Sept. 30, 1969 J. R. OGLEVEE 3,469,933

THERMO-DUSTER ALCOHOL BURNING FUNGICIDE SUBLIMER

Filed April 27, 1967 2 Sheets-Sheet 1

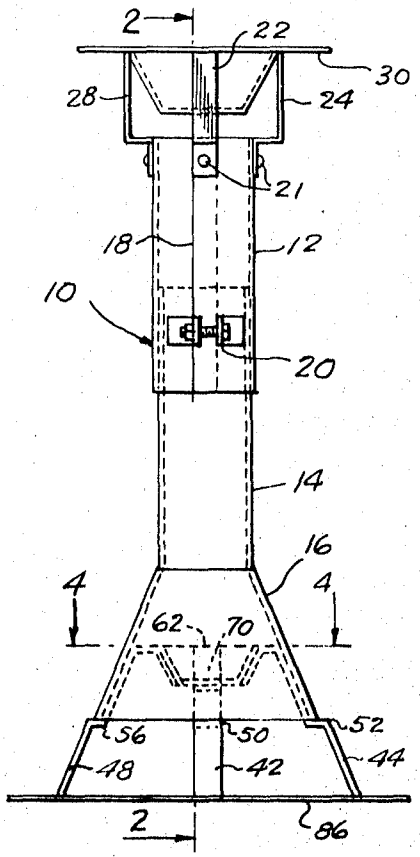

FIG. 1.

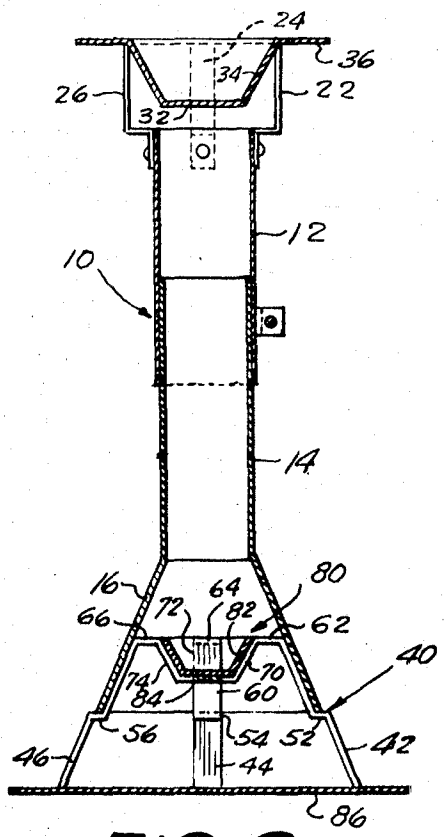

FIG. 2.

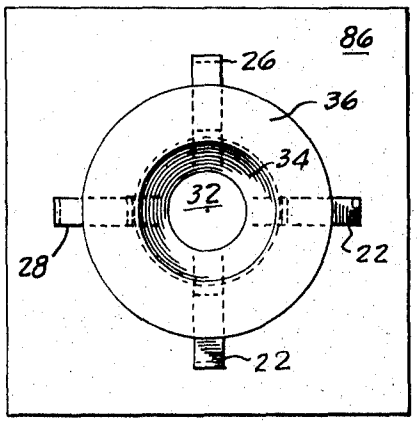

FIG. 3.

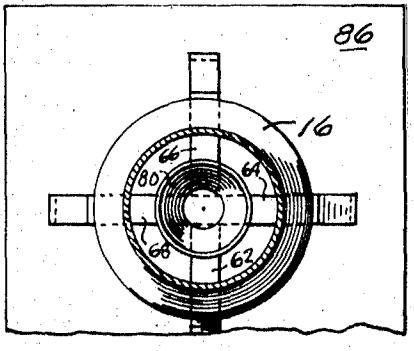

FIG. 4.

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FIG. 5

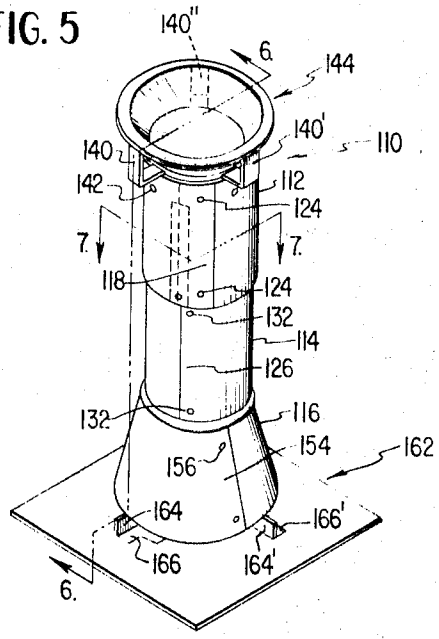


FIG. 6

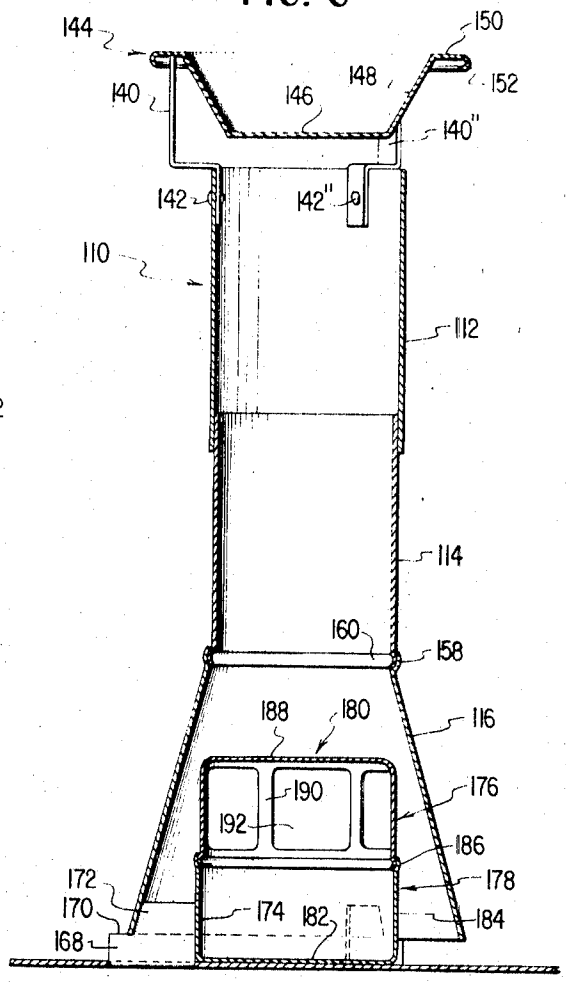


FIG. 7

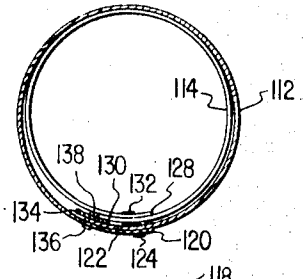


FIG. 8

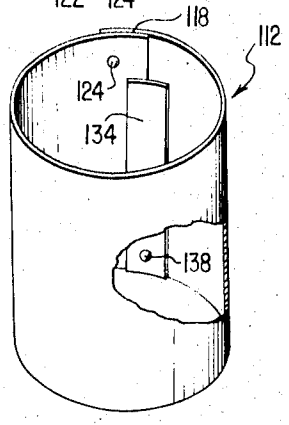
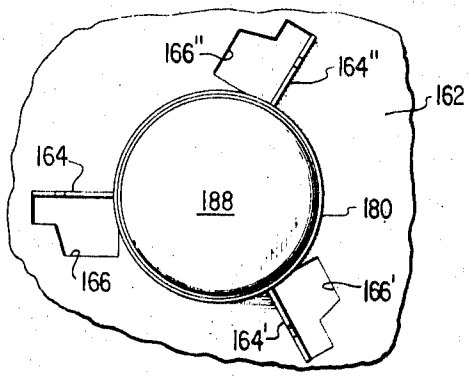


FIG. 9



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THERMO-DUSTER ALCOHOL BURNING FUNGICIDE SUBLIMER

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Int. Cl. A61l 3/00
U.S. Cl. 21—117 1 Claim

ABSTRACT OF THE DISCLOSURE

An alcohol stove for subliming a solid fungicide comprising an adjustable length cylindrical combustion chamber having a conical apron on the bottom, fingers supporting a fungicide vessel on the top, and a support for an alcohol vessel and for the combustion chamber on the bottom.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to alcohol stoves generally and more particularly to a compact stove especially designed for volatilizing a solid fungicide in which the length of the combustion chamber may be varied.

Description of the prior art

Alcohol stoves generally are well known in the prior art and many such stoves have been specially adapted for many purposes; however, the alcohol stoves of the prior art have been found unsuitable for the present application because in general they are too cumbersome, expensive, and more importantly, do not provide for adequate adjustment of the length of the combustion chamber and of the distance between the source of alcohol and the insecticide to be volatilized. In the present application, this latter feature is of the utmost importance since the insecticide vapors are combustible in themselves. Lack of adjustability prevents utilization of the conventional alcohol stove for the present purposes.

SUMMARY

This invention is directed to a specially designed compact alcohol stove which burns alcohol for subliming a solid fungicide such as Termil, which is Diamond Alkali Company's trademark for tetrachloro-isophthalonitrile. The alcohol burning stove comprises a generally cylindrical combustion chamber which in turn comprises a lower section having a cylindrical portion and a conical apron extending downwardly and outwardly therefrom, an upper cylindrical section which is formed from a sheet of metal curved to the shape of a cylinder having an overlapping lip area which is pivotally connected at the top and clamps together at the bottom about the cylindrical portion of the lower section, a plurality of fingers extending from the top of the upper section supporting a specially designed fungicide containing vessel which has a flat bottom portion substantially of the same diameter as the combustion chamber with upwardly and outwardly extending conical walls connected at the top to a laterally extending flange, and a specially designed support for supporting the combustion chamber a distance above a surface and for supporting a combustion vessel of alcohol immediately below the combustion chamber. Specific objects of the invention include the provision of the specially designed combustion vessel in combination with the combustion chamber and the provision of the specially designed combustion chamber which is adjustable in length.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a side elevational view of the subliming stove of this invention.

FIGURE 2 is a side elevational view of the alcohol burning stove of this invention shown partially in cross section taken substantially along lines 2—2 of FIGURE 1 in the direction of the arrows.

FIGURE 3 is a top view of the stove taken from the top of FIGURE 1.

FIGURE 4 is a top view of the stove in partial cross-section taken substantially along lines 4—4 of FIGURE 1.

FIGURE 5 is a perspective view of an alternative and preferred embodiment of the present invention.

FIGURE 6 is a side elevational view shown in partial cross section taken substantially along lines 6—6 in the direction of the arrows as shown in FIGURE 5.

FIGURE 7 is a top cross-sectional view taken substantially along lines 7—7 looking downward in the direction of the arrows as shown in FIGURE 2.

FIGURE 8 is a side perspective view in partial cutaway showing the top slidable element of the stove of the present invention.

FIGURE 9 is a top plan view showing the arrangement of the burner and the support plate of the preferred embodiment of the invention looking downwardly thereon.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While alcohol stoves are well known in the prior art, considerable difficulty has been experienced in designing and producing an alcohol stove which is sufficiently portable, inexpensive, and rugged for use in greenhouses. Even such stoves as have these characteristics have not been satisfactory because no means was provided for adjusting the length of the combustion chamber, for directing the heated gases about the volatilization vessel, and for adjusting the distance of the volatilization vessel above the combustion vessel. The present invention comprises a stove, specially designed for use with the solid fungicide tetrachloro-iso-phthalonitrile, sold under the trade name Termil by Diamond Alkali Company, which sublimes when heated and, if properly heated, under the correct circumstances, will be distributed sufficiently to treat an area up to 25 feet on each side of a unit in the open and to treat greenhouses of up to 32 feet in width.

In one preferred embodiment, the stove comprises a generally cylindrical combustion chamber **10** which in turn comprises an upper section **12** and a lower section **14** which includes a cylindrical portion and a conical apron **16** extending outwardly and downwardly therefrom. The upper section **12** comprises a sheet of metal which is formed to a cylinder having an overlapping lip area **18** which is held together at the bottom by a clamp **20** and is pivotally connected together at the top by a pin **21** which also secures a finger **22** which extends upwardly from the top of the combustion chamber. Fingers **24**, **26** and **28** are similarly secured to the top of the combustion chamber and extend upwardly therefrom to support a volatilization vessel **30**. Volatilization vessel **30** comprises a bottom portion **32** which is generally flat and is of substantially the same diameter as the internal diameter of the combustion chamber and is supported directly above the outlet of the combustion chamber to be directly contacted by the exiting heated gases therefrom. Conical walls **34** extend upwardly and outwardly from flat bottom **32** to an outwardly laterally extending flange **36**. The configuration of the bottom, walls,

and flange are of considerable importance in the invention. First, it is necessary that the bottom of the vessel intersect the heated gases from the combustion chamber to volatilize the fungicide in the vessel. Secondly, it is necessary to heat the sides of the vessel to prevent recrystallization of the fungicide on the sides, which would occur if no means were provided for heating the sides of the vessel. Thirdly, it is necessary to direct the heated gases, then, away from the top of the vessel since the fungicide is in itself flammable and would burn if permitted to contact the heated gases directly. These functions are admirably accomplished by the design of the fungicide vessel **30**. Heating occurs on the bottom plate which is substantially flat, is positioned directly above the outlet of the combustion chamber to intercept the heated gases exiting therefrom. The heated gases then flow up the sides **34** to prevent recrystallization of the fungicide and are then directed outwardly by flange **36**. In addition to providing the highly desirable results previously described, this configuration of the fungicide vessel and its unique cooperative relationship with the combustion chamber provides additional spreading of the fungicide since a stream of heated air is moving outwardly as well as upwardly from the combustion chamber.

A support for the combustion chamber proper and for the combustion vessel is shown at **40**. The support comprises, in one embodiment, a cross-shaped member, which may be a single sheet of metal formed in the described manner or it may be a plurality of units connected together to form the cross-shaped metal member. The cross-shaped metal member includes four legs, **42**, **44**, **46** and **48**, each of which has a shelf portion **50**, **52**, **54** and **56**, respectively. A central platform area **60** is formed at the intersection of the legs and is connected thereto by horizontal portions **62**, **64**, **66** and **68**, and by tapering combustion vessel side-supporting portions **70**, **72**, **74** and **76**. An alcohol vessel **80**, having an upwardly and outwardly extending conical wall **82** secured to a flat bottom **84** is supported centrally of the support member directly below the cylindrical combustion chamber. The entire assembly is preferably supported upon a plate **86** which may be of metal or of asbestos.

In a specific embodiment which has been found to be highly successful, the overall length of the combustion chamber, including the conical apron, is adjustable from about 8½ to about 11¼ inches with the fingers extending about 1¾ inches above the top of the combustion chamber. The subliming vessel is 4⅞ inches in diameter at the flange. The combustion chamber is supported approximately 1½ inches above the base plate which is 8 inches square. The top of the fuel cup is approximately 3 inches above the base plate.

As in the previous embodiment, the stove comprises a generally cylindrical combustion chamber **110** which in turn comprises an upper section **112** and a lower section **114** which includes attached thereto a conical apron **116** extending outwardly and downwardly therefrom.

In this embodiment the upper section **112** is made of sheet metal and comprises an overlapping lip portion **118** which includes, as best shown in FIGURE 7, overlapping end portions **120** and **122** secured together by a plurality of rivets **124**.

The other portion is slidably received over the lower portion **114** which is also made of sheet metal and includes a lip portion **126** which, as shown in FIGURE 7, includes overlapping portions **128** and **130** secured together by a plurality of rivets **132**.

An important feature of the invention is the provision of an adjustment tab **134**. The adjustment tab is disposed over the seam in the lip area **118** of the upper portion **112** and is secured in place by a rivet **136** which has an inwardly protruding end **138**. This tab serves two functions. First, it reduces or prevents the escape of gases and the entry of gases in the upper portion of the combustion chamber but more importantly it provides means for slidably securing the upper portion over the lower portion in a desired position. The tab **134** is of a resilient material and prevents undesired slippage between the upper and lower sections. Thus, when the combustion chamber length has been set it will remain as set.

A plurality of fingers **140**, **140'** and **140''** are secured by rivets **142** on the upper end of the upper portion **112**. These fingers extend outwardly and upwardly for supporting a volatilization vessel **144** which is generally of the type previously described with respect to the first embodiment. This vessel includes a bottom portion **146** for supporting the material to be volatilized, outwardly sloping walls **148** for directing the combustion gases upwardly and outwardly and a lip **150** which may be reverted at **152** for strength, for directing the combustion gases outwardly away from the gases produced by volatilization of the material in the receptacle.

The conical portion **116** is also made of sheet metal and includes a lip portion **154** which is secured together by a plurality of rivets **156** in a manner similar to that described with respect to the upper and lower portions. An annular lip **158** fits over an annularly formed boss **160** for securing the conical apron to the lower portion of the combustion chamber.

A base plate **162** is provided for supporting the stove. The base plate includes a plurality of tabs **164** taken therefrom and extending substantially vertically upwardly therefrom. Of course, this leaves opening **166** in the base plate.

As best shown in FIGURE 6, the tabs **164** include an upwardly extending member **168** which includes a flat portion **170** on the top thereof and an upwardly extending portion therefrom **172** for engaging the bottom of apron **116**. On the inside, a vertical portion **174** is provided for engaging the combustion vessel **176**.

The combustion vessel **176** comprises a bottom cylindrical container **178** and a top cylindrical member **180**. The bottom cylindrical container **178** includes a bottom portion **182** and cylindrical walls **184**. The tops of the cylindrical walls are secured as at **186** to the bottom of cylindrical member **180**. Cylindrical member **180** comprises a flame deflector and has a top closure member **188** supported by vertical members **190** leaving apertures **192** for escape of the burning alcohol.

This type of combustion vessel and flame detector provides a very high efficiency of the alcohol since the vapors are more thoroughly mixed with the air as it passes upwardly from the base plate along the walls of the apron to the combustion chamber.

OPERATION

The fuel cup or combustion chamber is filled approximately one-half full of denatured alcohol to give a burning time of from about 6 to 8 minutes.

The combustion chamber is then placed over the combustion vessel and adjusted to about ten inches in length overall, not including the support fingers. A desired amount of Termil is placed in the subliming vessel and the vessel is placed on the support fingers. The alcohol is then ignited. While most of the combustion of the alcohol occurs near the surface of the combustion vessel, significant quantities of alcohol vapor are carried further into the combustion chamber by air being drawn in from below the combustion chamber, past the edges of the combustion vessel where the alcohol vapors are mixed with the air, and into the combustion chamber proper. The combination is completed in the combustion chamber. Depending on atmospheric conditions, the purity of the alcohol, and perhaps other variables, it is necesary to adjust the length of the combustion chamber to prevent flame from shooting up past the subliming vessel. The adjustment is made by loosening clamp **20** and moving the upper section up or down with respect to the lower section in the first embodiment or simply by sliding the upper member relative to the lower member in the second em-

bodiment, the position being maintained by the resilient tap 134. In the first embodiment, once the proper adjustment is obtained, the clamp is tightened and the length of the combustion chamber will not generally need additional adjustment unless there is a significant change in atmospheric or other conditions. The heated air and the combustion gases then move upwardly and exit through the top of the combustion chamber where they are intercepted by the bottom of the subliming vessel and directed up the sides thereof and directed outwardly therefrom by flange 36. Generally, it takes about one to one and and one-half minutes for the Termil to begin to sublime and the sublimation should be completed in about five minutes. If a longer time is required, the length of the combustion chamber should be reduced.

It will thus be seen from the preceding description that the subliming stove of this invention may be economically manufactured but that it has highly desirable and essential characteristics for successful sublimation of fungicides such as tetrachloro-iso-phthalonitrile. Obviously, by making the proper adjustments, other volatile fungicides may similarly be sublimed. Indeed, wherever volatilization and spreading of a fungicide or other volatile material is a satisfactory method of treatment, the stove of the present invention will find application by adjusting the dimensions properly. The stove described is unusually efficient and gives an unexpectedly large area of treatment.

While the invention has been abstracted, summarized, and disclosed in specific terms, in order to permit those skilled in the art to practice the invention with the greatest facility, it will be realized that the disclosure is not intended in the limiting sense. Accordingly, the breadth of the invention is limited only by the scope of the appended claim.

I claim:

1. An alcohol burning fungicide subliming stove, comprising:

a cylindrical combustion chamber including,

a cylindrical lower section,

a cylindrical upper section slidably overlapping the lower section,

a vertically oriented elongate tab secured internally of the upper section to secure the upper and lower sections adjustably together so that the generally cylindrical combustion chamber is adjustable in length,

a plurality of fingers rigidly secured to the upper end of said upper section of said combustion chamber and extending upwardly therefrom,

a subliming vessel supported on said fingers positioned directly above the upper end of said combustion chamber,

said subliming vessel including a generally flat bottom member having a diameter substantially equal to the inside diameter of the combustion chamber,

conical side walls extending outwardly and upwardly from the bottom member for deflecting heated gases exiting from the combustion chamber, and

a circular flange extending laterally outwardly from the top of the conical sides for deflecting heated gases outwardly away from the contents of said vessel to prevent combustion of vapors leaving said vessel,

a combustion vessel for containing alcohol,

means supporting the combustion chamber a predetermined distance above a surface and for supporting the combustion vessel directly below the combustion chamber for permitting air to sweep from beneath the combustion chamber, past the combustion vessel where said air is mixed with alcohol vapors, and into the combustion chamber where complete combustion is effected to heat said subliming vessel to volatilize fungicide crystals contained therein,

said lower section further including a conical apron extending downwardly and outwardly from a cylindrical portion for directing air adjacent the edges of the combustion vessel,

the means for supporting the combustion chamber including a horizontal planar member, and a plurality of vertically oriented tabs extending upwardly from the planar member, said tabs each having at least one support portion for supporting the combustion chamber with the vertically oriented tabs defining a central area for fixing the location of the combustion vessel in spaced relation from the sides and bottom of the lower section, said combustion vessel including a lower container section having a bottom and cylindrical walls, and

an upper flame spreader section having a top cover and means supporting the top cover a spaced distance above the top of the cylindrical walls, said supporting means defining openings for egress of vapors for mixing of said vapors with air.

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D. G. MILLMAN, Assistant Examiner

U.S. Cl. X.R.

431—353; 126—43; 21—108