Jan. 11, 1927. 1,614,015

J. D. NEULS

APPARATUS FOR FUMIGATING

Filed Sept. 19, 1922

Fig. 1

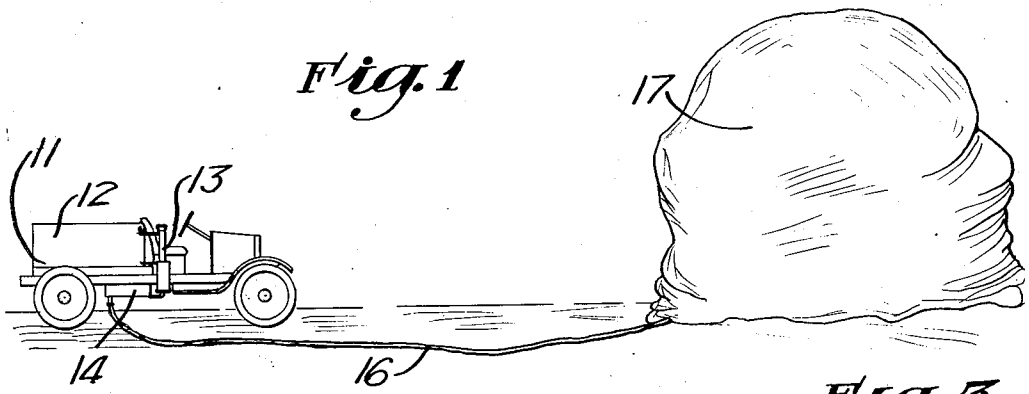


Fig. 4.

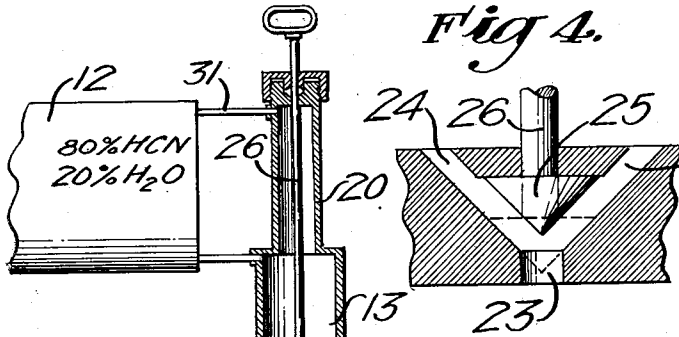


Fig. 3.

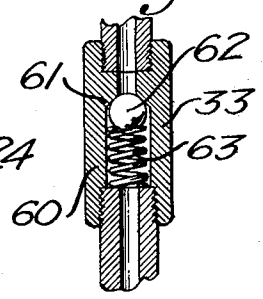
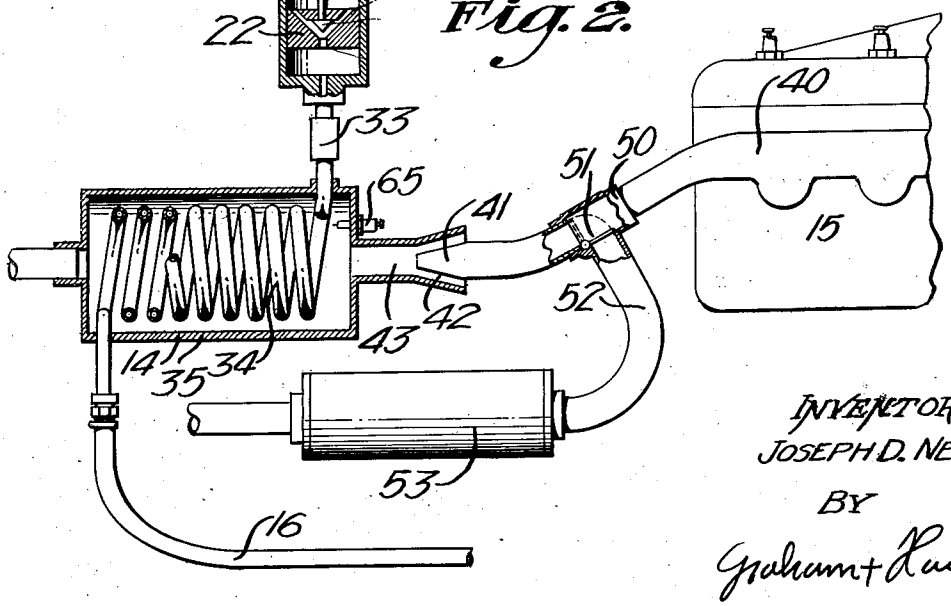


Fig. 2.



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BY
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ATTORNEYS.

Patented Jan. 11, 1927. 1,614,015

UNITED STATES PATENT OFFICE.

JOSEPH D. NEULS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CALIFORNIA CYANIDE COMPANY, INCORPORATED, A CORPORATION OF DELAWARE.

APPARATUS FOR FUMIGATING.

Application filed September 19, 1922. Serial No. 589,255.

My invention relates to the art of fumigation and is particularly adapted to the art of fumigating orchard trees, and particularly citrus trees, for the purpose of destroying pests which occur thereon.

In this art, as practiced in California, the tree to be fumigated is covered with a canvas tent which entirely encloses it and the space inside this tent is filled with a lethal gas or vapor. In practice hydrocyanic acid gas or vapor is commonly used and the following description will be limited to this particular substance, although other poisonous substances may be used if desired.

The principal object of my invention is to provide a fumigating device which will be very effective and which will be self contained and self propelling so that it can be run by its own power into the orchard passing between the trees and delivering the gas under the tents therein.

A further object of the invention is to provide a novel process of and apparatus for producing the hydrocyanic acid gas or vapor in such form that it will not condense after being injected under the tent.

A still further object of the invention is to utilize the waste heat of an internal combustion engine for the purpose of producing the hydrocyanic acid gas or vapor.

Further objects and advantages will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a view of a device embodying my invention as it appears in actual use.

Fig. 2 is a somewhat diagrammatic view of the vaporizing apparatus.

Fig. 3 is an enlarged view of the check valve, and,

Fig. 4 is an enlarged view of a portion of the piston and the propelling valve mechanism.

In the form of the invention shown, 11 is an automobile on which is mounted a tank 12 of liquid hydrocyanic acid mixture and upon which is also mounted a dose pump 13 and a vaporizer 14. The hydrocyanic acid is vaporized in the vaporizer 14 by utilizing the waste heat of the engine 15, the vapor being forced through a hose 16 under a tent 17 which covers the tree to be fumigated. The automobile is self propelling and the engine is used for operating the automobile and the waste heat produced thereby is used for vaporizing the desired poisonous vapor for use in the tent 17. This is accomplished by means of the device shown diagrammatically in Fig. 2.

The dose pump 13 consists of a casing 20 having an enlarged bore 21 in which a piston 22 is free to slide. The piston 22 has openings 23 in the bottom connecting with a plurality of openings 24 in the top. The opening 23 may be closed by a conical valve 25 which is pushed down by means of a piston rod 26 which is also used to operate the piston 23.

The hydrocyanic acid mixture carried in the container 12 includes approximately 20% of water, the mixture being admitted to the casing 20 from the tank 12 through a lower pipe 30. The upper portion of the casing 20 is connected by means of a pipe 31 with the top of the container 12. This arrangement allows fluid to flow readily into the casing 20 from the container 12 so that the casing 20 contains a mixture of hydrocyanic acid and water to the same level as that in the container 12. The lower portion of the casing 20 communicates through a check valve 33 with a coil of heavy copper pipe 34 carried in an outer shell 35 of the vaporizer 14. This vaporizer is fed with the exhaust gases from the exhaust manifold 40 of the internal combustion engine 15, these exhaust gases being forced through a nozzle 41 and mixed with air admitted through openings 42, the mixture being accomplished by injector action in a tube 43. A cut-out 50 is provided in the exhaust manifold 40 having a valve 51 which may be used to shut off the flow of gas to the nozzle 41, directing the gas through a pipe 52 into a standard form of muffler 53, or the valve 51 may be actuated to shut off the flow of gas in the muffler and direct it through the nozzle 41.

The check valve 33 consists of a body 60 having an opening 61 therein in which a ball 62 slides, the ball being forced upwardly by a spring 63.

The method of operation of the mixing devices is as follows:

With the parts in the position shown in Fig. 2, the space above the piston 22 fills by gravity from the container 12. The operator then pulls upwardly on the piston rod 26 and the liquid hydrocyanic acid mixed

with water passes through the openings 24 and 23 into the space below the piston, the conical member 25 being in the position shown in full lines in Fig. 4, during the upward movement of the piston. The piston is pulled up to a sufficient degree to allow the desired dose to collect therebelow. This selection of the dose does not occur until after the internal combustion engine has been operated for a short period and until the exhaust gases have been run through the vaporizer 14 for a considerable period. If desired, these gases may be ignited inside the casing 35 by means of a spark plug 65 connected to the ignition system of the engine 15 by any convenient means, not shown. The air admitted through the opening 42 forms a combustible mixture with the exhaust gases which mixture, if ignited by means of the spark plug 65 will burn freely inside the casing 35.

The coils 34 are preferably formed of copper and have heavy walls which are adapted to store heat. As the mixture of hydrocyanic acid and water is forced through these coils, the liquids come in contact with these heated walls and the hydrocyanic acid and water are changed into a vapor which is ejected through the hose 16 into the space under the tent 17. By using water to form steam it is possible to delay the condensation of the hydrocyanic acid in the tent 17, that is to say, the water, having a higher boiling point than the hydrocyanic acid, the steam tends to condense inside the tent before any considerable condensation of the hydrocyanic acid can take place therein. The steam in condensing releases its latent heat of vaporization and thereby tends to maintain the temperature inside the tent above the condensation point of the acid so that the acid remains in gaseous form for a considerable period.

It will be noted that by utilizing an automobile in this manner, I am able to use the engine both as a propelling vehicle and as a vaporizing medium for the gas and water. This provides a very efficient outfit which can be run into the orchard under its own power producing gas when needed, and in such quantities as may be needed, for proper fumigation.

No claim is made herein to the method of fumigating employing mixtures or solutions of liquid hydrocyanic acid and water. That subject matter is the invention of Frederick W. Braun and is claimed by him in a separate application.

I claim as my invention:

1. A self-propelled fumigating unit comprising an automobile having an internal combustion engine carried thereon, a container supported on said automobile and carrying a supply of liquid hydrocyanic acid, means for utilizing the exhaust gases of the engine to vaporize the hydrocyanic acid including walls forming a restricted channel through which the hydrocyanic acid is forced and outside of which the exhaust gases are passed, and means for mixing the exhaust gases with air before the mixture passes about said channel.

2. A self-propelled fumigating unit comprising an automobile having an internal combustion engine carried thereon, a container supported on said automobile and carrying a supply of liquid hydrocyanic acid, means for utilizing the exhaust gases of the engine to vaporize the hydrocyanic acid including walls forming a restricted channel through which the hydrocyanic acid is forced and outside of which the exhaust gases are passed, and means including an injector tube for drawing in and mixing air with the exhaust gases before the mixture passes about said channel.

3. A self-propelled fumigating unit comprising an automobile having an internal combustion engine carried thereon, a container supported on said automobile and carrying a supply of liquid hydrocyanic acid, means for utilizing the exhaust gases of the engine to vaporize the hydrocyanic acid including an expansion chamber, a coil within said chamber through which the hydrocyanic acid is forced, and a nozzle arranged to deliver the exhaust gases into the expansion chamber, said chamber having a passageway associated with the nozzle for conveying into the chamber air currents induced by the flow of the exhaust gases through the nozzle.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 13th day of September, 1922.

JOSEPH D. NEULS.