

[54] SMOKE CONSUMER

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[51] Int. Cl. **F23d 13/20, F23g 7/06**

[58] Field of Search.....**23/277 C; 55/DIG. 20, 23/DIG. 30; 261/DIG. 9; 431/202; 110/8 A**

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

A smoke consuming device having a vertically extending passageway and an open lower smoke-intake end to be secured to the smoke discharge end of a stack or the like; a horizontally positioned deflector spaced within the upper open end of said passageway cooperating with the sides of said passageway at the open upper end to define an annular discharge aperture around the outer periphery of said deflector, said passageway having downwardly and inwardly inclined walls extending from said upper open end of said passageway to a restricted-diameter throat spaced below said deflector and coaxial with said discharge aperture, and fuel discharge openings around said inclined wall spaced below the level of said deflector and directed toward the latter arranged to provide a substantially continuous annular flame extending across the path of smoke to said annular flame when said fuel is discharged through said openings into said passageway under pressure and is ignited.

1 Claim, 2 Drawing Figures

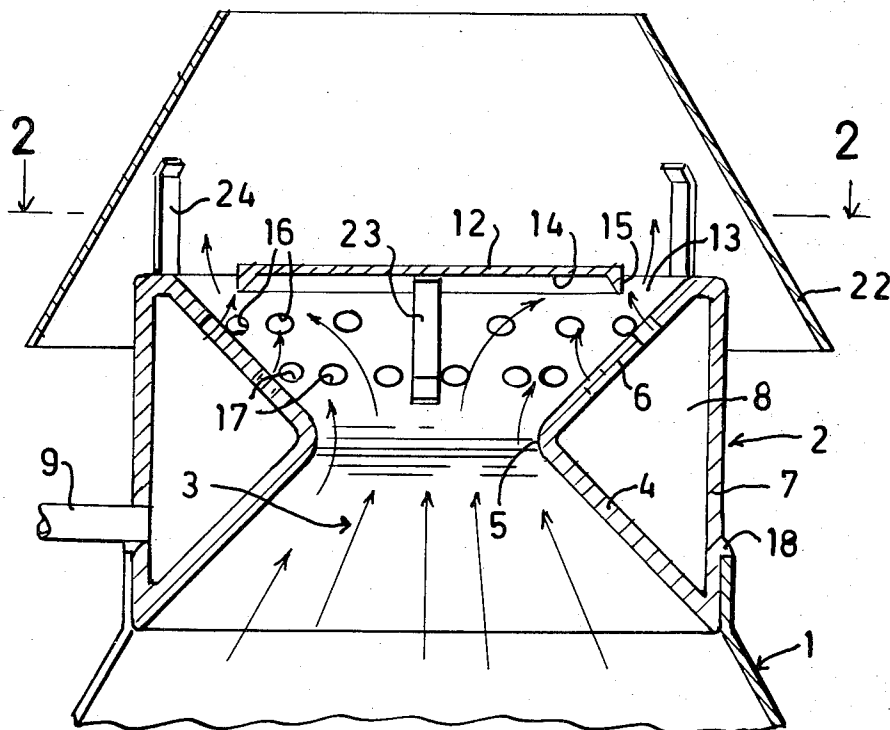


FIG. 1

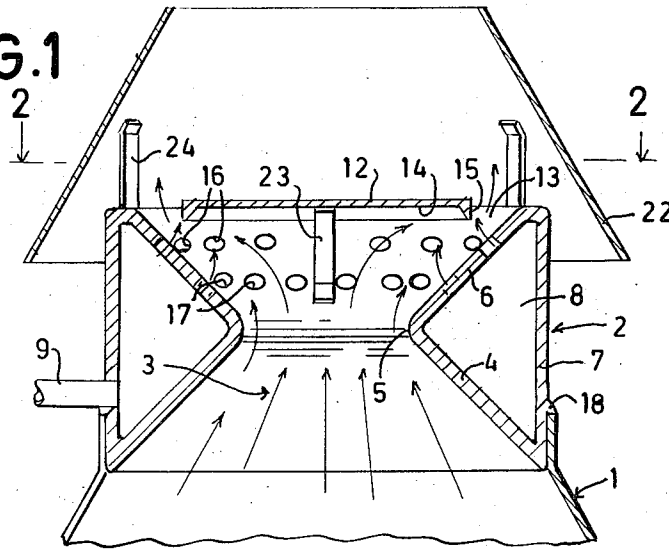
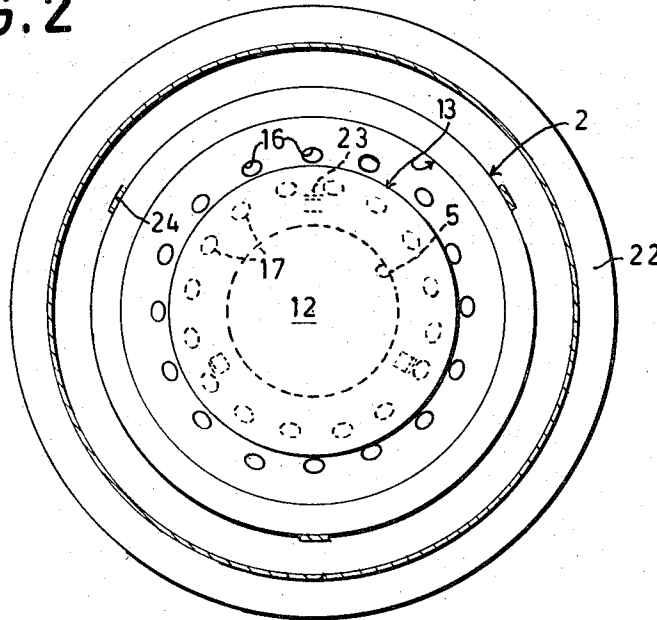


FIG. 2



SMOKE CONSUMER

SUMMARY

One of the objects of the present invention is the provision of a simple, economically made, highly effective smoke consuming device that is economical to operate and that may be readily installed on most existing stacks or conventional sawdust and waste burners such as are used at lumber mills.

Another object of the invention is the provision of a vertically disposed smoke consumer having an annular upper terminal discharge aperture within a vertically extending passageway in direct communication with a venturi-throat of lesser diameter than that of said aperture, said throat being spaced below and coaxial with said aperture and of lesser area than the total area of said aperture, and annular rows of flame openings directed inwardly below said annular aperture to intercept and consume the products of combustion before discharge of said products into the open air.

Other objects and advantages will appear in the description and drawings.

DESCRIPTION OF DRAWINGS

FIG. 1 is a vertical cross-sectional view through the device, including the upper terminal end of a sawdust burner or stack.

FIG. 2 is a cross-sectional view along line 2-2 of FIG. 1.

DESCRIPTION OF INVENTION

The word "stack" as used herein is intended to include the smoke discharge end of a sawdust burner, such as generally designated 1, or chimneys or incinerator discharge conduits, etc.

The smoke consumer itself is generally designated 2 and comprises a vertically disposed body having central passageway 3. The inner walls 4 of the lower or upstream portion of said passageway taper inwardly from the lower open end thereof to a restricted diameter throat 5, and the inner walls 6 of the upper or downstream portion of said passageway taper outwardly to the open upper end of the latter. This forms a venturi-like passageway providing for accelerated velocity of upwardly moving smoke at the throat 5.

An outer wall 7 spaced around the inner wall extends between the upper and lower ends of the passageway 3 and connect with the inner wall to form an annular chamber 8 between said inner and outer walls for a gaseous fuel. A fuel supply pipe 9 opens into chamber 8.

The walls 4, 6 and throat 5 are circular in horizontal cross-sectional contour, as are the upper and lower open ends of the passageway 3.

A circular, horizontal deflector plate 12 is supported by brackets 23 coaxial with passageway 3 within the upper open end of said passageway spaced from the sides thereof at said upper end to provide an annular discharge aperture 13. The underside of said deflector plate is centrally recessed as indicated at 14 to provide a downwardly projecting circular flange 15 along the outer periphery of said plate.

The outwardly and upwardly inclined upper portion 6 of passageway 3 is formed with an upper, horizontally disposed circular row of equally spaced fuel discharge passageways or openings 16 directed upwardly in an inward direction to direct the flames from said open-

ings toward the underside of the marginal portion of said disc plate 12. This row of openings is spaced below the upper edge of the portion 6 of passageway 3.

Spaced below the row of passageways or openings 16 is a similar row of openings 17 directed upwardly and inwardly toward the lower side of plate 12. These openings 17 are in staggered relation to the openings 16, and the spacing between the openings in each row is such that the flames from said rows flaring from said openings form a continuous annular flame across the aperture 13 with which flame the products of combustion are mixed and consumed.

The portion 6 of the inner wall is preferably disposed at an angle of 45° relative to horizontal, and the throat 5 is rounded in vertical cross-sectional contour.

Any suitable means may be provided for securing the device in position on the upper end of stack 1, such as a radially outwardly projecting flange 18 on the outer side of the cylindrical outer wall 7 for forming a seat adapted to rest on the upper terminal end of the stack.

As shown in FIG. 1 the lower portion 4 of the inner wall below throat 5 tapers downwardly and outwardly, and the inner surfaces may substantially form a continuation of the inner surface of the stack 1.

Spaced around the upper portion of the device is an open ended windshield 22. The terminal lower edge of the shield defining its lower open end is coaxial with the cylindrical wall 7 and annular aperture 13 and terminates below the upper level of the smoke consumer. The shield is frusto-conical in shape, its lesser diameter upper open end being coaxial with aperture 13 and being positioned a distance above the aperture 13 and slightly over the latter. The purpose of the windshield is to prevent the wind from interfering with the efficiency of the device, since the device itself is normally above the stack and in the open.

The deflector plate 12 and windshield 22 are respectively supported on the body of the smoke consumer 2 by suitable brackets 23, 24.

The total area of the aperture 13 is larger than the area within throat 5, the ratio being 1.8 to 1 which is relatively critical. In different sized smoke consumers the spacing between the flame apertures in each row is such as to insure a continuous annular flame across the annular discharge opening 13, and any conventional regulator and valve control means may be employed to control the flame from the flame apertures 16, 17. The body of the smoke consumer normally is a casting in which the portion 6 having openings 16, 17 therein is relatively thick with the sides at an angle of 45° relative to horizontal, whereby the flame is ejected in a direction normal to the portion 6. The flames from the openings of both the upper and lower row will spread after leaving the openings, and will generally follow the direction of the arrows, while the products of combustion passing upwardly through the throat 5 will impinge the downwardly facing lower surface of the plate 12 and will be deflected to flow below the outer flange 15 on said plate and through the aperture 13.

The restricted throat facilitates not only restricting the movement of the smoke to the flame apertures but, in combination with the deflector, which is directly in the path of the smoke passing through the throat, the velocity of the smoke so passing is slowed down and is deflected outwardly to the annular aperture 13 and

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successively into and past flames from openings 16, 17, before being exhausted.

In actual practice heavy dense smoke discharged from the stack 1 into the smoke consumer is colorless upon discharge from the annular aperture 13.

The burner illustrated is suitable for use with natural or artificial gas or PROPANE and the like, and it is pertinent to note that the deflector plate 12 extends into the open upper end of the passageway 3.

We claim:

1. A smoke consuming device for positioning on the discharge end of a stack comprising;

a. a body having a vertically extending passageway with a circular open upper end and a circular open lower end,

b. the wall of said passageway tapering inwardly from its opposite open ends to an annular throat of restricted diameter intermediate said open ends,

c. an outer wall spaced outwardly of the wall of said passageway and extending therearound, said outer wall and said wall of said passageway being connected at said upper and lower ends to provide an annular fuel chamber between said outer wall and the wall of said passageway, and the angle of the upper portion of the wall of said passageway disposed between said throat and its upper open end

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being approximately 45° relative to horizontal,

d. a horizontal, circular deflector plate coaxial with said upper open end spaced within the latter cooperating with said open upper end to define an annular discharge aperture for products of combustion, and means for positioning the lower end of said body on a stack for passage of smoke from the latter into the lower end of said passageway,

e. means for supplying fuel to said chamber,

f. a pair of horizontally disposed axially spaced annular rows of spaced openings formed in said upper portion of the wall of said passageway directed at an angle of approximately 45° relative to horizontal and toward the underside of the outer marginal portion of said deflector plate providing flame openings for directing the flames of ignited fuel directed in and said outer marginal portion of said deflector plate,

g. the underside of said deflector plate being formed with a recess extending to substantially the outer edge of said deflector plate, and a depending flange around said plate at its outer edge,

h. the ratio between the total area of said circular aperture and the area within said throat being approximately 1.8 to 1.

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