

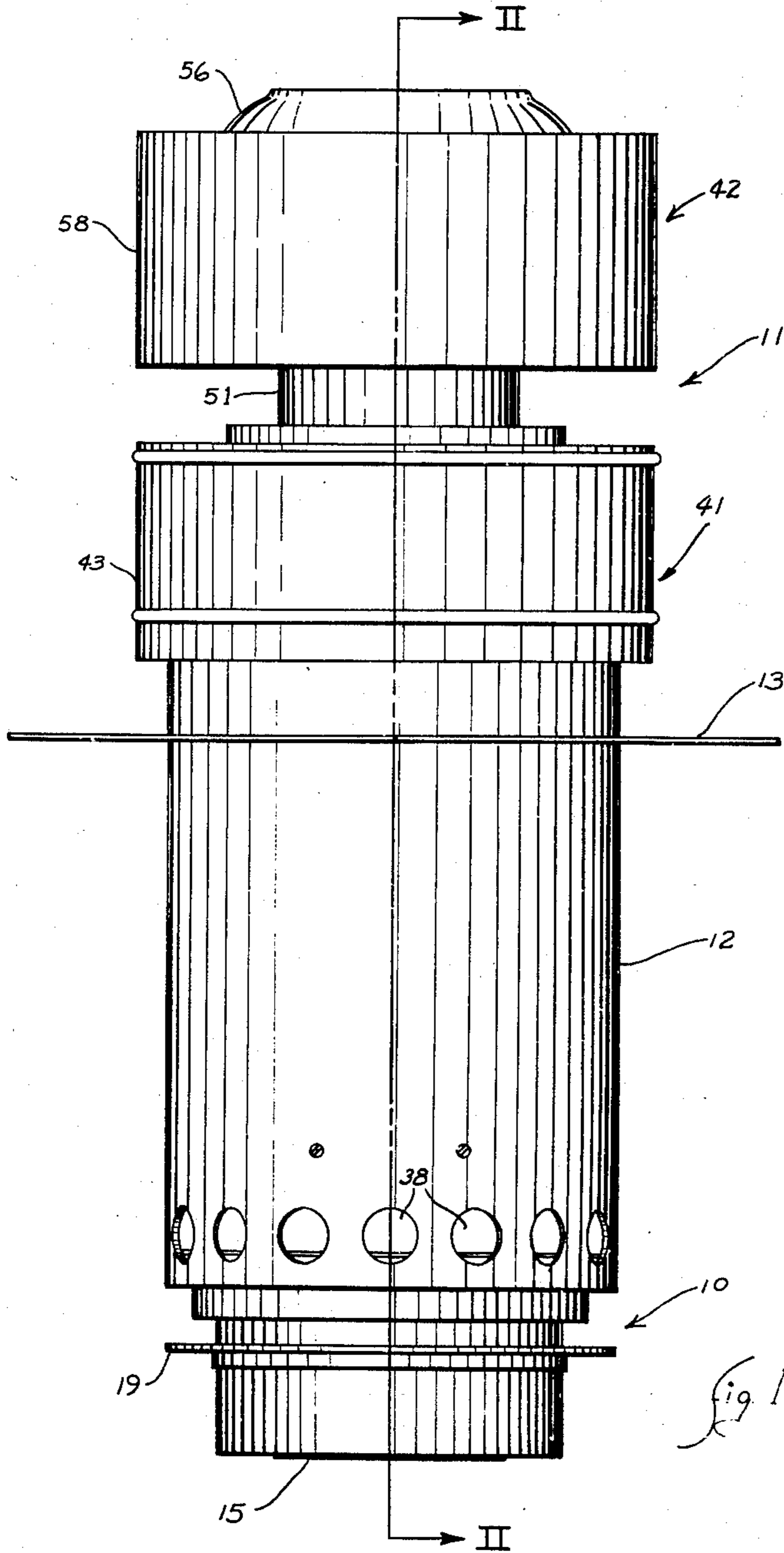
July 1, 1958

F. A. STRAWSINE
CHIMNEY CONSTRUCTION

2,841,071

Filed July 11, 1955

4 Sheets-Sheet 1



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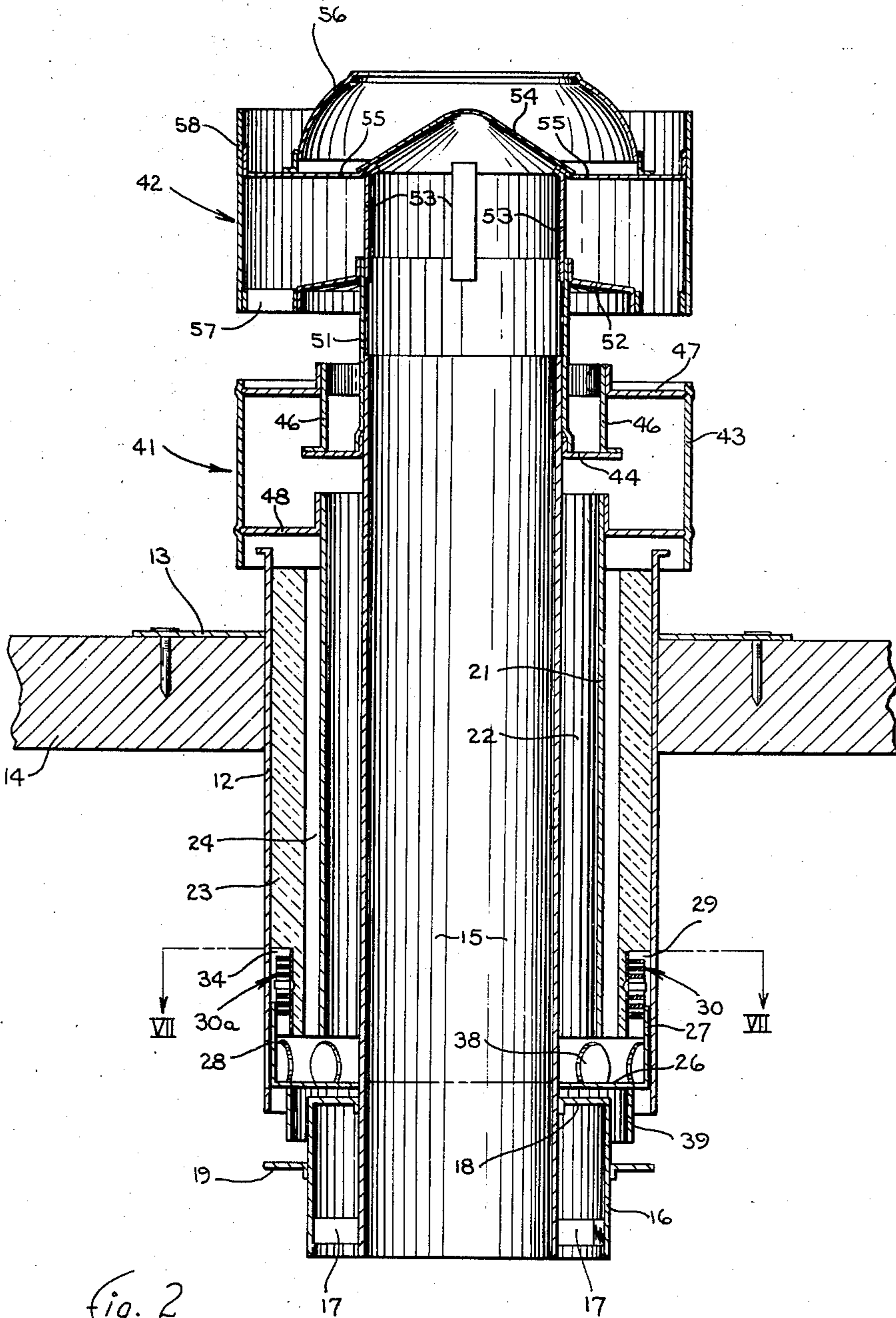


fig. 2

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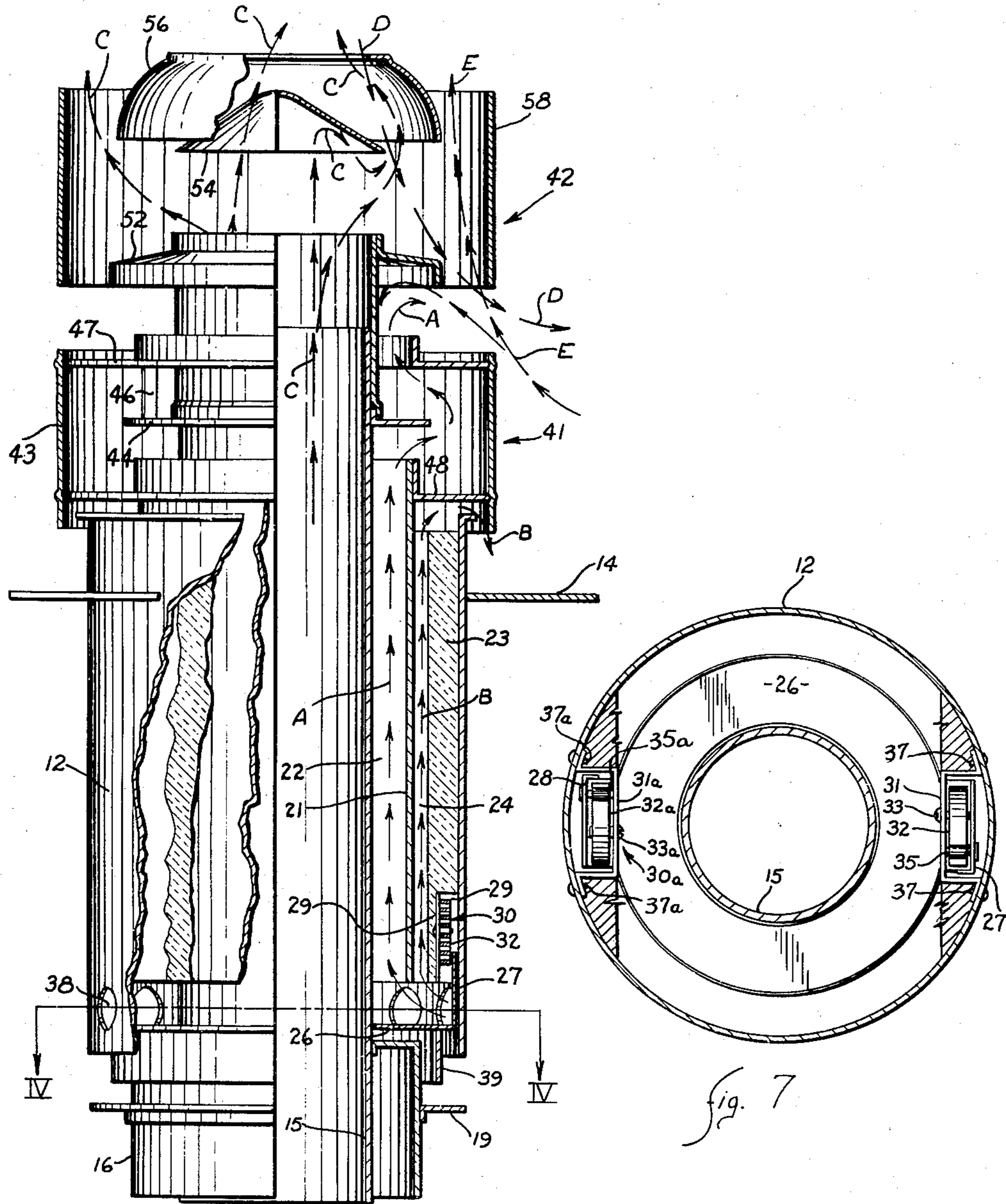


Fig. 3

Fig. 7

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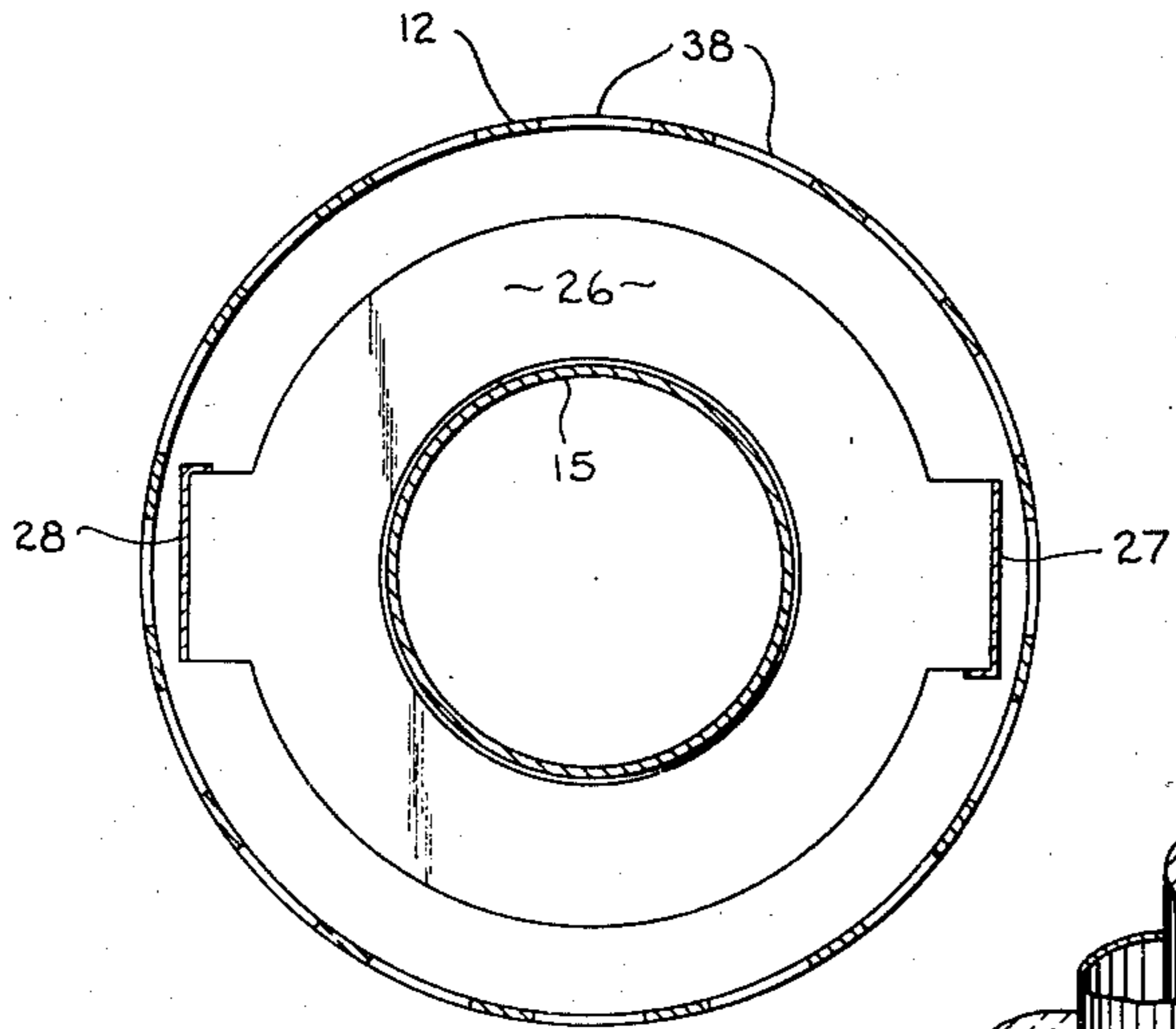


fig. 4

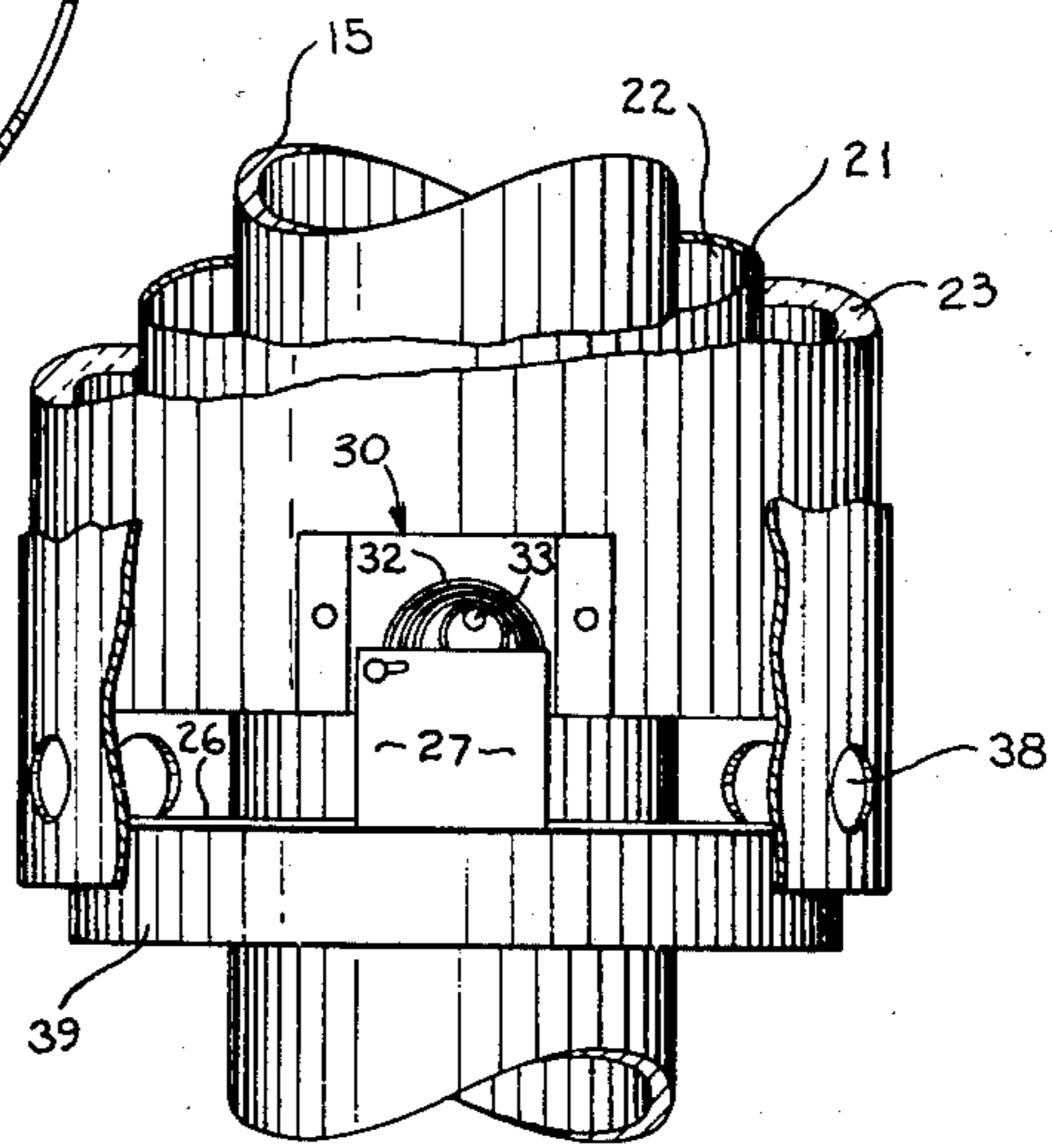


fig. 5

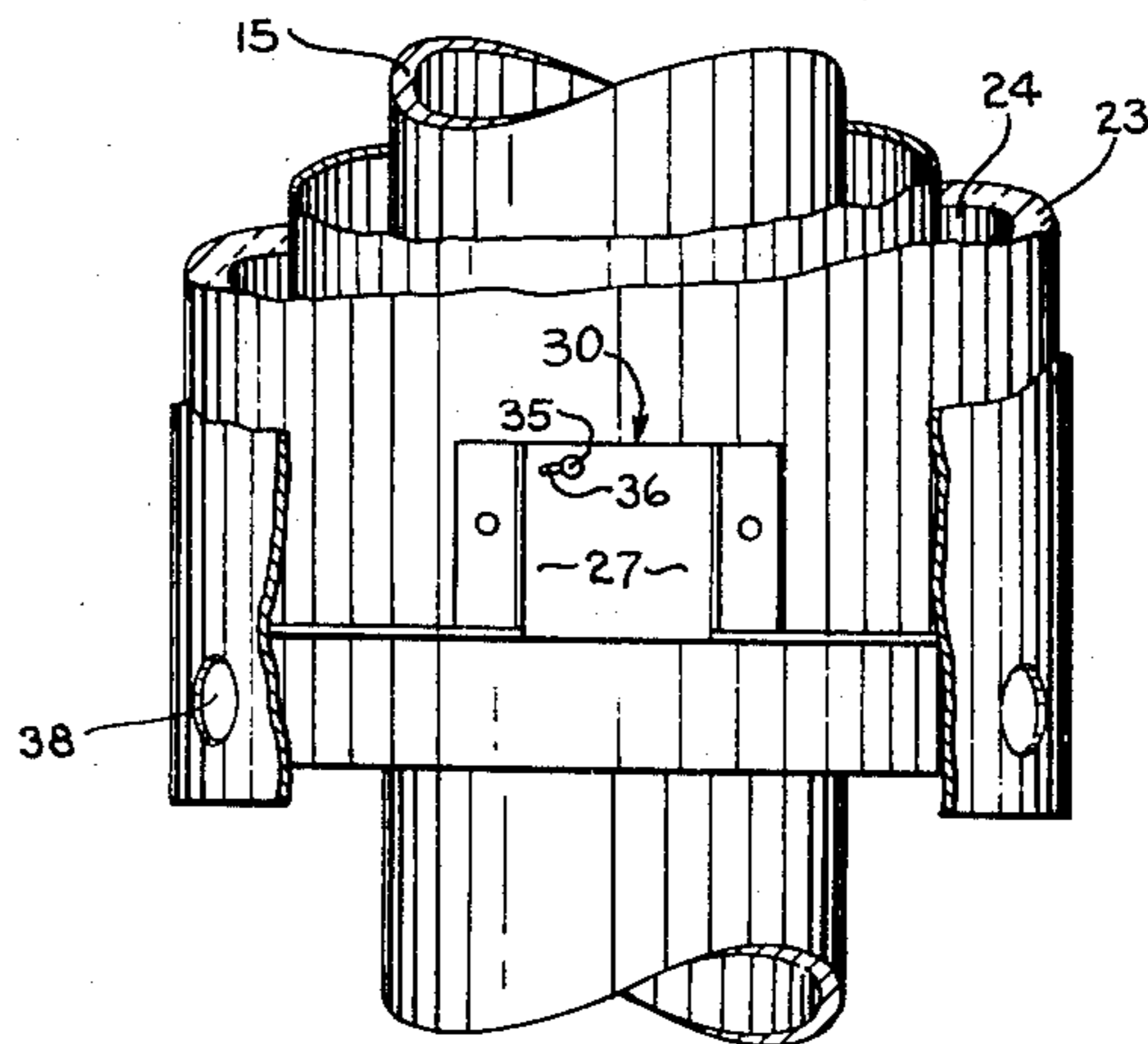


fig. 6

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2,841,071

CHIMNEY CONSTRUCTION

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8 Claims. (Cl. 98—46)

This invention relates to a chimney construction and more particularly relates to an insulated chimney construction useful on mobile homes.

There has existed for many years the problem of providing a suitable relatively small size chimney unit for mobile homes and the like. Such a unit must be capable of insuring a suitable draft in the combustion chamber of the space heater which draft is necessary for satisfactory operation of the space heater. In addition, such a unit must protect the interior of the home from the elements and also must prevent external air currents from passing downwardly into the home or into the combustion chamber. Of particular importance with regard to mobile homes is the requirement that the chimney be adequately insulated so that there is no possibility of the combustible portions of the mobile home which are in close proximity to the chimney reaching combustion temperature. This requirement is further complicated by the fact that the chimney units must be quite small and consequently bulky insulation cannot be used.

Accordingly, it is an object of this invention to provide an improved chimney construction.

It is a further object of this invention to provide an improved chimney construction which is relatively small in size but which is adequately insulated.

It is a further object of this invention to provide an improved chimney construction, as aforesaid, provided with a top sealing structure which prevents wind and weather from passing into the interior of the room being heated or into the combustion chamber.

It is a further object of this invention to provide an improved chimney and a top sealing structure therefore, which structure will not interfere with or hinder the draft in the combustion chamber.

It is a further object of this invention to provide an improved chimney construction in which relatively cool air will be circulated between the stack carrying the flue gases and the roof on which the chimney is mounted if the temperature in this region should become too high.

It is a further object of this invention to provide a wind and weather sealing top structure which will not only provide an adequate seal but will also be constructed as to present the least obstruction to the free passage of the gases so that the draft in the combustion chamber is not impaired.

It is a further object of this invention to provide a chimney construction which is relatively small in size, easy to construct and effective in operation.

Other objects and advantages of this invention will become apparent to those with knowledge of equipment of this type upon reading the following description and inspecting the accompanying drawings, in which:

Figure 1 is a side view of the chimney construction of the present invention.

Figure 2 is a sectional view taken along the line II—II of Figure 1.

Figure 3 is a view partly in central section and with the remaining portions partially broken away and omit-

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ting certain of the support structure for the various elements, and showing the movement of air and gases in broken arrowed lines.

Figure 4 is a sectional view taken along the line IV—IV of Figure 3.

Figure 5 is a partially broken away view of the lower portion of the chimney with the valve ring in open position.

Figure 6 is a view similar to Figure 5 with the valve ring in closed position.

Figure 7 is a sectional view taken along the line VII—VII of Figure 2.

General description

In meeting the objects and purposes above set forth as well as others related thereto, there is provided, in general, a chimney assembly 10 which includes a valved passageway through which relatively cool air is drawn from the room being heated to cool off the flue gas conduit if it approaches an undesirably high temperature. A weather sealing and wind sealing top assembly 11 is provided to prevent weather or wind from entering the room while permitting adequate draft to be maintained in the combustion chamber of the space heater.

Detailed description

The chimney assembly 10 includes an external cylindrical casing 12. A mounting flange 13 is secured to the casing intermediate the ends thereof and extends transversely of the longitudinal axis thereof so that the chimney assembly can be fastened to a roof 14 of the room or mobile home being heated (Figure 2).

The chimney assembly is provided with a cylindrical flue gas conduit 15 which may be integral with or rigidly affixed to the stack pipe of the space heater (not shown). The flue gas conduit extends through and beyond the casing 12 in the roof.

A cylindrical guard plate 16 (Figure 2) is provided for conduit 15 at the lower end thereof. Spacers 17 and flange 18 are mounted on guard 16 and snugly but slidably engage the external surface of the flue gas conduit 15. A heat deflecting flange 19 is affixed to the guard plate 16 intermediate the ends thereof and extends radially outwardly thereof. The purpose of the flange 19 and guard plate 16 is to deflect radiation or convection heat from rising directly around the pipe and concentrating around the lower portion of the chimney assembly, which concentration of heat might not only be dangerous to the roof structure but also might cause mis-operation of the thermostat device as hereinafter described.

A vent conduit 21 is spaced from and surrounds the intermediate portion of the conduit 15 and defines a passageway 22 therebetween. An annular layer 23 of insulation material is spaced from and surrounds the vent conduit 21. The insulation may be of any suitable kind capable of withstanding the temperature encountered in this type of application. The insulation may be in the form of a felted, form-retaining mat or it may be in a loose form enclosed in a suitable container or in a heat reflecting foil such as aluminum foil. A passageway 24 is defined by the layer of insulation and the vent conduit 21. Suitable fastening and spacing means (not shown) are provided to hold the various elements in spaced assembled relationship.

An annular valve plate 26 is provided to open or close the lower ends of passageways 22 and 24. The valve plate 26 surrounds the flue gas conduit and is adapted to slide up and down thereon. A pair of upwardly extending ears 27 and 28 are provided on opposite sides of the valve plate. Recesses 29 and 34 are provided in the lower portion of insulation layer 23 at either side thereof. Thermostat devices 30 and 30a are received in recesses 29

and 34 respectively. The thermostat devices are identical so only one will be described. Corresponding parts on the other thermostat will be indicated by the same reference character with the suffix "a" added thereto. Thermostat device 30 includes a mounting plate 31 which is received in the recess 29. A bi-metallic thermostat element in the form of a coil spring 32 is secured at one of its ends to the mounting plate 31 by fastener 33. The other end of the spring 32 is bent around and thereby affixed to a pin 35. The pin 35 rides in a slot formed in the ear 27 (Figure 6). The reason for providing a slot will be made clear as this specification progresses. The mounting plate 31 is attached to the external casing by fastening means 37 (Figure 7).

The lower portion of the external casing lying beyond the lower end of the vent conduit 21 and insulation layer 23 is formed with a series of circumferentially spaced openings 38 through which the ambient atmosphere from the room moves and thence into the passageways 22 and 24, when the valve ring 26 is in its open position. A depending strengthening flange 39 is mounted on the valve ring 26.

The wind sealing and weather sealing top assembly 11 includes a vent passageway sealing sub-assembly 41 and a flue conduit sealing sub-assembly 42.

The vent passageway sealing sub-assembly 41 includes a vent head band 43 which is co-axial with, and spaced outwardly from, the flue gas conduit 15. The band 43 is positioned radially outwardly of the casing member 12 and its lower edge overhangs the upper edge of the casing. A flange 44 is secured to the flue gas conduit by suitable means, such as spot welding, and extends radially outwardly thereof for a distance greater than the diameter of passageway 22. A plurality of circumferentially spaced support straps 46 (Figure 2) are affixed to an inwardly extending flange 47 which is secured to the band 43. This construction provides a rigid support for the band 43 on the flue gas conduit 15. A flange 48 is rigidly secured to the vent conduit 21 and to the band 43 to support the band in fixed spaced relationship with respect to conduit 21. The flange 48 is positioned above the upper edge of the casing 12.

The flue conduit sealing sub-assembly 42 includes an extension conduit 51 which is snugly but slidably fitted over the upper end of the flue gas conduit 15. An annular barrier 52 is secured to conduit 51 and is formed with a downwardly sloping upper surface. Support straps 53 extend vertically from the upper edge of the conduit 51 and support a dome-shaped deflecting cap 54 which is spaced above but generally aligned with the conduit 51. Ribs 55 are secured to cap 54 and to an annular weather cap 56. The weather cap 56 is provided with a convex upper surface and the central opening therein is of approximately the same diameter as the deflecting cap 54. A plurality of circumferentially spaced support bars 57 are mounted on the barrier 52 and are affixed to weather band 58. Ribs 55 also extend radially outwardly and support band 58 in fixed position relative to caps 54 and 56. Bands 43 and 58 are longitudinally spaced from each other.

The various support straps and ribs 46, 53, 55 and 57 are made as small as possible consistent with the desired rigidity of the assembled chimney in order to present the maximum area through which the air and flue gases may flow so that the draft in the combustion chamber may be maintained at the proper level.

Operation

Assuming that the space heater is operating satisfactorily and the walls of conduits 15 and 21 and the insulation layer 23 are not overheated, the valve ring 26 will be contacting the lower ends of conduit 21 and layer 23 and will block off passageways 22 and 24 (Figure 6). In this position of the valve the passageways 22 and 24 are open at their upper ends so that heated air therein will

rise and a limited amount of cool air will seep in from the outside. In normal operations of the heater, this construction insures that the temperature will not rise above the danger point and also insures a minimum amount of escape of the heated air from the room. If, for some reason, the conduits and the insulation layer 23 heat up excessively, the spring 32 will expand and will tend to coil upon itself and at some predetermined temperature range, below the combustion temperature of the roof, the ring 26 will be urged downwardly by the coiling tendency of the spring to allow the ambient air within the room to move through the openings 38 through the passageways 22 and 24 as indicated by the arrows A and B (Figure 3) to remove the excessively hot air therein. Thus in the closed position of the valve ring the end of the spring attached to pin 35 will be in a position where the pin is at the rightward end of the slot as appearing in Figure 6. As the temperature rises the spring will expand and tend to coil on itself. The pin 35 therefore moves to the leftward end of slot 36. Further rise in temperature causes the spring to coil more which results in the downward movement of the valve ring 26. Obviously the length of slot 36 determines the approximate temperature range at which the valve ring opens. Therefore, the length of slot 36 should be chosen having due regard for the nature of the insulation and the material of the roof so that the valve opens before their combustion or decomposition temperature is reached.

The ambient air in the room is at a higher temperature than the outside air so it rises through the passageways 22 and 24. This air is much cooler than the flue gases and will cool off the conduits and insulation layer so that there is no danger of combustion or decomposition thereof. When the temperature of the air and insulation reach their normal operating ranges valve ring 26 will close due to the contraction of spring 32.

The paths of the various air and gas currents are indicated by the arrows in Figure 3. The air passing through passage 24 indicated by arrows B will strike and be deflected by flange 48 and will pass outwardly between band 43 and casing 12. The air passing through passage 22 indicated by arrows A will be deflected by flange 44 and will pass between flange 47 and conduit 51 and then outwardly between bands 58 and 43. Flue gases passing through conduit 15 indicated by arrows C and thence through conduit 51 and will in part strike and be deflected outwardly by cap 54 and in part will immediately move around and upwardly of the cap and out through the central opening in cap 56 or out beyond the periphery of cap 56.

Snow and rain as well as substantially vertically directed down winds as indicated by the letter D will be deflected radially outwardly by caps 56 and 54 and barrier 52 and thereby be prevented from entering the flue gas conduit. Sidewardly directed winds indicated by the letter E will either be deflected by the bands 43 and 58 or will impinge upon the various angularly directed elements and be directed upwardly. In addition, the air current A will impinge on some of the side wind E and change its direction so that it too moves upwardly through assembly 11. The upward movement of these external winds aids in the creation of a satisfactory draft in the combustion chamber.

The chimney assembly may be made of any suitable material, ordinary sheet metal being preferred. Construction and assembly of the various parts is quite easy because standard cylindrical shapes and flat plates may be extensively used.

Although particular, preferred embodiments of my invention have been disclosed herein for illustrative purposes, it will be understood that variations or modifications thereof which do not depart from the scope of such invention, and the above disclosure thereof, are fully contemplated unless specifically stated to the contrary in the appended claims.

I claim:

1. In a chimney construction, the combination comprising: a flue gas conduit; a ventilating and weather-sealing attachment mounted on said flue gas conduit, said attachment including a weather band mounted in fixed position above said flue gas conduit relative to, and surrounding, said flue gas conduit; a weather cap mounted within, and spaced from, said weather band, said weather cap having a convex upper surface and a central opening there-through; a deflecting cap mounted beneath the opening in said weather cap and spaced therefrom, said deflecting cap having a convex upper surface and being of greater diameter than the internal diameter of the flue gas conduit and being of substantially the same diameter as said central opening; a dish-shaped barrier having a central opening therethrough mounted in fixed position relative to said conduit below and spaced from said deflecting cap and within said weather band, said barrier having a downwardly sloping upper surface, the diameter of said central opening of said barrier being substantially the same as the external diameter of said conduit, said barrier sealingly contacting said flue gas conduit.

2. In a chimney construction, the combination comprising: a flue gas conduit; a vent conduit surrounding and spaced from said flue gas conduit and defining a passageway therebetween; a ventilating and weather sealing attachment mounted on said flue gas conduit, said attachment including an annular weather band mounted above said flue gas conduit in fixed position relative to and surrounding said flue gas conduit; a weather cap mounted within and spaced from said weather band, said weather cap member having a convex upper surface and a central opening therethrough; a deflecting cap mounted in the opening in said weather cap and spaced therefrom, said deflecting cap having a convex upper surface and being of greater diameter than the internal diameter of the flue gas conduit and being of substantially the same diameter as said central opening; a dish shaped barrier having a central opening therethrough mounted around and sealingly contacting said flue gas conduit, said barrier being below and spaced from said cap and within said weather band, said barrier having a downwardly sloping upper surface; an annular vent band mounted in fixed position relative to and surrounding said flue gas conduit beneath and spaced from said weather band; an inwardly directed flange mounted on said vent band, said flange extending only part way to said flue gas conduit to define a passageway therebetween, said passageway between said flue gas conduit and said vent conduit and said passageway between said flue gas conduit and said flange being in communication.

3. The combination of claim 2 including: a layer of insulation surrounding and spaced from said vent conduit and defining a passageway therebetween, a second flange mounted on said vent band and extending inwardly thereof and sealingly contacting said vent conduit, said vent band being spaced from said insulation layer and providing a passageway for the air moving through the passageway between the vent conduit and said insulation layer.

4. In a chimney construction for a mobile home, the combination comprising: an elongated flue gas conduit extending through the ceiling of said mobile home; a vent conduit extending through said ceiling surrounding and spaced from said flue gas conduit, said vent conduit being of less longitudinal extent than said flue gas conduit, a portion of said flue gas conduit extending below the lower end of said vent conduit; means for closing off the lower end of said vent conduit; an insulation layer surrounding and spaced from said vent conduit; a flange structure extending transverse to the longitudinal axis of said flue gas conduit, said flange structure including an inverted, cup-shaped member telescoped over the lower end of said flue gas conduit with the side walls of said cup-shaped member being spaced from the exterior surface of said

flue gas conduit; and a heat deflecting flange secured to the exterior surface of the side walls of said cup-shaped member and extending transverse to the longitudinal axis of said flue gas conduit.

5. In a chimney construction, the combination comprising: a tubular flue gas conduit; means defining a vent conduit around said flue gas conduit; a tubular casing surrounding said vent conduit and extending below the lower end thereof, said casing having a series of spaced openings in the periphery thereof adjacent the lower end thereof; a tubular insulation layer within said casing, the lower edge of said layer being adjacent to and above the openings in the periphery of said casing; an annular ring longitudinally slidably and closely fitting within the space between the exterior surface of said flue gas conduit and the interior surface of said casing and being slidably mounted on said flue gas conduit and movable longitudinally of said flue gas conduit between a first position below said openings and spaced from the lower end of said vent conduit whereby said openings and said vent conduit are in communication and a second position above said openings wherein it blocks communication between said openings and said vent conduit; and temperature responsive means including bimetallic means positioned on the external surface of said insulation layer adjacent the lower end thereof and connected to said ring for causing movement thereof.

6. The combination of claim 5 wherein said temperature responsive means includes a pair of bimetallic coil springs positioned on diametrically opposed portions of said insulation layer, the radially inner ends of said springs being relatively fixedly secured with respect to said casing, and a pair of ears connected to said ring on diametrically opposed portions thereof, each of said ears having a slot therein, the other ends of said springs being mounted in said slots.

7. In a chimney construction, the combination comprising: a tubular flue gas conduit; a tubular vent conduit surrounding and spaced from said flue gas conduit; a tubular casing surrounding said vent conduit, said casing extending below the lower end of said vent conduit, said casing having a series of circumferentially spaced openings in the periphery thereof below the lower end of said vent conduit; a tubular insulation layer within said casing and spaced from the external surface of said vent conduit to define a passage therebetween, the lower end of said insulation layer being substantially co-planar with the lower end of said vent conduit and being above said openings in said casing; an annular, imperforate ring longitudinally slidably and closely fitting with the space between the exterior surface of said flue gas conduit and the interior surface of said casing and being slidable along said flue gas conduit and movable between a first position below said openings and spaced from the lower end of said vent conduit whereby said openings and said vent conduit are in communication and a second position abutting against the lower edge of said insulation layer and said vent conduit to block off communication therewith with said opening; a pair of bimetallic elements positioned between said casing and said insulation layer adjacent the lower end of said insulation layer and on diametrically opposed portions thereof, one end of each of said bimetallic elements being secured to said casing and the other end of each of said bimetallic elements being secured to said ring whereby said bimetallic elements are adapted to cause movement of said ring.

8. A chimney construction, comprising: an elongated flue gas conduit; a vent casing at least partially surrounding and spaced from said flue gas conduit to form a vent passageway therebetween, said flue gas conduit extending below the lower end of said vent casing; a weather cap on the upper end of said flue gas conduit; insulation means surrounding said vent casing and flue gas conduit; valve means for controlling air flow through the lower end of said passageway; a heat responsive valve actuator

mounted externally of said passageway and externally of said insulation means and operably connected to said valve; and a heat deflecting structure encircling the lower end of said flue gas conduit, said structure including a radially extending flange for shielding said valve actuator from convection currents.

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