent floor chamber C which communicates with the return or inlet opening. The direction of this flow within the end walls would of course be reversed assuming the location of the ducts **58** and **60** above the ceiling. In order to direct the flow from the adjacent floor chamber C, the opposite ends of this chamber are blocked off, as at **82**, so as to prevent flow of the air into the adjacent side wall chambers, which in turn are filled with suitable insulation **84**. Further, rather than having full height floor and ceiling joists along the outer sides of the end chambers C and D, such as would prevent any flow into the end wall chambers **74**, reduced height braces **86**, **88** and **90** are provided, thereby allowing free movement of the forced air between the horizontal chambers C and D and the vertical chambers **74**. Incidentally, if so desired, full height joists can be provided at this point with the joists having bores or passages drilled therethrough, generally in the same manner as the bores or holes **74** described in conjunction with FIGURE 3. Thus, it will be appreciated that as air is supplied to each of the end chambers C of the floor unit, this air, because of the blocking **82**, is directed laterally into the adjoining end wall chambers **74** and rises therein until laterally directed into the ceiling unit chambers D for subsequent movement therealong to the vertical end wall chamber **74** which communicate with the return portion of the adjacent floor chambers C, thereby providing a complete flow through the end walls as well as through the side walls. Incidentally, by utilizing the floor duct system described in conjunction with FIGURE 2, and tapping off of the two floor chambers at each end of the house, alternating flow can also be provided in the end walls if so desired.

From the foregoing, it will now be appreciated that a highly novel construction system has been defined, this system integrally incorporating air flow passages therein for providing a heretofore unknown manner of evenly and consistently maintaining a predetermined temperature within the building, this being done without necessitating any movement of air whatsoever within the living enclosure itself.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and de-

scribed, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In a building construction, a floor system, a wall system, and a ceiling system, said systems being combined to form an enclosure having a floor unit, a ceiling unit, and at least two side wall units and two end wall units, said wall units comprising the wall system, said floor unit comprising the floor system, said ceiling unit comprising the ceiling system, a plurality of elongated chambers extending completely through said floor and ceiling units from one side wall unit to the other side wall unit, each side wall unit having a plurality of elongated chambers extending therethrough and communicating at one end with the floor chambers and at the other end with the ceiling chambers, thereby forming a plurality of passages surrounding said enclosure, and means for inducing a forced flow of air through each passage, said means for inducing a forced flow of air through each passage inducing the flow in opposite directions in adjacent passages.

2. The construction of claim 1 wherein the chambers in each of the floor, ceiling and side wall units are defined by elongated laterally spaced structural members and inner and outer air retaining panel-like facing means secured directly to the opposite longitudinal edges of the structural members.

3. In a building construction, a floor system, a wall system, and a ceiling system, said systems being combined to form an enclosure having a floor unit, a ceiling unit, and at least two side wall units and two end wall units, said wall units comprising the wall system, said floor unit comprising the floor system, said ceiling unit comprising the ceiling system, a plurality of elongated chambers extending completely through said floor and ceiling units from one side wall unit to the other side wall unit, each side wall unit having a plurality of elongated chambers extending therethrough and communicating at one end with the floor chambers and at the other end with the ceiling chambers, thereby forming a plurality of passages surrounding said enclosure, and means for inducing a forced flow of air through each passage, the chambers in each of the floor, ceiling and side wall units being defined by elongated laterally spaced structural members and inner and outer air retaining panel-like facing means secured directly to the opposite longitudinal edges of the structural members, the majority of said chambers in each of the floor, ceiling and side wall units being in adjacent though non-communicating relation to each other, the number of chambers in each of these units being such so as to extend laterally for substantially the entire extent of the corresponding unit between the end walls, said end walls including adjacent, non-communicating elongated chambers extending vertically through each end wall, openings communicating each end wall chamber solely with both the adjoining floor chamber and the adjoining ceiling chamber, and means closing the opposite ends of said adjoining floor and ceiling chambers whereby flow induced in said adjoining floor and ceiling chambers will flow through said end wall chambers.

4. In a building construction, a floor system, a wall system, and a ceiling system, said systems being combined to form an enclosure having a floor unit, a ceiling unit, and at least two side wall units and two end wall units, said wall units comprising the wall system, said floor unit comprising the floor system, said ceiling unit comprising the ceiling system, a plurality of elongated chambers extending completely through said floor and ceiling units from one side wall unit to the other side wall unit, each side wall unit having a plurality of elongated chambers

extending therethrough and communicating at one end with the floor chambers and at the other end with the ceiling chambers, thereby forming a plurality of passages surrounding said enclosure, and means for inducing a forced flow of air through said passage, the chambers in each of the floor, ceiling and side wall units being defined by elongated laterally spaced structural members and inner and outer panel-like facing means secured to the opposite longitudinal edges of the structural members, the majority of said chambers in each of the floor, ceiling and side wall units being in adjacent though non-communicating relation to each other, the number of chambers in each of these units being such so as to extend laterally for substantially the entire extent of the corresponding unit between the end walls, said means for inducing a forced flow of air through each passage inducing the flow in opposite directions in adjacent passages.

5. In a building, a plurality of horizontal laterally spaced elongated parallel floor joists, panel-like means fixed to the upper and lower edges of said floor joists and forming individual enclosed chambers between adjacent floor joists, a plurality of vertically projecting parallel studs adjacent each end of the plurality of floor joists, said studs being laterally spaced and located one juxtaposed each joist end, panel-like means fixed to the inner and outer edges of the studs and forming individual enclosed chambers between adjacent studs, said stud chambers each communicating with a floor chamber and forming a continuation thereof, a plurality of horizontal laterally spaced elongated parallel ceiling joists, each ceiling joist having the opposite ends thereof located juxtaposed opposed ones of said studs, panel-like means fixed to the upper and lower edges of the ceiling joists and forming individual enclosed chambers between adjacent ceiling joists, said ceiling joist chambers communicating with aligned stud chambers at opposite ends thereof, thereby forming endless closed parallel circular passages about the building, adjacent ones of a majority of said passages being out of communication with each other, and means for introducing a forced flow of air for movement in a single direction through a circuit comprising substantially the entire length of each passage.

6. The construction of claim 4 including adjacent, non-communicating chambers extending vertically through each end wall, openings communicating each end wall chamber solely with both the adjoining floor chamber and the adjoining ceiling chamber, and means closing the opposite ends of said adjoining floor and ceiling chambers whereby flow induced in said adjoining floor and ceiling chambers will flow through said end wall chambers.

7. The construction of claim 5 wherein said means for introducing a forced flow of air comprises a source of pressurized air, a pair of adjacent air ducts communicated with said source and extending laterally across said circular passages, said ducts communicating with each other solely through said source and constituting a supply duct and a return duct, said ducts both communicating with each passage at adjacent locations which constitute the beginning and end of the corresponding flow circuits.

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