

Aug. 1, 1950

W. ONG

2,517,020

VENTILATED BUILDING CONSTRUCTION

Filed May 17, 1946

4 Sheets-Sheet 1

Fig. 1.

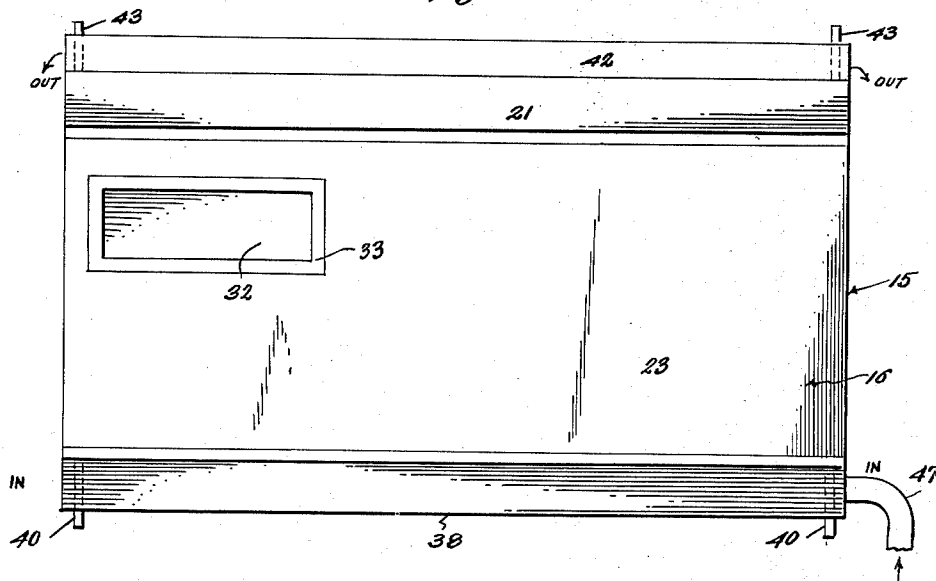
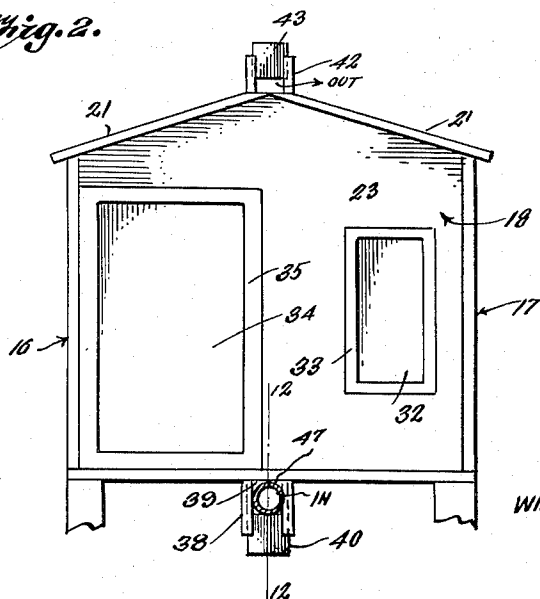


Fig. 2.



Inventor

WILLIAM ONG

By

Randolph & Beavers

Attorneys

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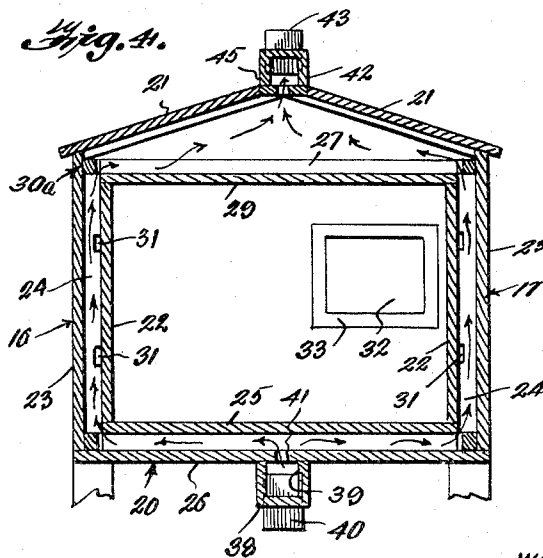
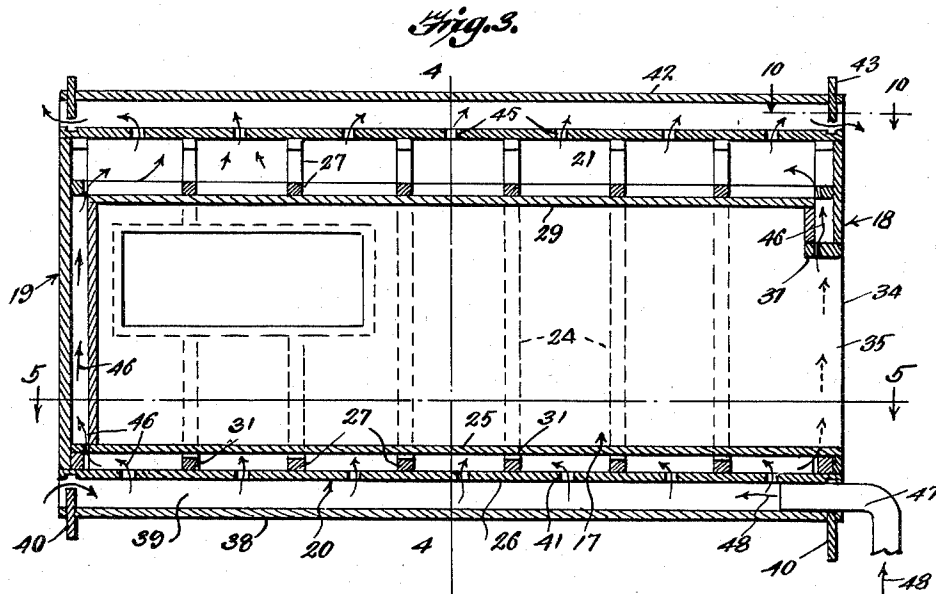
W. ONG

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Inventor
WILLIAM ONG

By *Randolph & Beavers*
Attorneys

Aug. 1, 1950

W. ONG

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Fig. 5.

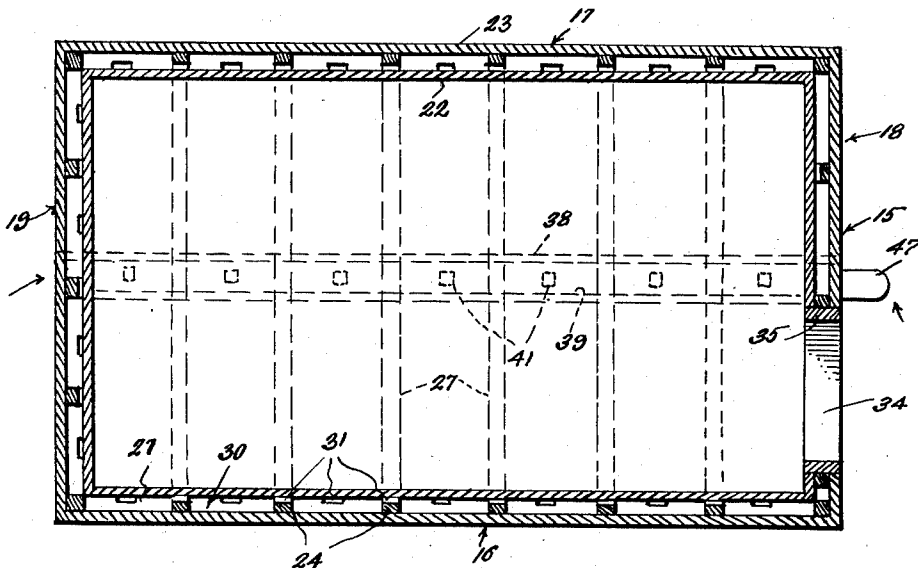


Fig. 6.

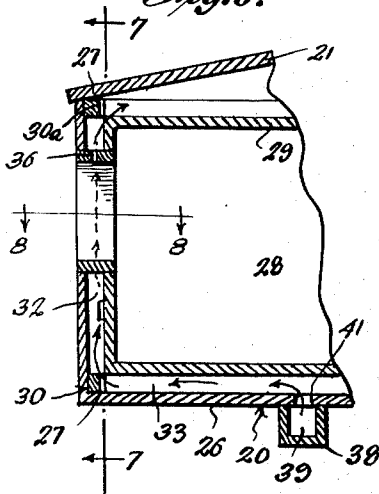
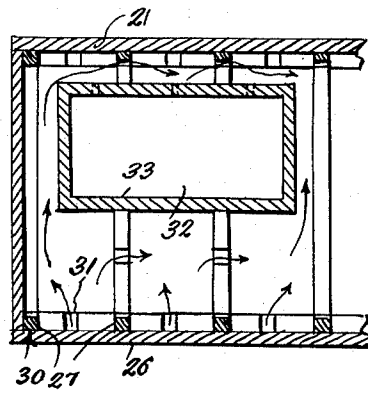


Fig. 7.



Inventor
WILLIAM ONG

By *Randolph & Creavers*
Attorneys

Aug. 1, 1950

W. ONG

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Fig. 8.

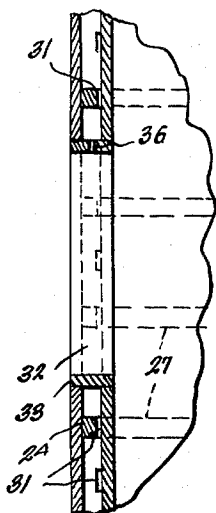


Fig. 10.

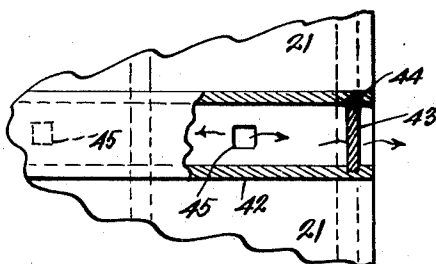


Fig. 11.

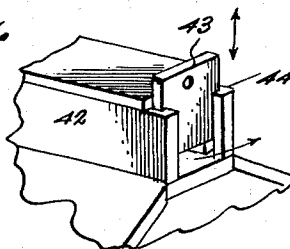


Fig. 9.

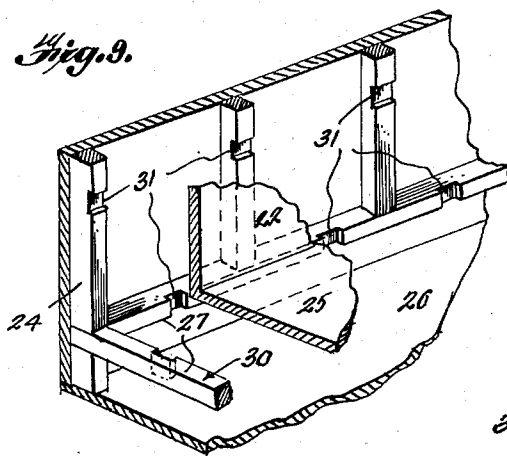
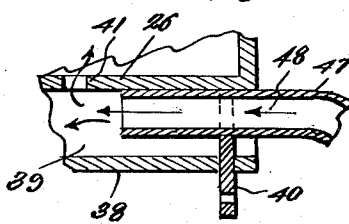


Fig. 12.



Inventor

WILLIAM ONG

By

Randolph & Beavers

Attorneys

UNITED STATES PATENT OFFICE

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VENTILATED BUILDING CONSTRUCTION

William Ong, Fredonia, Kans.

Application May 17, 1946, Serial No. 670,626

2 Claims. (Cl. 98—31)

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This invention relates to a novel building construction affording ventilating spaces or chambers within the walls, floors and roof thereof to permit a continuous upward circulation of air for cooling the interior of the building in hot weather or for heating the interior thereof in cold weather.

It is a purpose of the present invention to provide a ventilating construction for buildings of various types including houses, warehouses, trailers of various types, and other types of buildings used either for storage, or as living quarters for human beings or animals.

It is a primary object of the present invention to provide a ventilated building construction especially intended and adapted for use in hot climates where it is desirable to provide means for cooling the interior of dwellings or other buildings, and which utilizes the normal tendency of hot air to rise for producing a circulation through the walls, floor and roof of buildings for cooling such parts to therefore cool the interior of the building.

Another object of the invention is to provide a building construction of the aforescribed character, which may be utilized for the circulation of hot air in colder climates for heating the interior of the building by the so called "radiant heat" method.

Numerous other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view of a one-room ventilated building constructed in accordance with the invention;

Figure 2 is an end view in elevation thereof;

Figure 3 is a longitudinal, substantially central sectional view of the building;

Figure 4 is a cross sectional view thereof, taken substantially along a plane as indicated by the line 4—4 of Figure 3;

Figure 5 is a horizontal sectional view of the building taken substantially along a plane as indicated by the line 5—5 of Figure 3;

Figure 6 is a fragmentary transverse vertical sectional view of a portion of the building;

Figure 7 is a fragmentary longitudinal sectional view taken substantially along a plane as indicated by the line 7—7 of Figure 6;

Figure 8 is a fragmentary horizontal sectional view taken substantially along a plane as indicated by the line 8—8 of Figure 6;

Figure 9 is a fragmentary perspective view,

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partly in section and partly in elevation of a portion of the building;

Figure 10 is a fragmentary top plan view, partly in section of the building room, the sectional portion thereof being taken substantially along a plane as indicated by the line 10—10 of Figure 3;

Figure 11 is a perspective view of a portion of an end of the room, and

Figure 12 is a fragmentary vertical sectional view taken substantially along a plane as indicated by the line 12—12 of Figure 2.

Referring more specifically to the drawings, for the purpose of illustrating a simple embodiment of the invention, a one-room building, designated generally 15, is disclosed in the drawing. It is to be understood of course that the ventilated construction of the building 15, hereinafter to be described, may be embodied in buildings of various sizes and shapes having any number of rooms and including trailers, dwellings, warehouses, and other types of buildings.

The building 15 includes side walls 16 and 17, end walls 18 and 19, a floor 20, and a sloping roof 21. As best seen in Figure 5, the walls 16, 17, 18 and 19 each include an inner wall 22 and an outer wall 23, which walls 22 and 23 are retained in spaced apart relationship by a plurality of studs 24. Likewise, as seen in Figure 3, the floor 20 includes an upper floor 25 and a lower floor 26 which are retained in spaced apart relationship by means of a plurality of joists 27. The room or enclosure 28 of the building 15 is provided with a ceiling 29 which is spaced from the sloping roof 21 by additional joists 27, certain of which are arranged at an incline, as seen in Figure 3, to support the sloping sides of the roof 21 in spaced apart relationship to the ceiling 29.

As seen in Figure 9, the skeleton framework of the building 15 is located between the inner and outer walls thereof and includes a rectangular frame 30 located at the base of the building and a rectangular frame 30a which is located just beneath the roof 21. The frames 30 and 30a are formed by joists 27 which are connected at their ends to corner studs 24. The inner edges of all of the joists 27 and studs 24 which are located in the floor and walls of the building 15 are provided with transverse notches 31 in their inner edges forming communicating passages between the wall spaces 32 and the floor spaces 33 to permit a circulation of air between said spaces for a purpose which will hereinafter be described.

Some or all of the walls of the building 15 are provided with window openings 32 defined by

frames 33 which may be of various sizes and shapes. The window openings 32 may be closed by sashes of any type or construction, not shown. One or more of the walls of the building 15 are provided with door openings 34 defined by a frame 35 and which may support any type of door, not shown. As best seen in Figures 3 and 6, the top rail of the window frames 33 and door frames 35 are each preferably provided with a plurality of small apertures 36, 37, respectively, which open into the air spaces between the inner and outer walls 22 and 23.

As best seen in Figures 3 and 4, an elongated U-shaped member 38 is secured to the underside of the sub-floor 26 intermediate of the side walls 16 and 17 and extends from end to end of the building 15 to combine with a portion of the sub-floor 26 to form a conduit 39, the open ends of which are adapted to be closed or partially closed by sliding closures 40 which are slidably mounted in the end portions of the U-shaped member 38 for vertical sliding movement for closing or partially closing the ends of the conduit 39. The closures 40 are frictionally retained in closed or partially closed position. The sub-floor 26 is provided with a plurality of openings 41 which communicate with the conduit 39.

A conduit 42 of rectangular cross section forms the ridge pole of the roof 21 and is located at the apex thereof and between the sloping sides of the roof and extends from end to end thereof. The conduit 42, like the conduit 39 is open at its ends and said ends, as best illustrated in Figure 11, are provided with vertically slidable closures 43 which slidably and frictionally engage guideways 44. Frictional engagement exists between closures 43 and guideways 44 to maintain the closures in an open or partially open position. As best seen in Figure 10, the bottom portion of the conduit 42 is provided with a plurality of spaced openings 45 forming communicating ports between the interior of the conduit 42 and the space between the roof 21 and the ceiling 29.

Because of the normal tendency of warm air to rise, the building 15 has been designed especially for use in hot climates to utilize the natural action of the air. Consequently, the air in the spaces between the inner and outer walls 22 and 23, respectively, of the side walls 16 and 17 and the end walls 18 and 19 will tend to rise, as indicated by the arrows 46 into the chamber between the roof 21 and the ceiling 29. The hot air in this space will seek the highest point which is directly beneath the conduit 42 and will escape therefrom through the apertures 45 into said conduit. Assuming that the closures 43 are open or partially open, the hot air in the conduit 42 will seek escape into the cooler atmosphere beyond the open ends of the conduit 42. This upward circulation of the air will create a partial vacuum or suction causing the air between the floor 25 and sub-floor 26, as indicated by additional arrows 46, to be drawn into the spaces between the inner and outer walls 22 and 23 through the notches 31 in the joists 27 forming the bottom frame 30. Likewise, a partial vacuum or suction will thus be created in the space between the floor 25 and the sub-floor 26 thus causing air to be drawn into this space from the conduit 39, as indicated by additional arrows 45. The conduit 39 which is located beneath the building 15 may be disposed above or adjacent the ground or within the cellar of the building 15. In either case, the air beneath the building 15 will be substantially cooler than the air located

in the spaces between the inner and outer walls 22 and 23 or the spaces between the floor 25 and the sub-floor 26, so that if the closures 40 are open or partially open, as seen in Figure 3, the cool air will enter the conduit 39 through each end thereof and pass upwardly, as indicated by additional arrows 46, through the apertures 41 into the space between the floor and sub-floor. It will be readily apparent that this air will continue its upward movement between the wall portion 22 and 23, into the space between the ceiling 29 and roof 21, into the conduit 42 and out through the ends thereof. Thus, a continuous and complete circulation of air will be constantly occurring above, beneath and completely around the room or enclosure of the structure 15. The notches 31 in the joists 27 which are located between the floor 25 and sub-floor 26 permit the air to pass lengthwise of the building 15 within this space, as well as passing transversely between the joists. As previously mentioned, the notches 31 in the lower frame 30 permit the air to pass from the space beneath the floor 25 into the spaces between the inner and outer portions of the side and end walls. Likewise, the notches 31 in the upper frame 30a permit the air to pass from between the walls into the space between the roof 21 and ceiling 29. As the joists 27 in this last mentioned space do not contact both the roof and ceiling, sufficient space is available to permit the free passage of the air, as indicated by arrows 46, to the apertures 45. The notches 31 in the studs 24 of the side and end walls of the building 15 permit lateral movement of the air through the spaces between the inner and outer walls 22 and 23, past the studs 24. The openings 36 in the upper rails of the window frames 33 and the openings 37 in the upper rails of the door frame or frames 34 permit additional cool air to be drawn into the spaces between the inner and outer portions of the side and end walls.

Whereas, as previously stated, the ventilated building structure 15 is primarily intended for use in hot climates, the structure 15 may also be utilized in cold or temperate climates for cooling the enclosure during the summer months and for providing conduits for the circulation of hot air during the winter months. For accomplishing the latter purpose, a hot air flue 47 is shown in Figures 1, 2, 3 and 12 extending into an end of the conduit 39 past one of the partially opened closures 40. The opposite end of the conduit 47, not shown, may be connected to any suitable source for heating air so that the hot air therefrom, as indicated by the arrows 48, will pass upwardly through the conduit 47 and be discharged into the conduit 39, from which the hot air will follow the course, as indicated by the arrows 46, and as previously described in reference to the circulation of cooling air, to the upper, discharge conduit 42. This hot air will heat the closure of the building 15 by the so called "radiant heat system" through heating the inner walls 22, the floor 25 and the ceiling 29. Obviously, the closure 40 at the opposite end of the conduit 39 will be closed or another heat supply pipe 47, not shown, may be positioned to open into the opposite end of the conduit 39. Also, the extent of opening of the closures 43 will be reduced to retard the escape of the heated air until substantially all of the heat therefrom has been utilized.

Various modifications and changes are contemplated and may obviously be resorted to without departing from the spirit and scope of the

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invention as hereinafter defined by the appended claims.

I claim:

1. A ventilated structure comprising an enclosure having side walls and end walls each formed of spaced inner and outer wall portions, a floor composed of a floor portion and a sub-floor portion spaced therefrom, a roof composed of a ceiling and a peak roof portion spaced therefrom; a framework interposed between and connected to the inner and outer wall portions and the floor portion and sub-floor portion, said framework being connected to the peak roof portion and ceiling and connecting the inner wall portions to the floor portion and ceiling and the outer wall portions to the sub-floor portion and peak roof portion to provide spaces between the wall portions, floor portion and sub-floor, and ceiling and peak roof portions; said framework comprising floor joists disposed in the floor space, vertical stud members resting on said joists and disposed in the wall spaces, horizontal ceiling joists supported by the studs and disposed in the roof space, peak roof members supported by the vertical stud members and disposed in the roof space, and frame members extending along the ends of the floor joists and along the ends of the horizontal ceiling joists and located in the floor space and roof space, respectively; said floor joists, vertical stud members and frame members each having notches extending transversely thereacross forming air passages whereby air may circulate freely in different directions through the floor space and the wall spaces and between the floor space and wall spaces and from the wall spaces into the roof space; said sub-floor having a series of openings disposed longitudinally and centrally thereof and extending substantially from end-to-end of the sub-floor, a conduit secured to the underside of the sub-floor and extending from end-to-end thereof, said conduit having open ends communicating with the atmosphere and an open top communicating with each of the sub-floor openings for supplying air to the floor space, said peak roof portions having a series of openings along its ridge extending from end-to-end thereof, a con-

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duit secured along the outside of the roof ridge and extending from end-to-end thereof, said last mentioned conduit having an open bottom communicating with each of said ridge openings and having open ends communicating with the atmosphere and by which air can be exhausted from the roof space, and a valve for closing, exposing or partly exposing each of the ends of each conduit.

2. A ventilated structure as in claim 1, certain of said side and end walls being provided with window and door openings defined by window and door frames, respectively, the upper rail of each of said door and window frames being provided with apertures communicating with the atmosphere and with the interior of the enclosure and also with the spaces between the inner and outer wall portions for admitting air from the interior of the enclosure and from the atmosphere to the wall spaces.

WILLIAM ONG.

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