

[54] **FLAMMABLE LIQUID WASTE BURNER**

3,822,654 7/1974 Ghelfi..... 431/284

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[22] Filed: **Jan. 14, 1974**[21] Appl. No.: **433,255**

[52] U.S. Cl..... **431/202, 431/4, 431/285,**
431/351, 431/343

[51] Int. Cl. **F23d**

[58] Field of Search 431/202, 4, 190, 284, 285,
431/351; 110/7 B

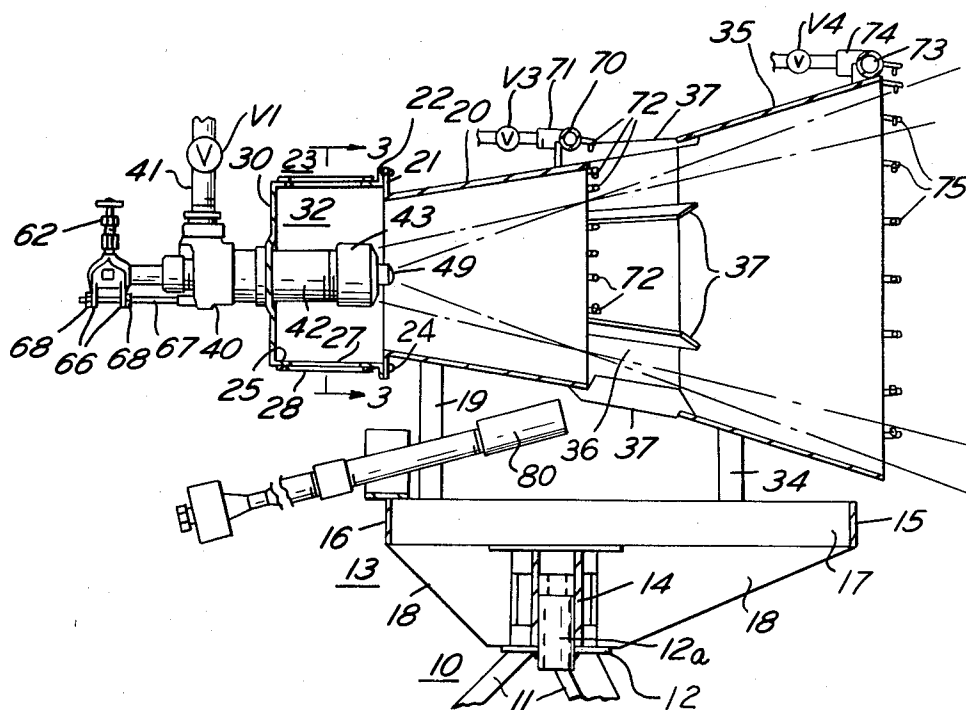
[56]

References Cited**UNITED STATES PATENTS**

3,565,562	2/1971	Drivet.....	431/353
3,797,992	3/1974	Straitz.....	431/285
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[57] **ABSTRACT**

A flammable liquid waste burner is disclosed for firing in an open area in parallel, provisions being made for atomizing the liquid waste, with booster combustible gas supplied if needed, the flame being directed through pairs of spaced diverging cones in tandem, air being drawn in at the space between the cones and water being sprayed into the burning materials between the cones and at the exit of the second cone. The structure can be turned in accordance with the wind direction to avoid undesired deflection by the wind of the flame.

8 Claims, 5 Drawing Figures

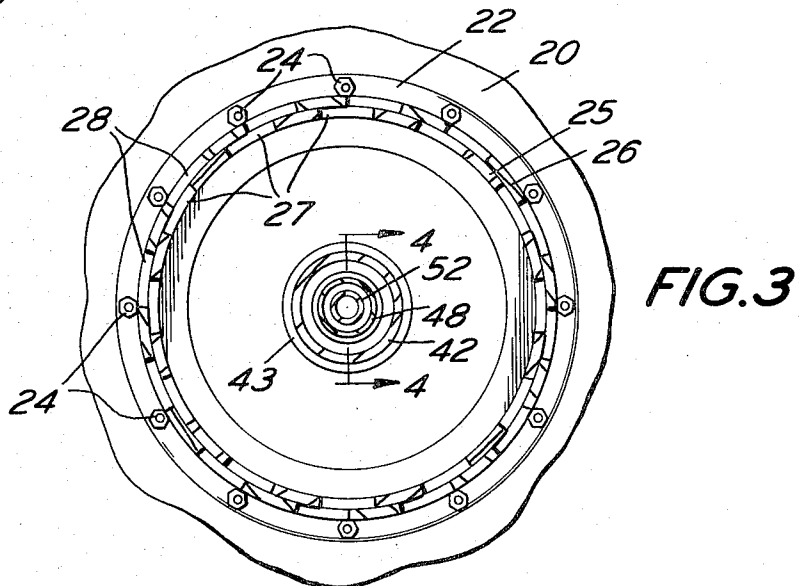
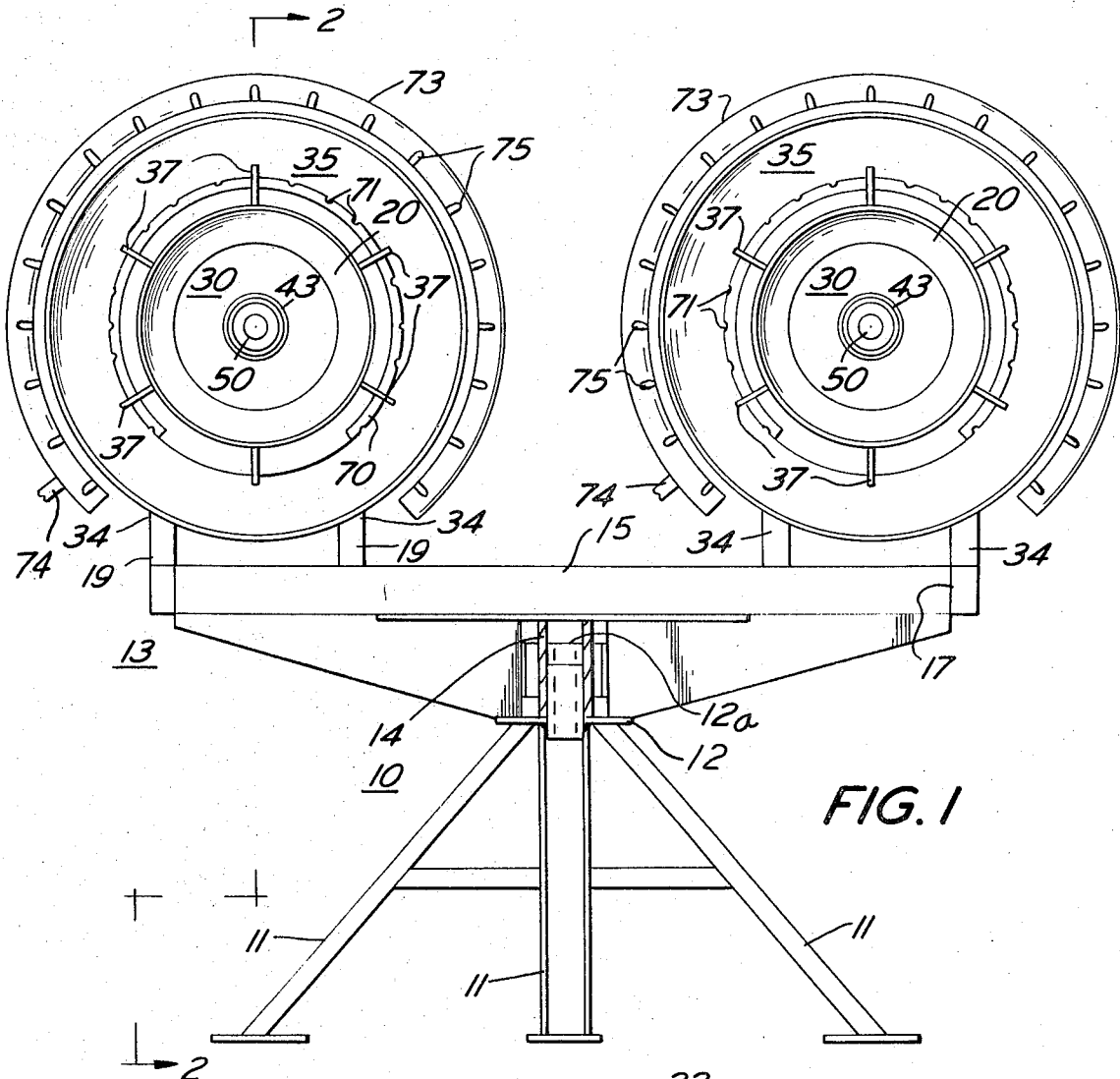


FIG. 2

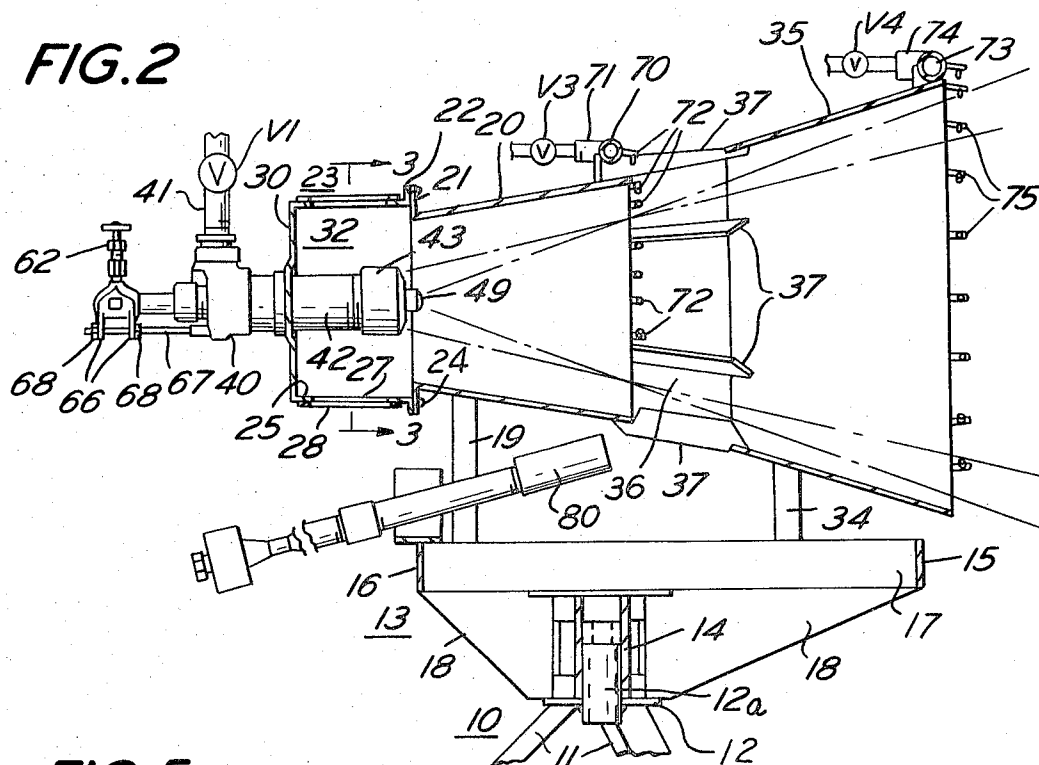


FIG. 5

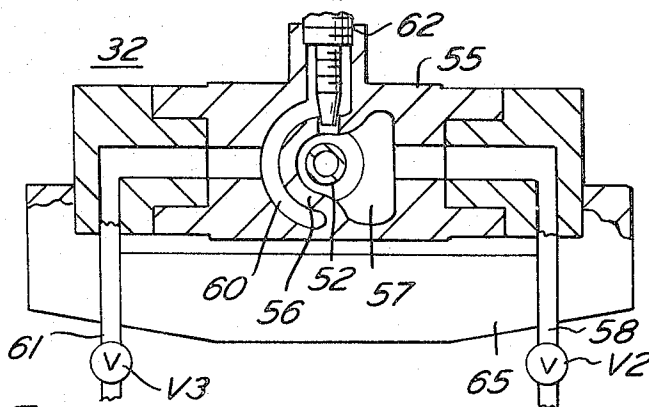
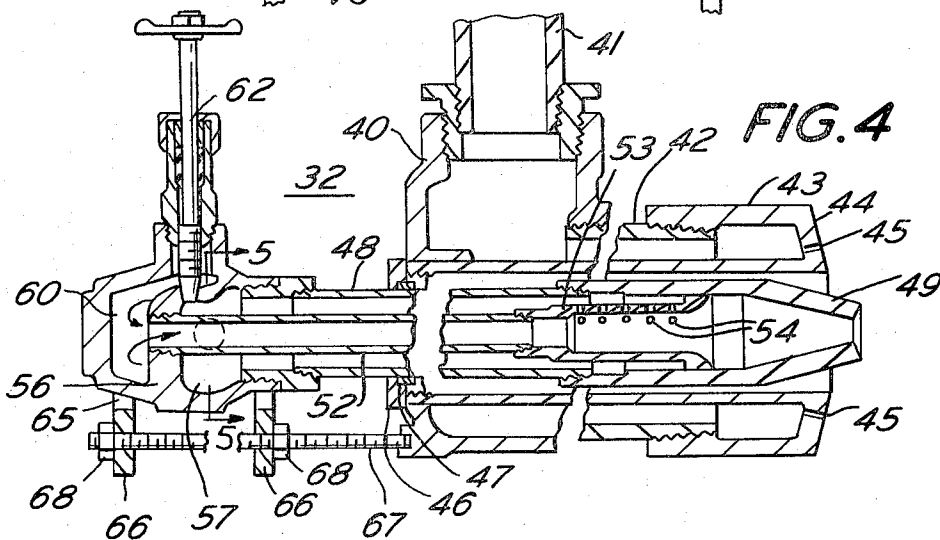


FIG. 4



FLAMMABLE LIQUID WASTE BURNER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to burners for flammable liquid wastes.

2. Description of the Prior Art

It has heretofore been proposed to burn liquid wastes by firing them in an open area. In one device which has been used the waste liquid was delivered to a dual burner unit, was atomized and the atomized liquid delivered from each burner through a ceramic refractory burner and a ceramic refractory muffle block in tandem. A gas pilot burner was provided for each burner, the primary air was controlled by dampers behind the burners and the secondary air was controlled by adjusting the air gap between the burner block and the muffle block.

The structures heretofore available, including the unit just referred to, were of limited capacity, had a great tendency to smoke particularly with certain waste flammable liquids, and being fixedly mounted could only be operated with favorable wind direction.

In my prior application for patent for Crude Oil Burner, filed Dec. 15, 1972, Ser. No. 315,339, and now U.S. Pat. No. 3,797,992, there is disclosed a burner for crude oil utilizing tandem cones and water sprays. The present burner unit utilizes some of the same concepts as are disclosed in that application but for flammable liquids having lower combustible content and which may be so low that additional fuel is required for disposal of the liquid waste.

SUMMARY OF THE INVENTION

In accordance with the invention a dual waste burner unit is provided, preferably having two simultaneously operated burners side by side, preferably mounted for easy turning in accordance with existing wind conditions, each burner having a burner head for delivery of the liquid waste in atomized form and with combustible gas supplied therewith if necessitated by low combustible content of the waste liquid. A pair of axially aligned spaced diverging frusto-conical flame confining elements in tandem is provided for each burner unit, each of the conical elements having at its outlet end a water spray ring.

It is the principal object of the invention to provide a flammable liquid waste disposal unit of high capacity and operating without smoke production.

It is a further object of the invention to provide a flammable liquid waste disposal unit which can be employed for disposal of waste liquids having a wide range of combustible content.

It is a further object of the invention to provide a flammable liquid waste disposal unit which can be used in open areas and which can be readily accommodated to the direction of the wind.

Other objects and advantageous features of the invention will be apparent from the description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part hereof, in which:

FIG. 1 is a view in elevation of the waste disposal apparatus as seen from the front;

FIG. 2 is a vertical central sectional view through one of the burners and taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a transverse sectional view, enlarged, taken approximately on the line 3—3 of FIG. 2;

FIG. 4 is a longitudinal sectional view, enlarged, taken approximately on the line 4—4 of FIG. 3; and

FIG. 5 is a transverse sectional view taken approximately on the line 5—5 of FIG. 4.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings a support 10 is provided which can be a tripod having legs 11 and horizontal platform 12 for easy movement to the desired place of use. The platform has a vertical tubular post 12a secured thereto.

A frame 13, pivotally carried by a vertical pivot sleeve 14 rotatable on the post 12a, includes front and rear frame plates 15 and 16, side frame plates 17 and bracing webs 18.

The frame 13 has extending upwardly therefrom pairs of supporting posts 19, each pair of which has secured thereto a rear or first frusto-conical element 20, of metal and preferably of stainless steel.

The element 20 has a rear flange 21 to which an attaching flange 22 of a primary air register 23 is secured by bolts 24. The flange has a cylindrical register housing 25 extending rearwardly therefrom. The housing 25 has a register sleeve 26 rotatably mounted thereon, the housing 25 and sleeve 26 having openings 27 and 28 for adjustment to control the primary air admitted to the interior of the housing 25. The housing 25 is closed at its rear end by a wall 30 which supports a burner assembly 32 shown in detail in FIGS. 4 and 5.

The frame 13 has pairs of posts 34 extending upwardly therefrom which are secured to and support front or second frusto-conical elements 35 which are in axial alignment with and spaced forwardly from the frusto-conical elements 20. The frusto-conical elements 35 are of metal and preferably of stainless steel and preferably have a greater flare angle than the elements 20. In the spaces 36 between the elements 20 and 35 metallic strips 37 are provided to direct fluid, including air, entering at this location and to brace the elements 20 and 35.

The burner assembly 32 includes a T-fitting 40 to which gas supply pipe 41, controlled by a valve V1 is connected for supply of combustible gas for combustion. The fitting 40 has spaced gas delivery pipes 42 and 42a extending forwardly therefrom having an end fitting 43 with a frusto-conical end surface 44 having delivery openings 45 therethrough for diverging flow as hereinafter described.

The fitting 40 has a gland 46 in threaded engagement therewith, the gland having a packing 47 within which an outer burner pipe 48 is slidably mounted. The outer

burner pipe 48 at its front end has a converging fitting or nozzle 49.

Within the outer burner pipe 48 an inner burner pipe 52 is carried the front of which has a sleeve 53 engaged at its front end within the fitting 49 and having a plurality of openings 54 for delivery of air or steam to the liquid advancing in the pipe 52 and for converting the same to a foam like emulsion for discharge through the converging fitting 49 at increased velocity.

The pipes 48 and 52 extend into a manifold fitting 55 having an interior wall 56 separating the interior into a space 57 communicating with the openings 54 and to which atomizing fluid such as steam or air under pressure is supplied through a supply pipe 58, controlled by a valve V2 and a space 60 communicating with the interior of the pipe 52 for delivery of the combustible liquid waste from a supply pipe 61, controlled by a valve V3. A bypass valve 62 can be provided for delivery of atomizing fluid directly through the pipe 52 from the rear end for cleaning.

The manifold 55 can be mounted in a bracket 65 having lugs 66 slidable on a threaded rod 67 attached to the fitting 40, nuts 68 holding the lugs 66 and the manifold 55 at the desired position of adjustment of the nozzle 49 with respect to the end fitting 43.

The frusto-conical element 20 at the exterior of the front end thereof is provided with a water supply ring 70 having a water supply connection 71 connected thereto with control valve V3, and having a plurality of small water delivery pipes 72 extending therefrom with deflectors at their ends delivering water in small streams or in spray form inwardly at the exit end of the frusto-conical element 20.

The frusto-conical element 35 at the exterior of the front end thereof is provided with a water supply ring 73 having a water supply pipe 74 connected thereto with control valve V4 and having a plurality of small water delivery pipes 75 extending therefrom with deflectors at their ends for delivering water in small streams or in spray form converging in the range from 5 to 30 degrees at the exit end of the frusto-conical element 35.

A gas pilot 80 is provided for supplying an igniting flame at the space between the frusto-conical elements 20 and 35, the pilot 80 mounted on the frame 13.

The mode of operation will now be pointed out.

The flammable liquid waste delivered through the pipe 61 is delivered through the manifold 55 in inner burner pipe 52 and at the same time atomizing fluid is delivered through the pipe 58 to the space 57 and thence through the openings 54 to provide a foam like emulsion of the liquid waste as it is discharged from the nozzle 49 the exit velocity being increased by the progressive decrease in diameter of the converging fitting 49. The delivery of the liquid waste in this manner results in better contact with the air and better combustion resulting in the elimination of smoke.

If the combustible content is sufficient the combustible material, supplied with primary combustion air induced through the register 23 by the discharge of fluent combustible material may burn without assistance as it advances successively through the frusto-conical elements 20 and 35.

If the combustible content of the waste liquid is not sufficient to support combustion then the burning may be aided by using combustible gas supplied through the pipe 41 and delivered in surrounding relation to the fluent combustible waste delivered from the nozzle 49.

As the combustible materials from the nozzle 49 or from both the nozzle 49 and the fitting 43 advance forwardly they burn, with additional air being induced at the spaces between elements 20 and 35.

At the same time and place, water is discharged from the pipes 72 as controlled by the valve V3, inwardly, the water introduction aiding in the addition of air to the burning materials and inhibiting smoke formation.

Water is also discharged from the pipes 75 as controlled by the valve V4, inwardly, the water introduction also aiding in the addition of air at this location and reducing smoke formation.

I claim:

1. Apparatus for burning flammable liquid waste comprising

a support, said support comprising a pivotally mounted frame for facing said housing and said cones in a selected substantially horizontal direction,

a housing,

said housing having means for controlling the delivery of air thereinto,

a burner assembly carried by said housing,

said burner assembly comprising

members for supplying flammable liquid waste forwardly with respect to said housing and

members for supplying supplemental fuel in close relation to the waste delivered from said first mentioned burner assembly members,

a rear cone connected at its rear end to said housing and through which combustible materials from said burner assembly and air from said housing are delivered for burning therein,

said rear cone and said housing being carried by said support,

said rear cone being larger at its forward end,

a front cone carried on said support extending forwardly from said rear cone in axial alignment therewith,

said front cone at its rear end being spaced from the front end of said rear cone to provide an air entry space and being larger at its front end,

a rear water spray ring contiguous to the front end of the rear cone and having members for directing water forwardly and inwardly into the space between said cones and into the flame therein, and

a front water spray ring contiguous to the front end of the front cone and having members for directing water forwardly and inwardly beyond the front end of said front cone and into the flame advancing therebeyond.

2. Apparatus for burning flammable liquid waste as defined in claim 1 which comprises

a plurality of devices as defined in claim 1 mounted on said support and facing in the same direction.

3. Apparatus for burning flammable liquid waste as defined in claim 1 in which

said second mentioned members include a connection to a supply of combustible gas.

4. Apparatus for burning flammable liquid waste as defined in claim 3 in which

said second mentioned members are positioned to supply combustible gas into said rear cone in surrounding relation to the flammable liquid waste.

5. Apparatus for burning flammable liquid waste as defined in claim 1 in which

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the longitudinal axes of said cones are horizontally disposed.

6. Apparatus for burning flammable liquid waste as defined in claim 1 in which a pilot is provided for ignition at the space between said cones.

7. Apparatus for burning flammable liquid waste as defined in claim 1 in which

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said burner assembly members are relatively adjustable for varying the relationship of delivery of the supplemental fuel to the delivery of the liquid waste in spray form.

8. Apparatus for burning flammable liquid waste as defined in claim 1 in which said cones are of metal.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,861,857

Dated January 21, 1975

Inventor(s) John F. Straitz, III

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the printed heading

Identify the inventor as John F. Straitz, III.

Identify the assignee, Combustion Unlimited Incorporated,
a corporation of Pennsylvania, P. O. Box 8856, Elkins Park,
Pennsylvania 19117.

Column 3

Line 45, after "80" "being" should be inserted.

Signed and sealed this 6th day of May 1975.

(SEAL)

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks