

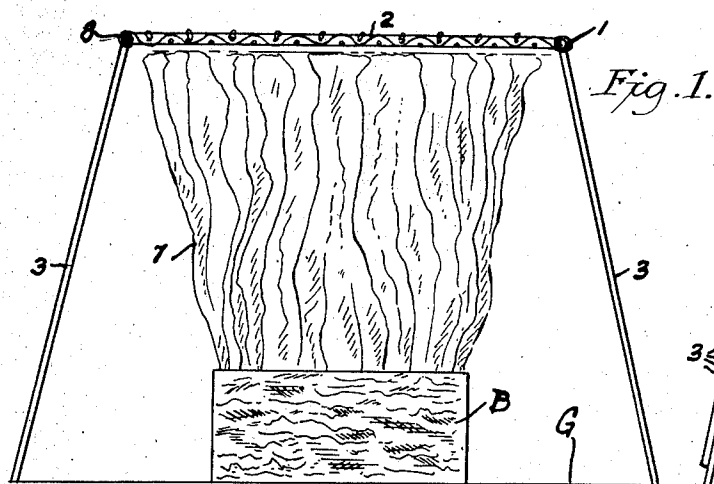
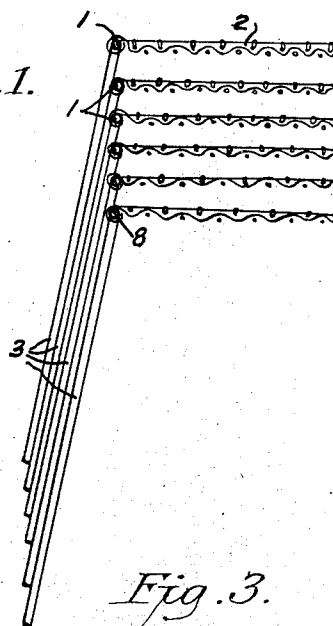
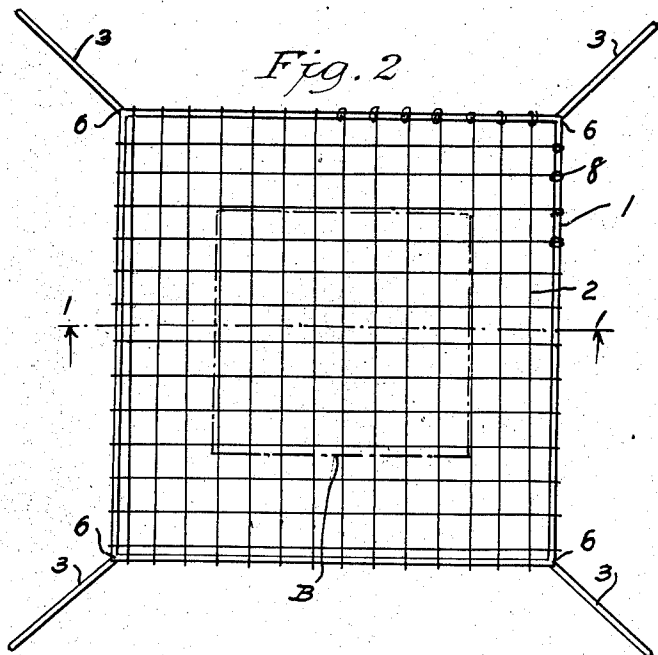
April 21, 1942.

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2,280,267

METHOD AND APPARATUS FOR TREATING ORCHARDS FOR FROST AND PLANT PESTS

Filed Feb. 1, 1940



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UNITED STATES PATENT OFFICE

2,280,267

METHOD AND APPARATUS FOR TREATING
ORCHARDS FOR FROST AND PLANT
PESTS

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Application February 1, 1940, Serial No. 316,784

12 Claims. (Cl. 47—2)

The present invention relates to an improvement in smudge creating means for use in frost protection in orchards and is especially useful for use in citrus fruit orchards or groves.

A further advantage is that the smudge creating fuel is in the form of a combustible briquette, and is preferably made of compressed, absorbent fibrous material, preferably of a vegetable origin, and which is impregnated with a, preferably hydrocarbon, residual waste distillate, which not only creates a heated smudge creating vapor during the burning thereof, but also simultaneously acts as a bactericide and insecticide during use.

A further important feature of advantage is in the use of a metal combustion control means which is light in weight, takes up very little space in transportation and has provision thereon for screening the flame of the fuel, thus limiting the height of the flame of the burning fuel. This latter feature is of great importance in orchards, where the lower branches of the trees, as in customary practice, are kept very low and close to the ground, and the flame of the burning fuel is thus kept from charring or burning such lower limbs or branches.

In present practice the currently used smudge pots or stoves are quite large and heavy, and the transporting means, usually a horse drawn truck, cannot carry very many of such stoves, usually three or four, and thus in the case where a large orchard or grove is threatened by frost, the distribution of stoves at strategic points is slowed down, and some of the trees do not obtain the frost protection before the stoves are set, fueled and ignited. In this particular instance the bulk and weight of the stoves compels the truck to make many trips to the place of storage of the stoves, and greatly delays their distribution.

The present device being made of wire, is light, and as will hereinafter be described in detail, are nestable in groups, and thereby take up little space, individually, and a truck can quickly and continuously, in a single trip through the grove, deliver a large number of said improved combustion controls at the desired points.

The foregoing, and other features of advantage will be apprehended as the herein description proceeds, and it will be obvious that modifications may be made in the structure and methods herein disclosed, without departing from the spirit hereof or the scope of the appended claims.

In the drawing:

Fig. 1 is a sectional view of the control device

in elevation taken on the line 1—1, Fig. 2 looking in the direction of the arrows, showing a fuel briquette in burning position;

Fig. 2 is a plan view of the control device;

Fig. 3 is a fragmentary sectional view showing a plurality of control devices, nested, for economy in space.

In practice, the present combustion control device is of a skeletal structure, shown fully in Fig. 2, and comprises a preferably rectangular wire frame 1, forming a jointless rim and also having four downstanding, outwardly slanted wire legs 3—3—3 and 3, which are joined to the top 1 at the corners 6, preferably by welding, Fig. 2, the legs, as viewed in Figs. 1, 2 and 3, holding the top forming frame 1 parallel to and at the desired combustion control distance from the ground line G, Fig. 1.

The top forming frame or rim 1 supports a metal wire mesh or screen 2, of suitable fineness, as to mesh dimensions. The ends of the wires of the screen 2 may be rolled or turned around the metal of the frame 1, as shown at 8, Figs. 1 and 2, and thus bind the mesh 2 into an integral unit with frame 1. The entire structure, as thus described, may be galvanized to give it protection against the weather and heat of use.

The fuel for creating the doubly protective smudge described herein, on account of cheapness and its natural burning qualities, is preferably in the form of a briquette B, Figs. 1 and 2, containing a waste distillate which is the result of refining natural petroleum and other oils, and the best distillate for the herein purpose is that made from the crude oils obtained from the States of Texas and Louisiana, amongst others, because the waste distillate obtained from refining the crude oils of these States contain a very large amount of sulphur, which when burned, gives off a sufficient volume of sulphurous acid with the smudge to act upon the plant pests and bacteria to destroy them, during the smudging operation.

The operation of the smudge system herein disclosed is simple, but effective. A briquette B, Fig. 1, is placed on the ground G, and a control is so located that the briquette B is superposed by the mesh portion 2. When the briquette is ignited, any flames 7 emitting therefrom are prevented by the screen 2 from passing therethrough, thus keeping the flames from rising higher than the plane of screen 2, but permitting the rising of the vapors of combustion there-through. The combustion control means herein,

thus acts on the same principle as the Davy miner's lamp.

The height of the screen 2 from the ground G, is suited to the average location of the lower branches of the trees in the grove.

In transporting the control devices from place to place, the outward flare of the legs 3 permit the nesting of a series of said controls, as is illustrated in the fragmentary sectional view in Fig. 3.

Having thus described the invention what is claimed is:

1. A smudge flame control device comprising a square substantially horizontal frame; a screen mounted on said frame coplanar therewith and made of small, heat conducting wires spaced to prevent flame fueled beneath the screen from rising through the screen to a height dangerous to nearby vegetation; and supporting legs attached to said frame and positioned to enable said device to be nested with other like devices.

2. A smudge flame control device comprising a substantially horizontal flame limiting screen made of small, heat conducting wires spaced to prevent flame fueled on the ground beneath the screen from rising through the screen and endangering nearby vegetation, and to retard combustion of the fuel in the flame at the screen and thereby facilitate the production of smoke; and an open support for said screen.

3. A nest set of flame-height control devices for burning smudge producing material, said set comprising, in combination, like devices each comprising a rectangular substantially horizontal frame; a screen mounted on said frame and substantially in the plane thereof and made of small heat conducting wires sufficiently spaced to rapidly conduct and dissipate the heat of a flame of fuel beneath the screen; and supporting legs attached to the corners of said frame and directed downwardly and outwardly to enable said device to be nested with other like devices; said screen widely distributing and radiating heat to the surrounding air and preventing passage of flame above a height dangerous to overhanging and nearby vegetation; the dissipation heat of the flame, retarding the combustion of fuel in the flame at the screen and causing unburned particles of fuel to produce increased quantities of smoke, and the space between the legs affording a clear view of the fuel and the amount still unburned.

4. A method for producing lethal smudge smoke, which method comprises producing a free flaring flame containing carbon and lethal sulphur compounds, and cooling an unconstrained horizontal upper zone of said flame to quench said flame at said zone while allowing free passage of constituents of the flame to pass through the zone, thereby allowing the gaseous sulphur compounds to be absorbed in particles of unburned carbon and to pass together through said zone in the form of a lethal blanketing smoke having the double function of killing harmful organisms and preventing frost.

5. A method for producing lethal smudge smoke in citrus fruit orchards; which method comprises producing in the orchard a free flaring flame from absorbent vegetable matter impregnated with petroleum distillate containing sulphur compounds; and cooling an unconstrained horizontal upper zone of said flame to quench said flame at said zone while allowing free passage of constituents of the flame to pass through the zone into the trees of the orchard,

thereby allowing the gaseous sulphur compounds to be absorbed in particles of unburned carbon and to pass together through said zone in the form of a lethal blanketing smoke having the double function of killing harmful organisms in the trees and preventing frost.

6. A method for treating orchards comprising producing a free flaring flame to heat the trees of said orchard by substantially direct radiation in all directions from said flame and simultaneously cooling an upper zone in said flame to quench said flame in the upper zone thereby producing particles of smoke producing carbon.

7. A method for protecting orchards from frost comprising producing a free flaring flame containing carbon, and non-aqueously cooling an unconstrained horizontal upper zone of said flame to quench said flame at all times at said zone while allowing free passage of constituents of the flame to pass through the zone, thereby allowing dry and activated carbon particles to pass through said zone and form a blanketing smoke, said quenching being non-aqueous and at the upper part of said flame to obtain particles driest and most water absorbent whereby the particles may drift adjacent to the trees of said orchard and there absorb and condense greater amounts of atmospheric water vapor then obtained by aqueous quenching and to liberate increased amounts of heat of condensation adjacent to said trees.

8. A method for protecting orchards from frost comprising producing a free flaring flame containing carbon and fueled on the ground in said orchard, and cooling an unconstrained horizontal upper zone of said flame to quench said flame at said zone while allowing free passage of constituents of the flame to pass through the zone, thereby allowing carbon particles to pass through said zone and form a blanketing smoke, said flame being fueled on the ground so that in the event of a sudden rise in atmospheric temperature the flame may quickly and easily be covered and smothered.

9. A smudge flame control device for orchards, said device comprising a substantially horizontal screen made of small, heat conducting wires spaced to prevent flame fueled on the ground beneath the screen from rising through the screen to a height dangerous to nearby vegetation and to retard combustion of the fuel in the flame at the screen and thereby facilitate the production of smoke; and widely spaced legs to support said screen, said wire affording large surface for the radiation of heat to the trees of said orchard, the device being free from obstruction between said screen and trees.

10. A smudge flame control device for orchards, said device comprising a substantially horizontal frame; a screen mounted on said frame coplanar therewith and made of small, heat conducting wires spaced to prevent flame fueled on the ground beneath the screen from rising through the screen to a height dangerous to nearby vegetation; and to retard combustion of the fuel in the flame at the screen and thereby facilitate the production of smoke; and widely spaced supporting legs free from obstruction therebetween attached to said frame and positioned to enable said device to be nested with other like devices, the intervals between the legs and of the screen permitting maximum radiation of heat directly from the flame to heat the trees of said orchard as soon as said flame is

produced, and the fuel being on the ground to permit convenient smothering of the flame.

11. An apparatus for producing lethal smudge smoke for orchard trees, which apparatus comprises means for producing a free flaring flame 5 containing carbon and lethal sulphur compounds; and means for cooling an unconstrained horizontal upper zone of said flame to quench said flame at said zone, thereby preventing burning the foliage and heating said means at said 10 zone to supply radiant heat to the trees and allowing free passage of the quenched constituents of the flame to pass through the zone, thereby allowing the gaseous sulphur compounds to be absorbed in particles of unburned carbon 15 and to pass together through said zone in the form of a lethal blanketing smoke having the double function of killing harmful organisms and preventing frost; the space at the sides of the flame being substantially entirely unobstructed 20 to allow direct radiation from the flame to the trees and ground to cooperate with the heated zone to effect quick heating of the orchard.

12. A method for producing lethal smudge smoke for orchard trees, which method comprises producing a free flaring flame containing carbon and lethal sulphur compounds; cooling 5 an unconstrained horizontal upper zone of said flame to quench said flame at said zone, thereby preventing burning the foliage; heating said zone to supply radiant heat to the trees, allowing free passage of the quenched constituents of the flame to pass through the zone, thereby al- 10 lowing the gaseous sulphur compounds to be absorbed in particles of unburned carbon and to pass together through said zone in the form of a lethal blanketing smoke having the double func- 15 tion of killing harmful organisms and preventing frost; and leaving the space at the sides of the flame substantially entirely unobstructed to allow direct radiation from the flame to the trees and ground to cooperate with the heated zone to 20 effect quick heating of the orchard.

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