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SHEET METAL CHIMNEY CONSTRUCTION

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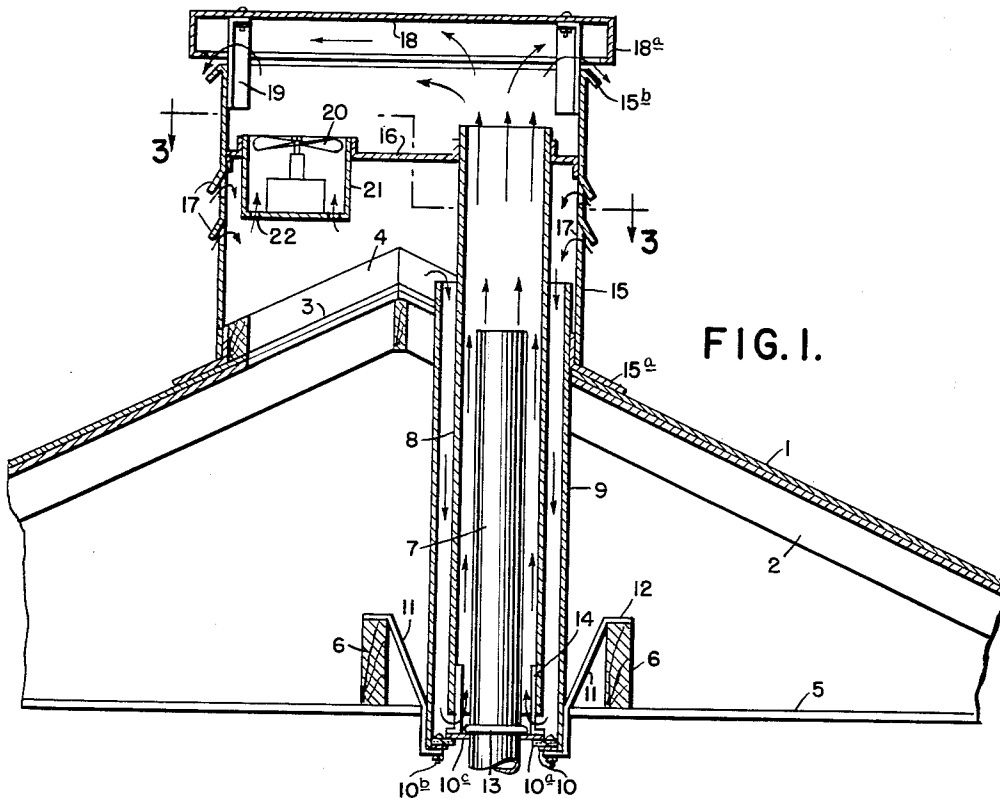


FIG. 1.

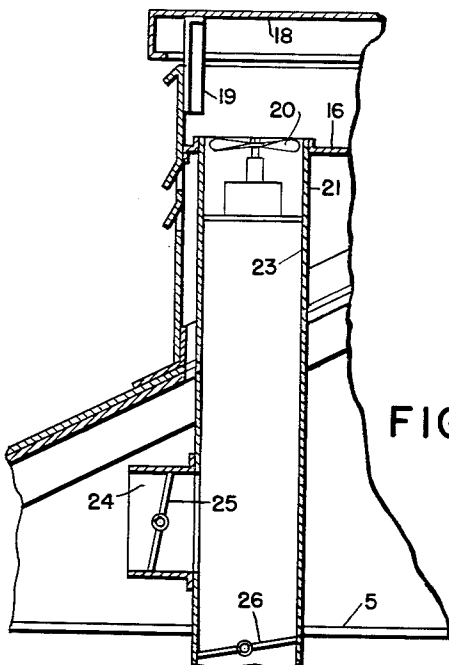


FIG. 2.

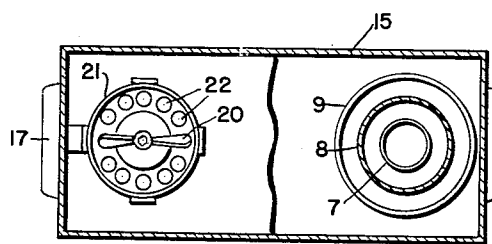


FIG. 3.

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SHEET METAL CHIMNEY CONSTRUCTION

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3 Claims. (Cl. 98—46)

This invention relates to building construction, and more particularly to chimney structures.

As is well known, a conventional brick chimney is one of the most expensive items which enter into the cost of building moderate priced homes, and many attempts have been made to reduce the cost by substituting pipes or flues of metal or other material for the usual brick or masonry construction.

One of the chief difficulties about employing metal chimney structures is the fire hazard involved in mounting a smoke pipe close to wooden or other combustible material commonly used in the construction of frame houses.

An object of the present invention is to provide an improved metal chimney structure in which the flue carrying the hot products of combustion is spaced from all wooden parts of the building and is wholly insulated therefrom by a flowing curtain of cool air.

Another object is to provide an improved arrangement of this kind in which the cooling air is drawn either from the outside, or from the attic space of the house, or both.

Still another object of the invention is to devise a metal structure of the above character so designed as to closely simulate the appearance of a conventional chimney.

Yet another object is to provide improved means for supporting the plurality of concentric pipes which I employ, so that they may be readily assembled and installed.

A still further object of the invention is to devise fan-operated ventilating means, enclosed within my improved chimney structure, by which air may be drawn out either from the attic space, or from some other space below the ceiling, or both, as desired.

With the above and other objects in view, and to improve generally upon the details of such equipment, the invention consists in the construction and combination of parts hereinafter described and claimed, and illustrated in the accompanying drawings, forming part of this specification, and in which:

Fig. 1 is a vertical section through the roof of a building with my improved chimney structure installed therein, parts being in elevation;

Fig. 2 is a fragmentary similar view, showing a modified arrangement; and

Fig. 3 is a horizontal section substantially on the line 3—3, of Fig. 1.

Referring to the drawing in detail and first more particularly to Figs. 1 and 3, thereof, 1 designates the roof of a house, supported on the usual rafters 2. At any suitable point, preferably near the ridge of this roof, is formed an opening 3 surrounded by a frame collar 4.

5 designates the usual ceiling of the house and is supported on the customary joists, two of which are shown at 6.

7 designates a smoke pipe or flue carrying the products of combustion from a stove or furnace. This extends

downwardly from a point adjacent the opening 3 in the roof to a point below the ceiling 5.

This smoke pipe 7 is surrounded by an intermediate pipe 8 which is spaced from the smoke pipe and extends a substantial distance above it.

The third or outer pipe 9 surrounds and is spaced from the intermediate pipe, and the upper end of this outer pipe terminates well below the upper end of the intermediate pipe 8.

These three pipes may conveniently be supported as follows. A plate 10, located just below the ceiling 5 is secured to straps 11 which extend through the ceiling and are anchored at 12 to the upper edge of adjacent joists 6. A circular plate 10^a of insulating material fits within the outer pipe 9 and rests upon the plate 10 and may be fastened to it and the straps 11 as at 10^b. A third and smaller annular plate 10^c rests upon the insulating plate 10^a, and snugly surrounds the smoke pipe 7. This pipe is formed with an annular bead 13 which engages and rests upon the top of the plate 10^c. Thus the smoke pipe is also supported by the plates 10 and 10^a. The insulating plate 10^a prevents heat from being conducted from the smoke pipe to the outer pipe.

The intermediate pipe 8 preferably terminates a short distance above the plate 10^c and is supported thereon by means of legs or brackets 14. Thus the smoke pipe and intermediate pipe can be assembled and placed in position from above, and all three pipes are carried by the straps 11 supported on the joists 6.

Supported on the roof and enclosing the opening 3 and the outer and intermediate pipes above described is a chimney casing 15 of rectangular shape in cross section, as shown in Fig. 3. This chimney casing is preferably made of sheet metal and is provided at its lower edges with flanges 15^a overlapping the roofing material and serving as flashing. At its upper end the casing may be turned over to provide outwardly extending flanges 15^b constituting soot deflectors.

Extending across the chimney casing is a diaphragm or partition 16 which serves to close the opening 3 in the roof. The intermediate pipe 8 extends up through this partition and makes a tight joint therewith.

At a point below the partition 16 and above the upper end of the outer pipe 9 the side walls of the chimney casing 15 are provided with louvers forming openings 17 through which outside air may enter the casing.

Mounted at the top of the chimney casing is an anti-downdraft rain cap 18 supported on the casing as by means of brackets 19 and having a peripheral down turned flange 18^a. The rain cap is so positioned that a suitable space is provided between the flanges 15^b and 18^a to permit the free escape of gases.

The space between the roof 1 and ceiling 5 constitutes an attic space, which, as is well known, tends to accumulate heated air, and one of the objects of the present invention is to provide means for withdrawing such heated air from the attic space. By reference to Fig. 1 it will be seen that the upper end of the outer pipe 9 is in direct communication with this attic space through the opening 3.

The operation of the above described arrangement will be apparent. Hot products of combustion flowing upwardly through the smoke pipe 7 tend to set up an ejector action in the intermediate pipe and thus to create a partial vacuum within that pipe. Fresh air from the outside thereupon enters the chimney casing through the openings 17 and is thence drawn downwardly through the space between the outer and intermediate pipes. This air then flows under the lower edge of the intermediate pipe and is thence forced upwardly through the space between the intermediate pipe and the smoke pipe. At the same time air from the attic space is also drawn down-

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wardly through the outer pipe 9 and follows the same course.

The mixture of air and combustion gases is discharged from the upper end of the intermediate pipe at a point above the partition 16, and thence escapes under and around the edges of the rain cap 18.

It will be observed that the rectangular chimney casing 15 mounted on the roof as shown, simulates in appearance the conventional brick chimney, and it will be seen that due to the flow of air downwardly and upwardly through the spaces between the several pipes, the outer pipe 9 is maintained relatively cool, and prevented from becoming sufficiently hot, where it comes in contact with the wooden building structure, to create a fire hazard.

In some cases, especially in warm climates, it may be desirable to mount within the chimney casing additional means for withdrawing air from the attic space. This is illustrated as consisting of an upwardly directed motor driven fan 20 mounted in a housing 21 set into the partition 16, this housing being provided below the fan with suitable air openings 22. When the fan is operating it is obvious that air will be drawn upwardly from the attic space and discharged above the partition 16, so that it escapes from beneath the rain cap 18.

As a modified arrangement, I may in some cases provide a conduit 23 extending downwardly from the fan housing 21 into and through the attic space as shown in Fig. 2. An inlet 24, opening into the attic space is provided and may be controlled by a valve or damper 25, while the conduit may extend down through the ceiling into some room, such as bathroom or kitchen, which it is desired to ventilate, and may be controlled by a valve or damper 26. When it is desired to draw air from the attic space the valve 25 is opened and the valve 26 closed, while, if it is desired to draw air from the lower room, the valve 25 is closed and the valve 26 opened.

What I claim is:

1. In a building construction, the combination with a roof having an opening, of a smoke pipe extending downwardly from said opening into the building, an intermediate pipe surrounding and spaced from said smoke pipe and extending substantially above the upper end thereof, an imperforate outer pipe surrounding and spaced from said intermediate pipe, the upper end of said outer pipe terminating at a point well below the upper end of said intermediate pipe and the lower end of said outer pipe extending below the lower end of said intermediate pipe and being sealed to said smoke pipe, means at the lower end of said intermediate pipe establishing a passageway between the space between said intermediate and outer pipes and the space between said intermediate and smoke pipes, a chimney casing, rectangular in cross-section, supported on and projecting above said roof, said casing covering said opening and extending above the upper ends of said intermediate pipe, and said casing having openings in its side wall at a point above the upper end of said outer pipe and below the upper end of said intermediate pipe, through which openings outside air may enter the upper open end of said outside pipe and flow downwardly through the annular space between said outside and said intermediate pipes, and thence through said passageway at the lower end of said intermediate pipe into the annular space between said intermediate pipe and said smoke pipe, and means for preventing outside air from entering the space between said intermediate and outer pipes except through said openings in the side wall of the chimney casing, and an anti-down draft rain cap mounted at the top of the chimney casing and supported in spaced relation thereto.

2. In a building construction, the combination with a roof having an opening, of a smoke pipe extending downwardly from said opening into the building, an intermediate pipe surrounding and spaced from said smoke pipe and extending substantially above the upper end thereof, an imperforate outer pipe surrounding and

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spaced from said intermediate pipe, the upper end of said outer pipe terminating at a point well below the upper end of said intermediate pipe and the lower end of said outer pipe extending below the lower end of said intermediate pipe and being sealed to said smoke pipe, means at the lower end of said intermediate pipe establishing a passageway between the space between said intermediate and outer pipes and the space between said intermediate and smoke pipes, a chimney casing, rectangular in cross-section supported on and projecting above said roof, said casing covering said opening and enclosing the upper ends of said intermediate and outer pipes, and said casing having openings in its side wall at a point above the upper end of said outer pipe, through which openings outside air may enter the upper open end of said outside pipe and flow downwardly through the annular space between said outside and said intermediate pipes, and thence through such passageway at the lower end of said intermediate pipe into the annular space between said intermediate pipe and said smoke pipe, and a horizontal partition extending across and closing said casing at a point intermediate the height thereof and above said openings in the side wall thereof, said intermediate pipe passing upwardly through said partition, with its open upper end disposed above the same, and an anti-down draft rain cap mounted at the top of the chimney casing above and spaced from said partition, all of the pipes lying entirely below said rain cap.

3. In a building construction, the combination with a roof having an opening, and a ceiling below the roof providing an attic space, of a smoke pipe extending downwardly from said opening through said attic space to a point below said ceiling, an intermediate pipe surrounding and spaced from said smoke pipe, an imperforate outer pipe surrounding and spaced from said intermediate pipe, the upper end of said intermediate pipe extending to a point well above the upper ends of both said smoke pipe and said outer pipe and the lower end of said outer pipe extending below the lower end of said intermediate pipe and being sealed to said smoke pipe, a chimney casing, rectangular in cross-section, supported on and projecting above said roof, said casing covering said opening and enclosing the upper ends of all of said pipes so that the interior of said casing and the upper end of said outer pipe are in communication with said attic space, a horizontal partition extending across and closing said casing at a point intermediate its height and above the upper end of said outer pipe, said intermediate pipe passing up through said partition, and said casing having openings in its side walls at a point below said partition, through which openings outside air may enter said casing, whereby such outside air, mixed with air from said attic space, may enter the upper open end of said outside pipe and flow downwardly through the annular space between said outside and said intermediate pipes, and thence beneath the lower end of said intermediate pipe into the annular space between said intermediate pipe and said smoke pipe, and an anti-down draft rain cap mounted at the top of said chimney casing and spaced therefrom to provide a smoke outlet.

References Cited in the file of this patent

UNITED STATES PATENTS

120,031	Brown	Oct. 17, 1871
142,598	Valk	Sept. 9, 1873
196,698	Peck	Oct. 30, 1877
340,299	Eberhart	Apr. 20, 1886
1,328,647	Carl	Jan. 20, 1920
2,087,637	Burt	July 20, 1937
2,130,385	Fluor, Jr. et al.	Sept. 20, 1938
2,358,397	Howle	Sept. 19, 1944
2,372,707	Blome	Apr. 3, 1945
2,381,548	McLaughlin, Jr.	Aug. 7, 1945
2,634,720	Thulman	Apr. 14, 1953