DOME TYPE VENT TOP

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Filed: June 4, 1969
Appl. No.: 830,268

U.S. Cl. .................................................. 98/84
Int. Cl. .................................................. F23J 1/02
Field of Search ........................................... 98/83, 84, 66, 122

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ABSTRACT
A dome type top or terminal device for vent or flue pipes comprising a dome-shaped sheet metal top member vertically spaced from and connected by supporting legs with a skirt having substantially the same diameter. An intermediate air flow divider member is fixed to the supporting legs and provides upper and lower cylindrical discharge openings which can be optimized for maximum air flow efficiency.

3 Claims, 6 Drawing Figures
This invention relates to improvements in terminal or top devices for use on metal gas vents or chimney flue pipes.

In the development of vent caps or tops for gas vents or prefabricated metal chimneys there are several important considerations. First of all, a top must provide for sufficient air flow through the vent pipe under all external wind conditions, that is, it must produce a strong updraft from any wind angle and a low operating resistance. It should produce no back draft or air flow reversal under any circumstances. Moreover, it must prevent the influx of rain and foreign objects or animals, such as birds. Yet, it should have a pleasing appearance when installed above the roof level of a house or even a trailer type dwelling.

A general object of the present invention is to provide an improved vent cap or top that solves the aforesaid problems to a degree heretofore not achieved by any vent top design.

Another object of my invention is to provide a vent top having a construction that is particularly well adapted for ease and economy of manufacture.

Another more specific object of my invention is to provide a dome type vent top having a double-discharge arrangement that provides improved operating results such as increased updraft performance and less wind resistance while utilizing dome and skirt elements that require a relatively shallow draw.

Still another object of the present invention is to provide a vent top that discharges gas more nearly horizontally under most conditions thereby lessening the danger of sooting the outside of the pipe immediately below the top. In vent tops heretofore devised, this was a serious problem in that such sooting detracted from the appearance of the installation.

The present invention contemplates a vent top which generally includes a circular dome and an annular skirt that are held apart vertically and connected by suitable support members. A stub pipe or connector fits within or is attached to the skirt. Between the dome and the skirt is a cylindrical wind band which is spaced so that annular discharge openings are provided both above and below it. The aforesaid general arrangement including the dimensional and space relationship of these major components and the manner in which they are joined together provide important features of the invention.

Other objects, advantages and features of the present invention will become apparent from the following detailed description which will now be described in conjunction with the accompanying drawings.

In the drawing:

FIG. 1 is a view in elevation and partially in section of a vent top embodying the principles of the present invention;

FIG. 2 is a fragmentary plan view of the vent top shown in FIG. 1, with portions thereof shown in section;

FIG. 3 is an enlarged view in section taken at line 3—3 of FIG. 1;

FIG. 4 is a view in elevation and partially in section of a modified form of my vent top;

FIG. 5 is a plan view of the vent top of FIG. 4 with a portion thereof broken away to show internal details; and

FIG. 6 is an enlarged fragmentary view in elevation and in section of the vent top of FIGS. 4 and 5.

Referring to the drawing, FIG. 1 shows a terminal device or vent top embodying the principles of the present invention which is normally attached to a flue or vent pipe 11 above the roof level of a house or building. Generally it comprises a dome-shaped top member 12, preferably of sheet metal, that is circular in planform and is connected to but spaced upwardly from a skirt member 14. The dome top is smoothly curved, starting from an essentially flat slope at its outer edge 16 which slope decreases to essentially zero at the center of the dome top, thereby giving it a smooth external shape with good aerodynamic characteristics.

The skirt member 14 preferably has approximately the same outer diameter as the dome top and is provided with a central opening 18 surrounded by an upturned cylindrical flange portion 20. A tubular stub connector 22 is preferably attached to the flange portion and extends downwardly to facilitate the connection of the terminal device with a vent pipe or chimney. From this inner flange an inner skirt portion 24 first slopes downwardly at a relatively steep slope and then becomes an outer portion 26 that slopes at an analytically lesser angle. Among other things, this double-slope skirt configuration prevents any water from collecting on it and also assures smooth air flow through the device. However, I have found that the skirt member of this vent top whether curved or conical appears to have little effect on the overall air flow performance of the top so long as it is the same size as the dome or upper element. In other words, it can slope from 15 to 30 degrees, and it may have a plain or cylindrical or curled edge.

Interconnecting the dome member 12 and the skirt 14 are a plurality of circumferentially spaced apart pairs of supporting legs 28 and 30, both of which have a channel-shaped cross section. The outer leg 28 of each pair is substantially vertical and has flange portions 32 and 34 at its opposite ends which are fastened, as by rivets, to the outer surface of the skirt 14 and the inner surface of the dome 12, respectively. The inner supporting leg 28 of each leg pair is provided for extra strength. It is connected by a rivet 36, or the like, to its adjacent outer leg 28 near the lower end thereof, and from there it extends upwardly and inwardly at an angle. At its upper end each leg 30 is connected by a flange 38 to the inner surface of the dome and at a location spaced radially outwardly from the flange 34 of the adjacent outer leg. Only three or four pair of the supporting legs are used, and as they are spaced apart and relatively narrow in width they have little if any effect on the air flow pattern into and out of the terminal device. Although the double-leg supporting system provides unusual strength with a minimum of air flow obstruction, other forms of supporting legs could be used within the scope of the invention.

Attached to the outer supporting legs 28 is an intermediate air flow controlling band 40 that is positioned between the dome and the skirt to create upper and lower discharge openings 42 and 44 above and below the band. The circumference of this band must be greater than the cylindrical inner flange 20 on the skirt and less than the outer diameter of the dome and preferably it is approximately halfway between these inner and outer limits. Also, the band is of uniform width and, in accordance with the present invention, its lower edge is located just above the top edge of the skirt, while the top edge of the band is just below the outer edge of the dome top. I have found that the width of the band for terminal devices on conventional vent pipe should be about 0.25 to 0.31 times piping diameter and the band diameter should be 1.5 times piping diameter in order to produce the desired results.

When ready for installation the vent top 10 is first connected at its cylindrical flange portion 20 to the tubular connector 22 by some suitable fastening means. For example, I may utilize a tubular section which is expandable at its upper end by means of a screw 48 that is seated in adjacent boss portions 50 formed in the overlapped ends of the tubular section. By turning the screw the boss portions are spread apart, thereby increasing the diameter of the tubular section at its upper end and causing it to fit tightly within the vent top.

Another form of my vent top embodying the principles of the present invention is shown in FIGS. 4 to 6. This embodiment is also comprised generally of a dome shaped top member 12a, a skirt member 14a spaced downwardly from the top member and an intermediate cylindrical member 52 located between and interconnecting the top and skirt members. This intermediate member, which may be formed and cut from a single strip of sheet metal, comprises a central cylindrical band having substantially the same relative dimensions and location with respect to the opposed skirt members as the band member 40 in the vent top 10. Integral with the band portion 40a are a plurality of transverse members 54 that serve as connectors on the intermediate member 52.

In the embodiment shown, I have provided five such transverse members 54, and when the intermediate member 52 is
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3. bent into its cylindrical shape the transverse members at its extreme ends are brought in an overlapping arrangement. It is apparent, however, that a different number of transverse members could be used, if desired. Also integral with the band portion 40a and its transverse members is an upper integral grille section 56 forming a bird screen around the band portion 40a comprised of parallel spaced apart bars 58 connected by a circular upper end member 60 that terminates just below the inside surface of the dome top member 12a. A similar but possibly longer integral grille section 62 is provided along the lower edge of the band portion 40b, and it also has spaced apart bars 64 connected to a lower circular end member 66. The transverse members 54 are considerably wider than the grille bars 58 and 64, and have spaced apart bead portions 68 along their length to provide added stiffness. At its top end, each transverse member is bent inwardly at substantially a right angle to form a foot 70 which is adapted to be flush against a flat base portion 72 of a relatively large dimple or recess 74 formed in the dome top 12a. Extending downwardly through each flat base portion and the foot adjacent thereto is a rivet 76 or some other suitable fastener.

The skirt member 14a on the top 10a is similar to the skirt member 14 in that it has substantially the same outer diameter as the dome-shaped top member and inner and outer skirt portions 24a and 26a that slope at different angles. However, in the top 10a these inner and outer skirt portions are separated by an annular shoulder 78 which provides a cylindrical surface for supporting the lower circular end member 66 of the lower grille section 62. Circumferentially spaced apart adjacent the latter shoulder are a plurality of upstanding protuberances 80 on the inner skirt portion 24a. Each of these protuberances is formed with a generally vertical outer surface 82 extending upwardly from and flush with the shoulder 78 and each is also aligned with the transverse member 54 on the intermediate cylindrical member 52. Thus, each vertical surface 82 lies flush against and can be readily fastened to the lower end of a transverse member 54.

As with the top 10, the skirt 14a is also provided with a cylindrical inner flange portion 20 to which a stub connector 22 may be attached, as previously described.

The dome top 10a is particularly well adapted for automated, high volume production because of the structural features just described.

The dome top member 12a, the intermediate cylindrical member 52 and the skirt member 14a can all be formed in a simple stamping or forming operation from single pieces of sheet metal (e.g., 0.016 gauge aluminum or stainless steel). When ready for assembly, the fastening of the dome top member to the feet 70 can be done rapidly with precision and efficiency using standard rivets. Similarly, the skirt member 14a can be attached to the intermediate member 52 by outside riveting through the aligned transverse members 54 and skirt protuberances 80.

The performance and function of the vent top 10a is similar to that of the top 10 and the former provides an additional protection against birds and the like due to the upper and lower grille or screen sections.

With both embodiments, the flow of air or gases up through the vent or flue pipe 11 is essentially split as it reaches the upper edge of the skirt 14. That portion of the flow nearer the inside surface of the collar or connector stub 22 tends to pass around the top edge 46 of the skirt and out the lower discharge opening 44. The flow from near the center of the connector stub 22 continues upwardly and outwardly through the upper discharge opening 42 above the flow divider band 40 or 40a. The overall result is a flow pattern that can adjust itself to varying wind conditions and internal flue pressure. In addition to acting as a flow divider, the band also serves to prevent the influx of wind and rain except under extremely adverse environmental conditions.

Although the top members 12 and 12a are shown as dome-shaped they could be conical-shaped, if desired, if provided with a shallow draw or angle. As air flows over and around the top device the pressure within it is reduced and air discharges through the openings above and below the wind band. I have found that highly favorable air flow characteristics are produced by the double-discharge vent top of the present invention including a tendency to induce aspiration within the vent pipe while offering a minimum resistance to flow. The vertical spacing between the dome member and the skirt at their outer edges is important and preferably is of the order of 0.5 to 0.6 of their diameters which should be approximately equal.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim: 1. A terminal device adapted for installation on the outlet end of a vent pipe or chimney comprising: a top member which is circular in plan view and has a raised central portion to present a generally dome-shaped appearance; a frusto-conically shaped skirt member spaced vertically below said top member, said skirt member having a central opening adapted to fit closely above the top of said vent pipe or chimney, the outer diameter of said skirt member being substantially the same as the outer diameter of the top member; means connecting said top member and said skirt member together; and a cylindrical wind band fixed in position between said top and skirt members and forming upper and lower discharge openings; said wind band being positioned substantially halfway between the circumference of the central opening of the skirt and the outer circumference of the skirt; said wind band being formed of flat sheet material having a plurality of circumferentially spaced integrally formed upper and lower lateral extensions which are provided at their respective ends with means for securing them to the dome and skirt members, the band having a circumferential row of perforations along its top and bottom marginal portions; the edges of the band lying close to dome and skirt portions respectively, at a distance which is less than the height of the perforations; the upper edge of the central unperforated portion of the band lying approximately in the same plane as the outer circumference of the top member and the lower edge of the unperforated edge lying in the plane of the upper central opening of the skirt member.

2. A terminal device according to claim 1 wherein the top member is provided with a plurality of depressions each having a flattened bottom and means securing each of the extensions to the underside of a flattened bottom.

3. A terminal device according to claim 2 in which the skirt member is comprised of a pair of frusto-conical sections, the smaller opening of the lower section having the same radius as the larger opening of the upper section, the sections being connected by a cylindrical wall connecting the rims of said openings, the lower ends of the integrally formed extensions being secured to said wall.

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