No. 676,341. Patented June 11, 1901.

L. RICARD.

INSECT DESTROYER.

(Application filed Feb. 23, 1901.)

(No Model.) 4 Sheets—Sheet 1.

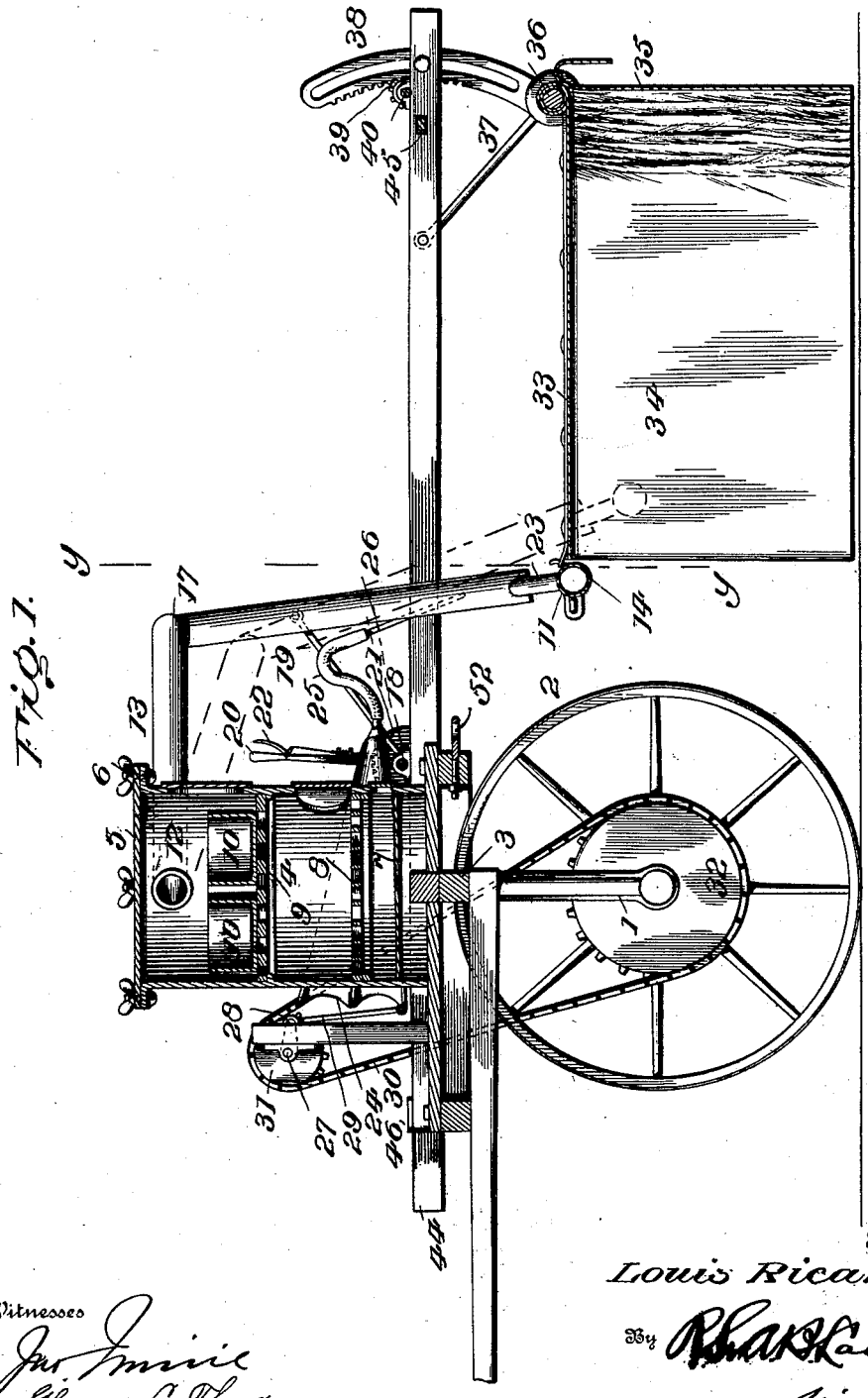


Fig. 1.

Witnesses
Jno. Imrie
Gladys L. Thompson

Inventor
Louis Ricard
By Blakeley
Attorneys

No. 676,341. Patented June 11, 1901.

L. RICARD.

INSECT DESTROYER.

(Application filed Feb. 23, 1901.)

(No Model.) 4 Sheets—Sheet 2.

FIG. 2.

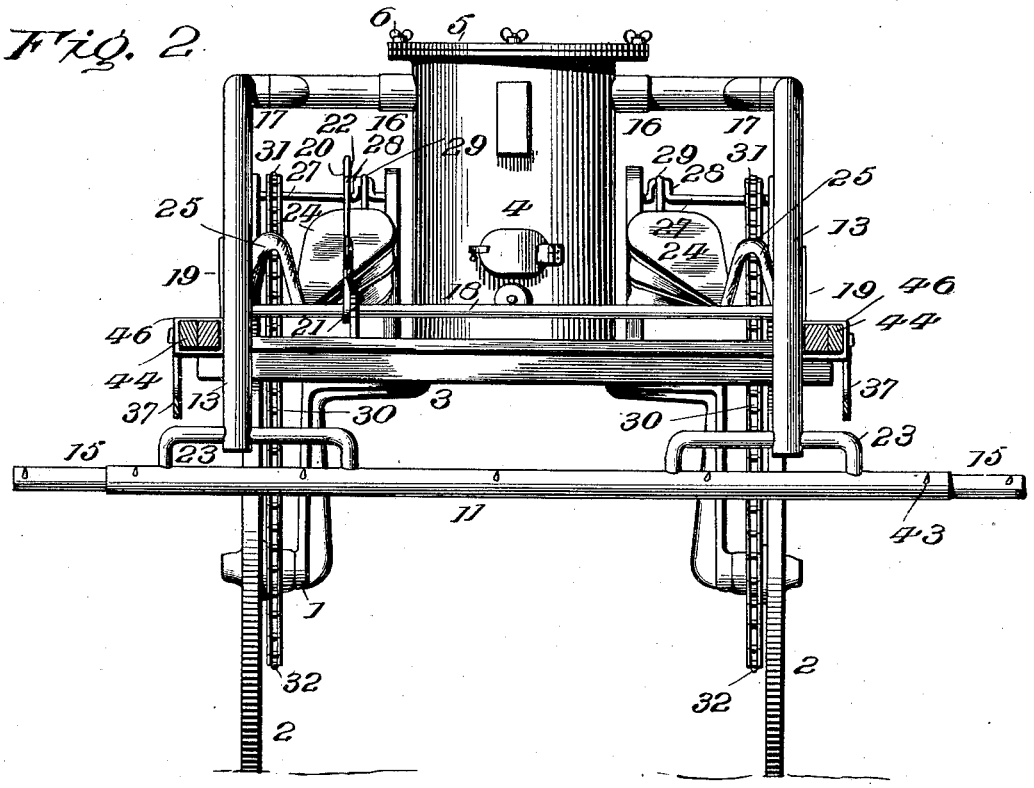


FIG. 6.

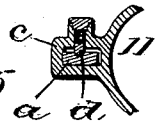


FIG. 5.

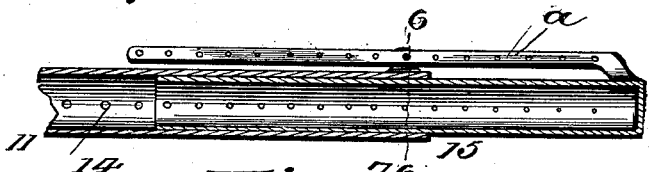
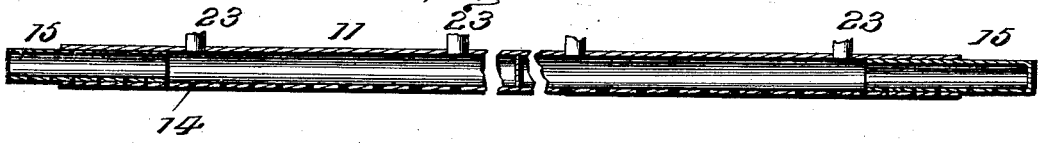


FIG. 7.



Inventor

Louis Ricard

Witnesses

Jno. Imrie

Gladys L. Thompson.

By R. S. & R. Lacey

His Attorneys

No. 676,341. Patented June 11, 1901.

L. RICARD.

INSECT DESTROYER.

(Application filed Feb. 23, 1901.)

(No Model.) 4 Sheets—Sheet 3.

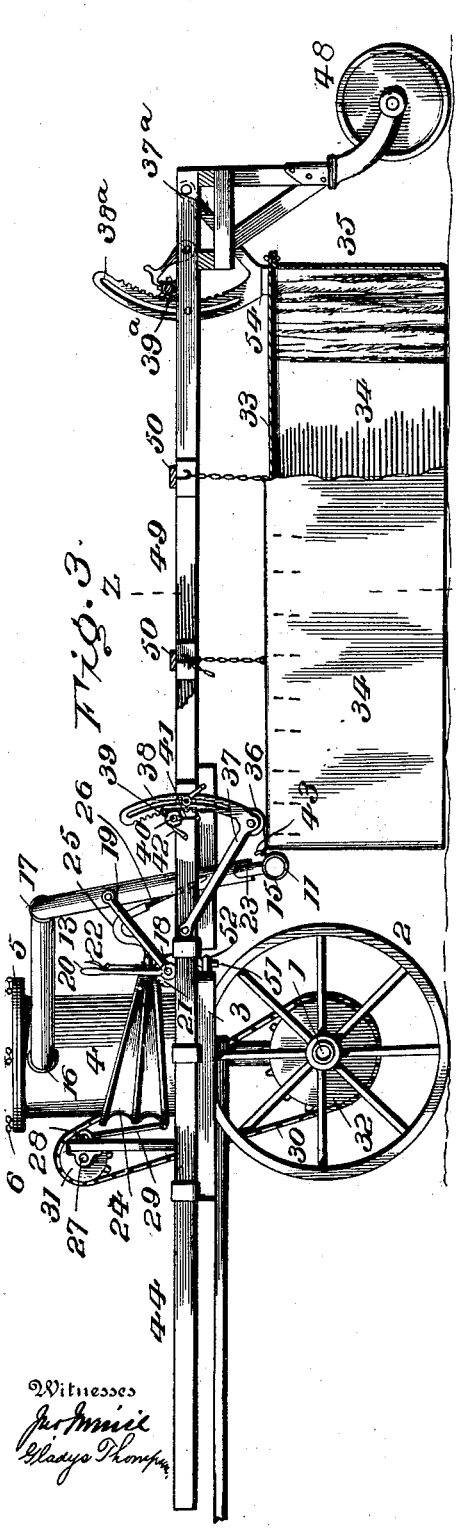


Fig. 3.

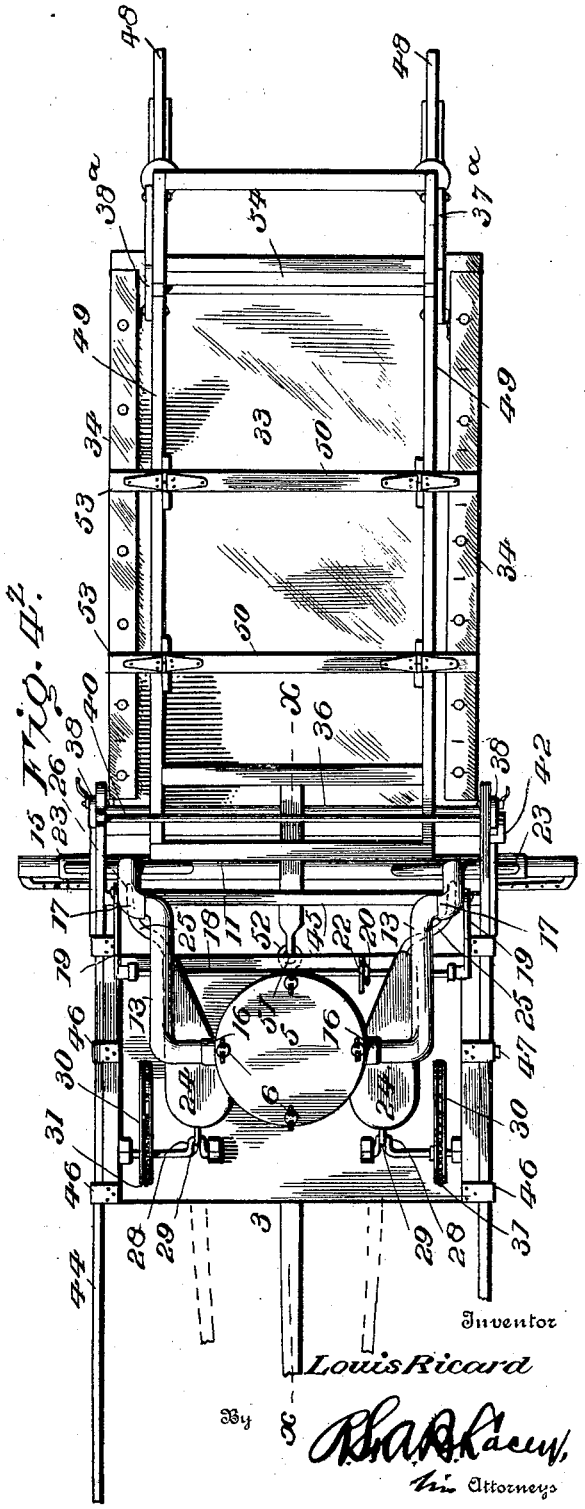


Fig. 4.

Witnesses
Jas. Imrie
Gladys Thompson

Inventor
Louis Ricard
By his Attorneys
Baker & Lacey

No. 676,341. Patented June 11, 1901.

L. RICARD.

INSECT DESTROYER.

(Application filed Feb. 23, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 8.

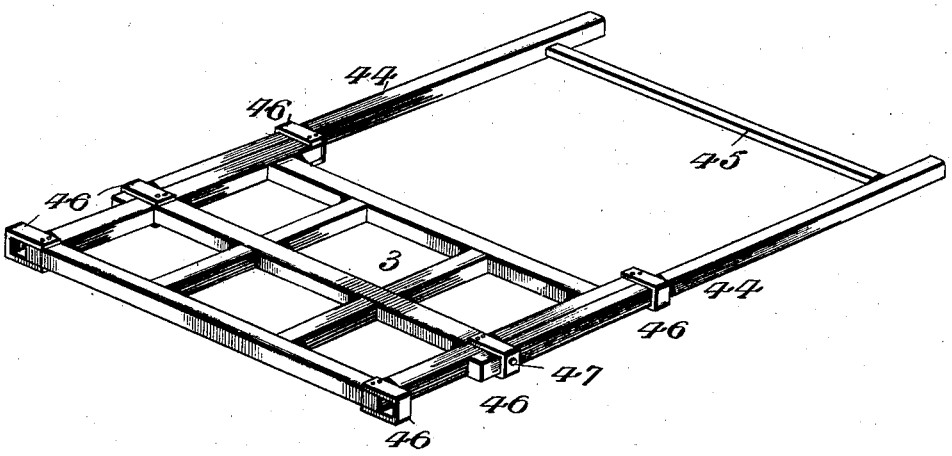


Fig. 9.

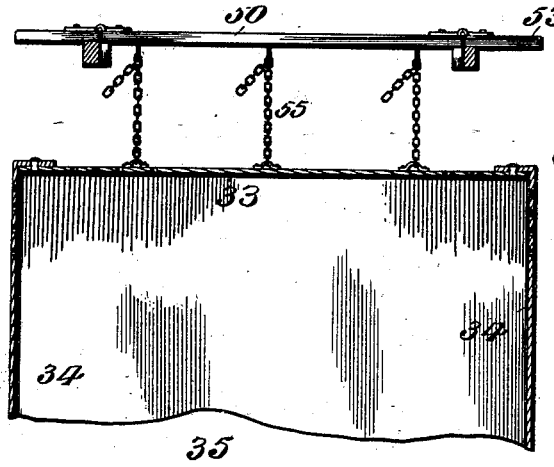
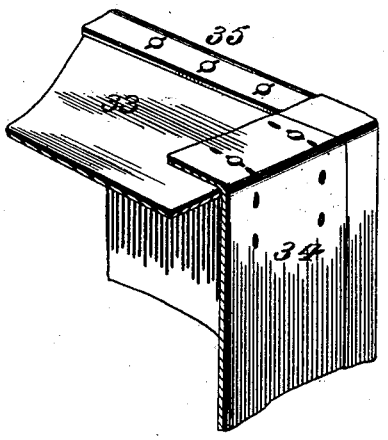


Fig. 10.



Witnesses
Jno. Imrie
Gladys L. Thompson.

Inventor
Louis Ricard
By R. R. Raney
his Attorneys

UNITED STATES PATENT OFFICE.

LOUIS RICARD, OF GREENBAY, WISCONSIN, ASSIGNOR TO WILLIAM LARSEN, OF SAME PLACE.

INSECT-DESTROYER.

SPECIFICATION forming part of Letters Patent No. 676,341, dated June 11, 1901.

Application filed February 23, 1901. Serial No. 48,526. (No model.)

To all whom it may concern:

Be it known that I, LOUIS RICARD, a citizen of the United States, residing at Greenbay, in the county of Brown and State of Wisconsin, have invented certain new and useful Improvements in Insect-Destroyers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In industries dependent upon crops serious losses are frequently met with by reason of insect ravages. Particularly is this the case where the plants are of a succulent nature, such as peas and beans, which are troubled with aphis. This invention aims to destroy the insects and prevent their propagation by providing apparatus of novel construction, easy of manipulation, and effective in result for fumigating the plants.

In its general construction the machine comprises a truck, a furnace for the conversion of an insecticide into fumes or vapor, means for the creation of a forced draft, which is essential to the delivery of the insect-destroying vapor to the plants, a distributer for the insect-killing fumes and smoke, a hood for holding the vapor and smoke in contact with the plants, and adjusting means for raising and lowering and lengthening and shortening the hood, as required to meet existing condition of growth and nature and quantity of insects to be exterminated.

The invention also consists of the novel features, details of construction, and combination of the parts, which hereinafter will be more fully disclosed and finally claimed, and for this purpose and also to acquire a knowledge of the merits of the invention and the structural details of the means whereby the results are attained reference is to be had to the appended description and the drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a machine especially constructed for attaining the objects of this invention, the same being taken on the line X X of Fig. 4. Fig. 2 is a rear view taken on the line Y Y of Fig. 1. Fig. 3 is a side elevation of the machine, showing the supplemental truck in position and the hood extended, a portion of the latter being broken away. Fig. 4 is a top plan view of the machine, as illustrated in Fig. 3. Fig. 5 is an enlarged longitudinal section of an end portion of the distributer. Fig. 6 is a detail section of the keeper and adjusting-bar on the line 6 6 of Fig. 5. Fig. 7 is a longitudinal section of the distributer, the central portion being broken away. Fig. 8 is a perspective view of the frame of the main truck and the adjustable frame coöperating therewith. Fig. 9 is a cross-section on the line Z Z of Fig. 3. Fig. 10 is a detail perspective view of a rear-corner portion of the hood.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The truck for supporting the component parts of the machine may be of any desired construction best adapted for the purpose and may be impelled over the field by horse or other power. As shown, the truck comprises an axle 1, ground-wheels 2, and a frame 3, the latter being secured to the axle in any selected way. The axle is preferably of the arched type, so as to elevate the operating parts to clear the plants and prevent injury thereto without requiring the use of extra large ground-wheels. A furnace 4 is mounted upon the truck and is provided with a tight-fitting cover 5, secured in place by bolts 6. This furnace comprises an ash-pit 7, a fuel-grate 8, and perforated shelf 9, upon which are placed one or more vessels 10 containing the material, chemical, or drug for producing the vapor, smoke, or fumes to be subsequently used as an insecticide for extermination of the aphis or other insect to be killed. The several compartments of the furnace formed by the grate 8 and shelf 9 are accessible by means of doors. The distributer 11 is connected with the upper portion or chamber 12 of the furnace by means of pipes 13 or in any desired way which will admit of the fumes

and smoke being conveyed from the furnace to the distributer for application to the plants to be treated. This distributer may be of any form, and, as shown, consists of a pipe of suitable length having perforations 14 in its lower portion, through which the smoke, fumes, and vapors escape. The perforations 14 gradually increase in diameter or size from the extremities of the pipes 23 toward a middle point, so as to insure a uniform distribution of the insect-killing vapors. In order to admit of the lengthening and shortening of the distributer, its terminal portions 15 have telescopic or adjustable connection therewith, said end portions having perforations to register with corresponding perforations in the outer end portions of the main pipe, so as to insure a delivery of fumes at the overlapped parts of the main pipe and the adjustable sections 15.

The pipes 13, connecting the upper portion of the furnace with the distributer 11, involve a sectional construction, the sections being jointed at 16 and 17, so as to admit of the raising and lowering of the distributer, as indicated by the full and dotted lines in Fig. 1. The joints 16 and 17 may be of any construction which will admit of the turning of the sections, whereby the desired result is attained. The distributer is adapted to be raised and lowered and held in an adjusted position by any means suitable for this purpose, and those devised consist of a shaft 18, arms 19, projected from the end portions of the shaft and attached at their outer or rear ends to the distributer, a lever 20, attached to the shaft 18, and detent mechanism, the same consisting of a toothed segment 21 and a hand-latch 22, the latter being applied to the lever 20 and adapted to coöperate with the teeth of the segment 21. The pipes 13 have branched connection with the distributer 11, as shown at 23, whereby the fumes are supplied to the distributer at a number of points, the purpose being to secure a uniform delivery of the insect-killing vapor. It is essential to create forced draft to the furnace and a blast through the distributer in order to maintain a supply of smoke and fumes when the machine is in operation, and to meet this contingency means for creating a blast of air are provided and may be a bellows, sand-blower, pump, or other contrivance generally employed in the mechanic arts for this purpose. As shown in the drawings, a bellows 24 is provided for each pipe 13 and is operated from a ground-wheel by means presently to be described. A flexible tube or pipe 25 connects the bellows with the pipe 13 and is of a length to admit of the vertical adjustment of the distributer. The nozzle 26, applied to the outer end of the flexible tube 25, enters the lower end of the pipe 13 a short distance from the branch connection 23 and creates a suction or vacuum in said pipe 13, whereby air is forced to pass through the furnace to support combustion of the fuel, and this air in its passage through the furnace becomes impregnated with the fumes of the chemicals, drugs, or insecticide, so as to insure the attainment of the desired end when applied to plants. The shaft 27 is journaled to a convenient portion of the platform and is provided with a crank portion 28, connected by pitmen 29 with the bellows for operation thereof. A sprocket-chain 30 connects the sprocket-wheel 31 of the shaft 27 with a sprocket-wheel 32, attached to the ground-wheel. It will be understood that each bellows will be operated by independent means from a ground-wheel, the connections being substantially alike. Hence a detailed description of one only is given.

The hood is formed of canvas and comprises a top portion 33, side flaps 34, and a rear flap 35. The canvas 33 is wound upon a roller 36, mounted so as to be raised and lowered according to the height of the plants to be treated. Pivoted arms 37, connected at their upper forward ends to the frame in any of the usual ways, support the roller 36, which is journaled thereto. Curved bars 38 extend upward from the pivoted arms 37, and their concave edges are toothed to mesh with pinions 39, secured to the ends of a shaft 40, adapted to be rotated by means of a crank or handle 41. A pawl 42 or equivalent detent coöperates with the shaft 40 to prevent rotation thereof when desired, so as to hold the roller 36 and hood at the required elevation. This pawl 42 is adapted to engage with a tooth of one of the pinions 39. The free end of the canvas or textile 33 is adapted to engage with the distributer 11, preferably by means of hooks 43. From what has been said it will be readily understood that the height of the canvas can be regulated by vertically adjusting the roller 36 and the distributer 11. The side flaps 34 and the rear flap 35 have adjustable connection with the top 33 either by means of buttons and buttonholes, hooks and eyes, or in any way which will admit of the lengthening and shortening of the flaps, according to the distance of the canvas or textile 33 from the ground, thereby preventing the dragging of the flaps.

It is desirable to vary the length of the hood in order to expedite the operation and insure the destruction of the insects, and for this purpose a frame has adjustable connection with the truck and consists of longitudinal bars 44 and transverse connecting-bars 45. The longitudinal bars 44 are slidable in keepers 46, applied to the side bars of the truck-frame, suitable means, as pins 47, being provided to secure the bars 44 in an adjusted position. The roller 36 and its mountings are attached to the rear ends of the bars 44. Hence when said bars are moved rearward the distance between the roller 36 and the distributer 11 increases and the length of the hood is proportionately extended. By this means

the hood can be varied in length to meet any condition, as may be required.

Where the hood is to be lengthened to twenty or thirty feet, or thereabout, it is expedient to provide a supplemental truck for supporting the rear end, and this truck is mounted upon caster-wheels 48 to admit of the machine making a short turn when at the end of the field and preliminary to recrossing. The frame of this supplemental truck comprises longitudinal bars 49 and transverse bars 50 and is adapted to make detachable connection with the main truck, preferably by means of a hook and eye 51 and 52. The transverse bars 50 are extensible, and for this purpose are provided with foldable end pieces 53, hinged thereto. When it is required to decrease the width of the hood, the end pieces 53 are folded upon the bars 50, and when a hood of maximum width is required said end pieces are turned outward to aline with the bars 50. A transverse bar 54 is located at the outer or rear end of the frame of the supplemental truck, and the canvas or textile 33 is adapted to have its outer end attached thereto when the supplemental truck is in position. This transverse bar 54 is attached to arms 37^a, pivoted to the bars 49 and adjustable by means of curved bars 38^a and pinions 39^a in a manner similar to corresponding parts carrying the roller 36 and hereinbefore described in detail. The intermediate portion of the canvas or textile 33 is supported by means of hangers 55, which preferably consist of lengths of chain attached at their lower ends to the canvas and having adjustable connection at their upper ends with the cross-bars 50.

In operation the machine is propelled over the field either by horse or mechanical power, and in its forward movement the blast-creating mechanism is operated to increase a forced draft through the furnace and a positive delivery of the smoke, vapor, and fumes through the distributer. The fire being kindled in the furnace and the chemical, drug, or other material for creating smoke, fumes, or vapors being placed in the compartment 12 and the cover 5 being secured upon the furnace and the hood properly adjusted as to width, length, and height, the smoke and fumes are collected in the hood and held in contact with the plants, so as to kill the insects infesting the plants or vines, whereby destruction of the crop from this source is overcome.

A bar *a* is secured to the outer end of each telescoping section 15 and is provided in its length with indentations *b*, spaced apart equal to the distance between the perforations 14. This bar is slidably mounted in a keeper *c*, attached to the body of the distributer, and is held in an adjusted position by means of a spring-actuated pin *d*. By having the indentations *b* spaced apart a distance equal to the spaces between the perforations 14 registry of the latter opposite the overlapped portions of the main and telescoping sections of the distributer is insured.

Having thus described the invention, what is claimed as new is—

1. In an insect-destroyer, or plant-fumigator, a furnace or generator, a distributer, a pipe connecting the distributer with the furnace, means for vertically adjusting the distributer, an air-blast-creating device, and a flexible tube connecting the air-blast device with the pipe connection between the distributer and furnace, substantially as and for the purpose set forth.

2. In an insect-destroyer, a distributer comprising a body portion having perforations, and a telescoping section having corresponding perforations to provide for a delivery of the insecticide at the overlapping end portions of the main and telescopic sections, in combination with a bar attached to the telescoping section and having indentations in its length spaced apart to correspond with the distances between the perforations of the telescoping section, and a pin for coöperation with the said indentations to hold the bar and telescoping section in an adjusted position, substantially as described.

3. In an insect-destroyer or plant-fumigator, and in combination with the distributer, and means for adjusting the same vertically, a hood adapted to be supported at its front end by the said distributer, and means for adjustably supporting the opposite end of the hood, substantially as set forth.

4. In an insect-destroyer, and in combination with the distributer, a hood adapted to be lengthened and shortened, and supporting means therefor, substantially as set forth.

5. In an insect-destroyer and plant-fumigator, and in combination with the distributer for the insecticide, a hood comprising a canvas or textile, a roller for the said canvas to wind upon, and means for adjustably supporting the roller, whereby the length and height of the hood can be varied, substantially as set forth.

6. In an insect-destroyer, and in combination with the truck, and a canvas or textile constituting a hood, a support for the free end of the said canvas, and an adjustable support for the opposite end portion of the canvas, and means for securing the adjustable support to the truck in the required position, substantially as set forth.

7. In an insect-destroyer of the character described, and in combination with the truck, a hood adapted to be lengthened and shortened, and a support for the said hood having adjustable connection with the truck, substantially as set forth.

8. In an insect-destroyer, main and supplemental trucks, a hood of textile material supported at its ends by the main and supplemental trucks, and intermediate adjustable supports, substantially as set forth.

9. In an insect-destroyer of the character

described, and in combination with the main truck, a supplemental truck having detachable connection with the main truck, and a hood supported by the main and supplemental trucks, substantially as set forth.

10. In an insect-destroyer of the character described, and in combination with the main truck, a supplemental truck comprising longitudinal bars and transverse bars and having detachable connection with the main truck, the transverse bars being capable of being lengthened and shortened, and a hood of textile material supported by the trucks and adapted to have its width varied, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS $\overset{\text{his}}{\underset{\text{mark}}{\times}}$ RICARD. [L. S.]

Witnesses:
JEROME R. NORTH,
H. O. FAIRCHILD.