United States Patent

[11] **3,574,983**

[72] Inventors **Peter A. Kreider**
1307 Denice Court;
Richard D. Pepworth, 639 Cottonwood Drive, Brea, Calif. 92621

[21] Appl. No. **797,752**
[22] Filed **Feb. 10, 1969**
[45] Patented **Apr. 13, 1971**

[54] **COOL WALL MODULAR CHIMNEY**
9 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **52/219,** 98/46, 126/307
[51] **Int. Cl.** ..... **E04d ,13/14** E04f 17/02
[50] **Field of Search** 52/219, 91, 218, 227; 98/46; 126/307

[56] **References Cited**

UNITED STATES PATENTS

457,233	8/1891	Suffron	98/46
843,797	2/1907	Dauben et al.	52/219X
1,042,085	10/1912	Clawson	52/219
1,657,441	1/1928	Huouinen	52/91X
2,275,902	3/1942	Nasenburger et al.	52/219X
2,304,500	12/1942	Hoesli	52/218X
2,372,707	4/1945	Blome	52/218X
2,687,127	8/1954	Leffler	98/46X
2,713,301	7/1955	McKann	52/218X
2,821,900	2/1958	Primich	98/46
3,339,540	9/1967	Kreider	160/117X
3,472,031	10/1969	Kelso	52/227X

FOREIGN PATENTS

77,487	9/1918	Switzerland	52/219

Primary Examiner—Frank L. Abbott
Assistant Examiner—Sam D. Burke, III
Attorney—William C. Babcock

ABSTRACT: A free standing cool wall chimney that is formed from a number of modular sections of thermal insulation material which may be supported in whole or in part from a roof structure. The chimney is particularly adapted for use with a preformed fireplace, and surrounds a flue pipe that extends upwardly from the fireplace to cooperate with the flue pipe to define an annulus-shaped passage therein. Air is admitted into the lower portion of the passage to be subsequently heated by the flue pipe. The heated air moves upwardly in the passage to discharge from the upper end thereof, and in so doing, maintains the chimney in a cool condition. The chimney is further maintained in a cool condition due to the sections thereof being fabricated from a heat insulation material.

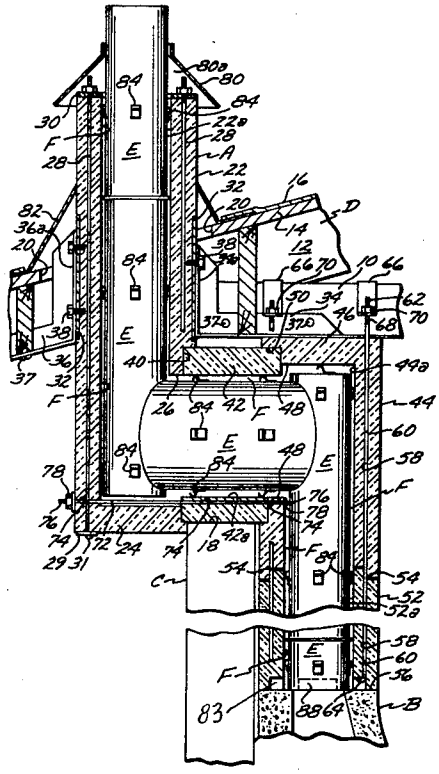


FIG. 1

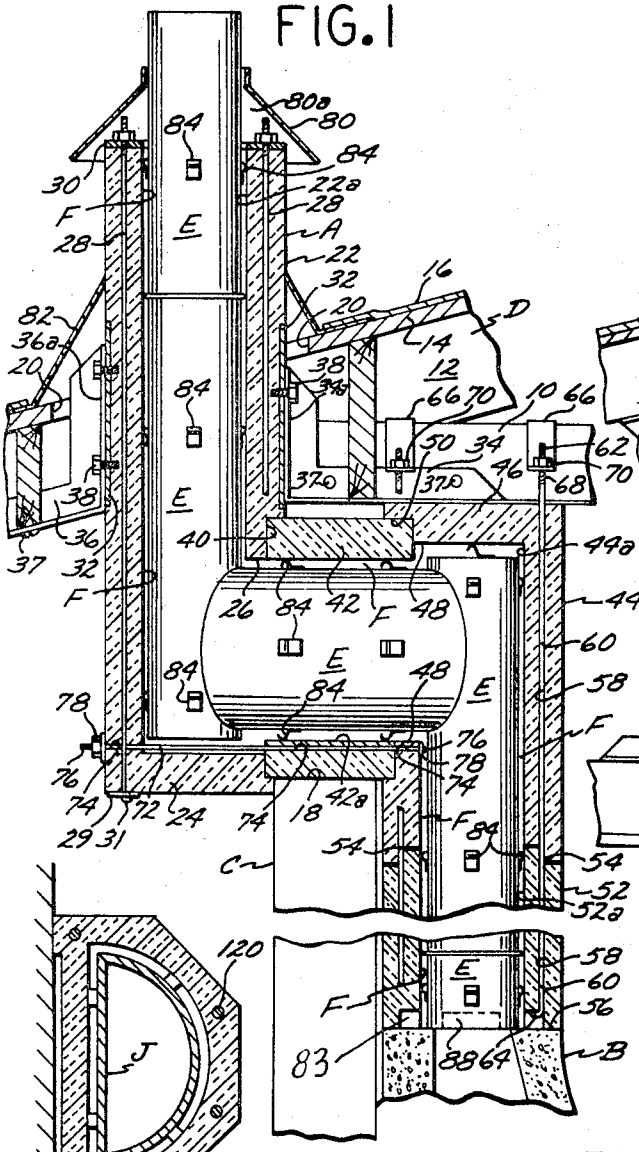


FIG. 2

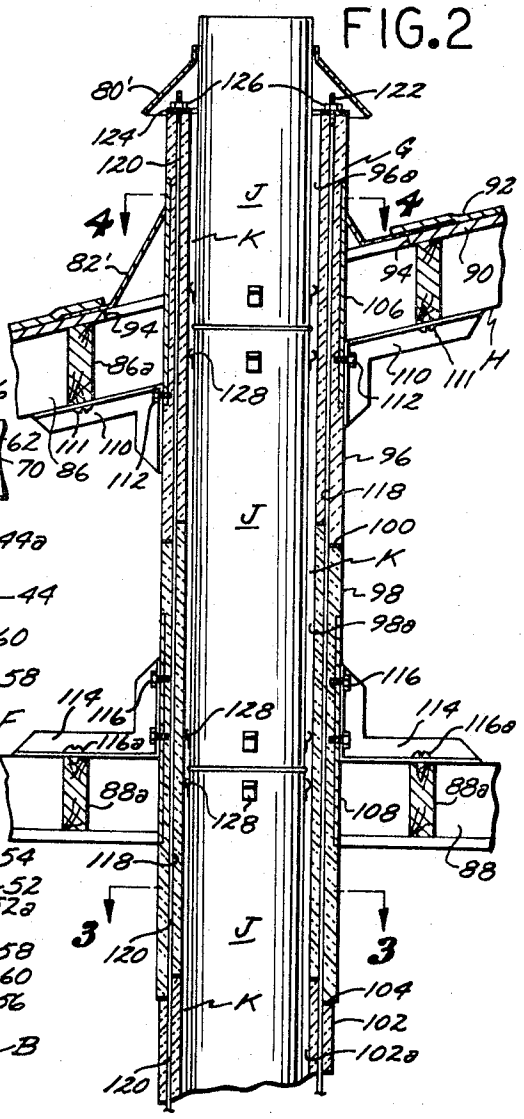


FIG. 5

FIG. 3

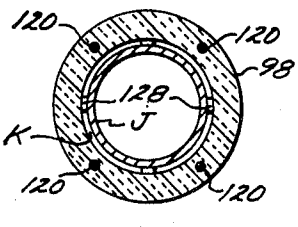


FIG. 4

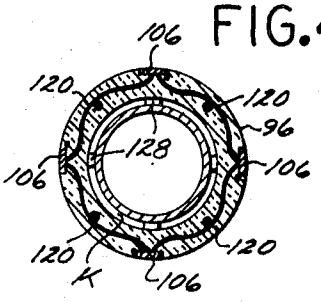


FIG. 6

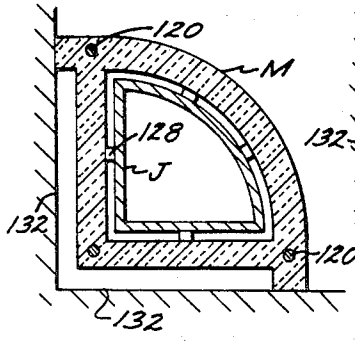
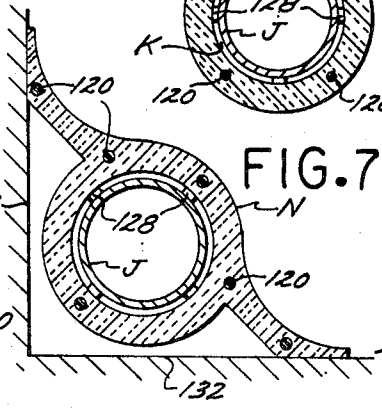


FIG. 7



INVENTORS.
PETE A. KREIDER
RICHARD D. PEPWORTH
BY
William C. Babcock
ATTORNEY

COOL WALL MODULAR CHIMNEY

BACKGROUND OF THE INVENTION

1. Field of the Invention

A freestanding cool wall chimney formed from a plurality of precast modular sections that are interconnected, with the weight of the chimney being adapted to be supported in whole or in part from the roof structure of the building with which the chimney is associated.

2. Description of the Prior Art

During the past few years preformed portable fireplaces have been evolved that may be positioned at a desired location in a new or existing building structure. Heretofore chimneys connected to such fireplaces become relatively hot after use, which not only constitutes a fire hazard, but a source of serious burns to those who may inadvertently come into personal contact therewith. Prior chimneys have included insulated roof sections but not "room" or "above-roof" sections. Also, they do not incorporate cooling air jackets with airflow upwardly therethrough. Furthermore, prior chimneys for portable fireplaces were strictly functional in appearance, not adapted to receive a decorative appearance imparted thereto that would blend with the interior of the building in which the fireplace is installed.

The purpose of the present invention is to provide a chimney structure that will substantially eliminate the inherent operational disadvantages of the prior art chimneys of the character described, as well as furnish a chimney that is attractive in appearance, and with specific provisions for freestanding wall mount, and corner mount applications.

SUMMARY OF THE INVENTION

A freestanding chimney that remains cool during use, and one that is particularly adapted for use with portable fireplaces such as described and claimed in U.S. Letters Pat. No. 3,339,540 entitled "Portable Pre-cast Fireplace" issued to Peter A. Kreider on Sept. 5, 1967. The present chimney may be formed in any desired cross-sectional configuration, and is characterized by a longitudinally extending passage between the chimney and flue pipe into the lower portion of which cool air is admitted, with the air being heated as it flows upwardly therethrough. Heating of the upwardly moving stream of air minimizes the quantity of heat transferred from the flue pipe to the chimney. Further, the chimney is cast of insulation material which runs the full length from fireplace to top of flue.

A major object of the present invention is to provide a freestanding cool wall chimney that is assembled on the job site from preformed modular sections of a cementitious material having low heat conductivity, and with the sections being of any predetermined configuration and transverse cross section.

Another object of the invention is to provide a chimney that encloses a flue pipe and is separated therefrom by a longitudinally extending passage, yet with the chimney being maintained in a cool condition by circulating air upwardly through the passage.

A still further object of the invention is to supply a chimney in which the sections thereof are interlocked by tie rods, which sections are susceptible of being cast to resemble brick or stone or in any desired texture of color.

Yet another object of the invention is to furnish a chimney that can extend upwardly through the roof structure, or outwardly through a wall situated below the roof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical cross-sectional view of a first form of the chimney structure extending through both the wall and roof of a building;

FIG. 2 is a vertical cross-sectional view of a second form of the chimney that extends upwardly through the roof structure of a building;

FIG. 3 is a transverse cross-sectional view of the second form of chimney, taken on the line 3–3 of FIG. 2;

FIG. 4 is a transverse cross-sectional view of the second form of chimney, taken on the line 4–4 of FIG. 2; and

FIGS. 5, 6 and 7 are various transverse cross-sectional shapes in which the first and second forms of chimney may be constructed, and are representative of a large number of possible cross-sectional shapes therefor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The first form A of the chimney is shown in FIG. 1 as being connected to the upper portion of a fireplace B and extending upwardly therefrom through a wall C and roof structure D of a building. The roof structure D is defined by a number of spaced roof joists 10 and angularly disposed roof rafters 12. The rafters 12 support a roof 14 that is covered by a waterproof layer 16, such as shingles, sheeting, or the like. A transverse opening 18 is formed in wall C, and an opening 20 is provided in the roof structure D, as shown in FIG. 1.

The first form A of the chimney includes a first tubular roof section 22 that has a closed lower end 24. A transverse opening 26 is formed in section 22 above the closed lower end 24. The roof section 22 is cast or otherwise formed from a cementitious material as described in U.S. Pat. No. 3,339,540, but preferably contains a higher percentage of lightweight aggregate to lower the weight of the section, and at the same time increase the thermal insulation qualities of the section.

The use of additional lightweight aggregate results in a material that is softer than the composition used in forming the fireplace in U.S. Pat No. 3,339,540, and roof section 22 may accordingly be more easily decorated by carving, or the like. Also, by using a composition containing a greater percentage of lightweight aggregate, a first roof section 22 is obtained that is more easily cut or otherwise severed to a desired length by means of conventional equipment. In forming the roof section 22, longitudinal bores are included therein. A number of circumferentially spaced, longitudinally extending reinforcing rods 28 extend downwardly through the bores, with the upper ends of these rods being welded or otherwise secured to a flat metallic ring 30. The lower ends of tie rods 28 are terminated in load-spreading washers 29 which are held in place thereon by conventional means 31, such as nuts, or the like.

A number of circumferentially spaced, longitudinally extending metallic tie plates 32 are embedded and bonded to the exterior of the first roof section 22, as shown in FIG. 1. First and second generally L-shaped brackets 34 and 36, respectively, are secured to roof joists 10 and rafters 12. Brackets 34 and 36 are provided with flanges 34*a* and 36*a*, respectively, through which bolts or screws 38 extend to engage openings in tie plates 32 and section 22. The brackets 34 and 36 and screws 38 cooperatively support the first chimney section 22 from the roof structure D. Brackets 34 and 36 are secured to the joists by screws or bolts 37.

A recess 40 is formed in the first roof section 22 that is in communication with the transverse opening 26. Recess 40 is removably engaged by the outer end of second tubular roof section 42 formed from the type of cementitious material used in the construction of the first roof section. Roof section 42 extends through the opening 18 in wall C, as illustrated in FIG. 1.

A first vertical tubular chimney room section 44 is provided, which has a closed upper end 46. A transverse opening 48 is formed in section 44 below the closed end 46. A circular recess 50 is formed in room section 44 that is in communication with opening 48. The inner end of the second section 42 removably engages the recess 50 (FIG. 1).

A second tubular room section 52 is situated below first room section 44 and in axial alignment therewith. The adjacent ends of room sections 44 and 52 are of tongue and groove structure 54, and are in removable engagement. The lower end 56 of second room section 52 is preferably in contact with the upper surface of fireplace B.

A number of circumferentially spaced, longitudinally aligned bores 58 are formed in first and second room sections

44 and 52, respectively, through which tie rods 60 extend upwardly to terminate in projecting threaded end portions 62. Hooks 64 are formed in the lower ends of tie rods 60 which engage the lower end portion of room section 52 (FIG. 1). A number of inverted U-shaped members 66 are provided that are supported on the roof joists 10. Openings 68 are formed in members 66 through which the threaded end portions 62 project and are engaged by nuts 70. By tightening the nuts to bring them to bear against the U-shaped members 66, the entire weight of the first and second room sections 44 and 52 may be transferred to the roof joists 10.

The lower end of first roof section 22, the upper end of first room section 44, and second roof section 42 are removably held together by at least one tie rod 72 that extends through axially aligned bores 74 formed therein, as also shown in FIG. 1. Tie rod 72 has threaded ends 76 that are engaged by nuts 78.

First and second chimney roof sections 22 and 42, and first and second room sections 44 and 52 have longitudinally extending openings 22*a*, 42*a*, *44a*, and 52*a*, respectively, defined therein. A continuous sequence of metallic flue pipe sections E extend upwardly from the top of the fireplace B through the openings 52*a*, *44a*, *42a*, and 22*a* to terminate above the upper extremity of the first roof section 22 (FIG. 1). A vented rain collar 80 is mounted on the uppermost one of the flue pipe sections E. A roof jack 82 extends upwardly from the roof layer 16 to the projecting portion of first roof section 22 and closes the opening 20 in roof 14.

The external cross section of the flue pipe sections E is substantially less than that of the openings 22*a*, *42a*, and 52*a* in which they are disposed. The flue pipe sections E are held in centered positions in openings 22*a*, *42a*, *44a*, and 52*a* by clips 84 which are attached thereto. The clips 84 extend outwardly from these flue sections, as shown in FIG. 1.

Flue pipe sections E cooperate with roof sections 22, 42, and room sections 44, 52 to define an elongate annulus-shaped passage F that originates at the lower end 56 of section 52 and terminates at the upper end of section 22. Cool air is admitted into the lower end of passage F by way of one or more ports 83 formed in the lower end of the second room sections 52.

When the fireplace B is in use, the hot combustion gases pass upwardly through the flue pipe sections E. The heated sections E warm the air contained in passage F, and this warmed air rises to discharge into the ambient atmosphere from under the vented rain collar 80 through the annular opening 80*a*, therein, which opening is situated above the roof structure D. This rising warm air causes cool air to be drawn into the passage F through ports 83, whereupon it, too, is warmed and escapes into the ambient atmosphere. The constant upwardly moving stream of air in passage F serves as an insulation barrier to prevent transfer of any substantial quantity heat from the flue pipe sections E to the roof sections 22, 42 and room sections 44, 52.

A second form G of the air-cooled chimney of the present invention is shown in FIG. 2 that is adapted for use with a roof structure H composed of angularly disposed rafters 86 and horizontal ceiling joists 88. The rafters 86 support a roof 90 covered by a layer 92 of shingles, or other waterproof material. The rafters 86 and joists 88 are connected by cross members 86*a* and 88*a*, respectively, as illustrated in FIG. 2. An opening is formed in roof 90 through which the chimney G projects upwardly.

A first vertical tubular chimney roof section 96 is disposed in opening 94 to rise above the roof 90, as well as downwardly to a position above the ceiling joists 88. The chimney roof section 96 is cast, or otherwise formed, from the same type of cementitious material used in forming the previously described chimney sections 22 and 42. A second tubular roof section 98 is provided, which is in axial alignment with first roof section 96. The lower end of first section 96 and upper end of second section 98 are of tongue and groove structure 100, whereby they are adapted to removably engage one another. At least one tubular chimney room section 102 is disposed below second roof section 98 and in axial alignment therewith. The lower end of second roof section 98 and upper end of room section 102 are joined by a tongue and groove structure 104.

A number of circumferentially spaced, longitudinally extending tie plates 106 and 108 are bonded to exterior surfaces of both the first and second roof sections 96 and 98. A plurality of inverted L-shaped brackets 110 are secured to the rafters 86 by screws or bolts 111, and are in abutting contact with plates 106 to which they are secured by screws 112. The ceiling joists 88 support a number of L-shaped brackets 114 secured to tie plate 108 by screws 116. The brackets 114 are secured to room joists 88*a* by screws or bolts 116*a*.

A number of circumferentially spaced, longitudinally extending bores 118 are formed in first and second roof sections 96, 98 and room section 102, through which tie rods 120 that are affixed to the lower end of room section 102 extend upwardly. The upper end portions 122 are threaded, and these sections project upwardly through spaced openings (not shown) formed in a flat ring 124 that rests on the upper extremity of first roof section 96. Threaded end portions 122 are engaged by nuts 126. When nuts 126 are tightened, the entire weight of the room section 102 can be supported from the roof structure H.

Roof sections 96, 98, and room section 102 have longitudinally extending openings 96*a*, *98a*, and 102*a*, respectively, formed therein in which consecutive lengths of flue pipe J are disposed in the same manner as flue pipe E in the first form A of the chimney. Clips 128 secured to the flue pipe J maintain the same in centered positions in roof sections 96, 98 and room section 102.

The flue pipe J and roof sections 96, 98, and room section 102 cooperatively define a continuous annulus-shaped upwardly extending passage K through which cool air may circulate upwardly. The lower end of room section 102 is disposed adjacent the upper surface of a fireplace (not shown), in the same manner as lower end 56 of room section 52 shown in FIG. 1. The lower end of room section 102 is provided with a port (not shown) through which cool air is admitted into the lower end of passage K. The second form G of the chimney operates in the same manner as the first form A thereof. A vented rain collar 80 is secured to the upper end of the uppermost flue pipe section J illustrated in FIG. 1 Opening 94 is closed by a roof jack 82. The tie plates 32 and 106 are connected by metallic rings 120, one of which is shown in FIG. 4, that are embedded in the insulation material defining the roof sections 22 and 96. The rings 110 are preferably coated with a plastic material, such as one of the vinyl compounds, to permit thermal expansion of the rings without cracking the material defining the roof sections 22 and 96. The plastic material serves as a cushion when the metal defining the rings 110 expands at a greater rate when heated than does the material defining the roof sections 22 and 96.

The first and second forms A and G of the chimney are not limited to the circular tubular structure shown in FIGS. 3 and 4, but may be any one of the cross-sectional shapes illustrated in FIGS. 5 to 7. The chimney section L shown in FIG. 5 is adapted to be disposed adjacent a flat wall 130, while room sections M and N are used in corner walls 132. The roof sections 22 and 96 are similarly susceptible of formation in a wide variety of cross sections, with the cross selected being dependent on the decorative effect that is desired. Irrespective of the cross section selected, the room sections will have the general structure shown in FIG. 3, and the roof sections the structure illustrated in FIG. 4. The roof sections 22 and 96 may be extended to any desired height above a roof by adding further sections thereto, which sections are preferably joined together by the tongue and groove joints.

We claim:

1. In combination with a roof structure that includes a plurality of spaced first joists and rafters, together with a fireplace situated therebelow, a freestanding roof supported chimney, which chimney includes:

a. an elongate, tubular, vertical chimney roof section formed from a cementitious material that extends through an opening in said roof, the lower end of which is situated below said roof, with the upper end of said section being situated thereabove;
b. at least one first tie plate disposed in a fixed position relative to the external surface of said roof section;
c. at least one first bracket secured to one of said first joists and to said first tie plate to support said tubular roof section from said roof;
d. a flue pipe of substantially lesser external transverse cross section than the interior cross section of said chimney roof section which extends downwardly therethrough to the upper interior of said fireplace;
e. an elongate tubular vertical room section formed from a cementitious material that encircles said flue pipe above said fireplace and below said roof section, with the interior transverse cross section of said room section being substantially greater than the exterior cross section of said flue pipe;
f. first tubular means for connecting the upper end portion of said room section to the lower end of said roof section;
g. second means for holding said flue pipe in spaced relationship with the interior surfaces of said roof and room sections to define an annulus-shaped passage;
h. third means adjacent said fireplace for admitting air into the lower portion of said passage, which air is subsequently heated by said flue pipe and thereafter moves upwardly in said passage to discharge therefrom above said roof, and with said upwardly moving air serving to prevent transfer of any substantial quantity of heat from said flue pipe to said roof and room sections; and
i. fourth means for supporting said tubular room section from said roof structure.

2. A chimney as defined in claim **1** wherein said first roof section and said room section are in vertical alignment and said first means comprises a second tubular roof section that connects to the lower end of said roof section and the upper end of said room section.

3. A chimney as defined in claim **1** wherein said second means comprise a plurality of circumferentially and longitudinally spaced clips secured to the exterior surface of said flue pipe, with the outer ends of said clips being disposed adjacent to the interior surfaces of said roof and room sections.

4. A chimney as defined in claim **1** wherein said third means comprises at least one port formed in the sidewall of said room section.

5. A chimney as defined in claim **1** wherein said fourth means includes:
a. a plurality of tie rods threaded at the top that extend downwardly through circumferentially spaced, vertically aligned openings in said roof and room sections;
b. fifth means for securing the lower ends of said rods to said room section; and
c. a plurality of nuts which engage said threads on said rods, with said nuts resting on the upper extremity of said roof section.

6. A chimney as defined in claim **1** wherein said first roof section has a closed lower end and said room section an upper closed end, with said roof and room sections being in laterally spaced relationship and said first means comprises a second horizontal tubular roof section that extends between an opening formed in the lower portion of said first roof section and an opening provided in the upper portion of said room section.

7. A chimney as defined in claim **6** wherein said roof structure is defined by both said first angular joists and second joists that are horizontally disposed, which chimney further includes:
a. a plurality of transversely aligned tie rods having threads on their upper ends which extend downwardly through spaced bores formed in said room section, with the lower ends of said rods being secured to the lower portion of said room section;
b. at least one inverted U-shaped member that engages at least one of said horizontal joists in which member a plurality of openings are formed through which the ends of said rods that are threaded extend upwardly; and
c. a plurality of nuts which engage said threads on said rods and bear against upper surfaces on said members to support said room section from said horizontal joists.

8. A chimney as defined in claim **6** which further includes fifth means for removably holding said second roof section in a sandwiched position between said first roof section and said room section.

9. A chimney as defined in claim **8** wherein said fifth means includes:
a. a plurality of tie rods which extend through a plurality of axially aligned bores in said first and second roof sections and said room sections, said tie rods having outwardly projecting end portions on which threads are formed; and
b. a plurality of nuts that engage said threads with said nuts bearing against the external surfaces of said first roof section and said room section.