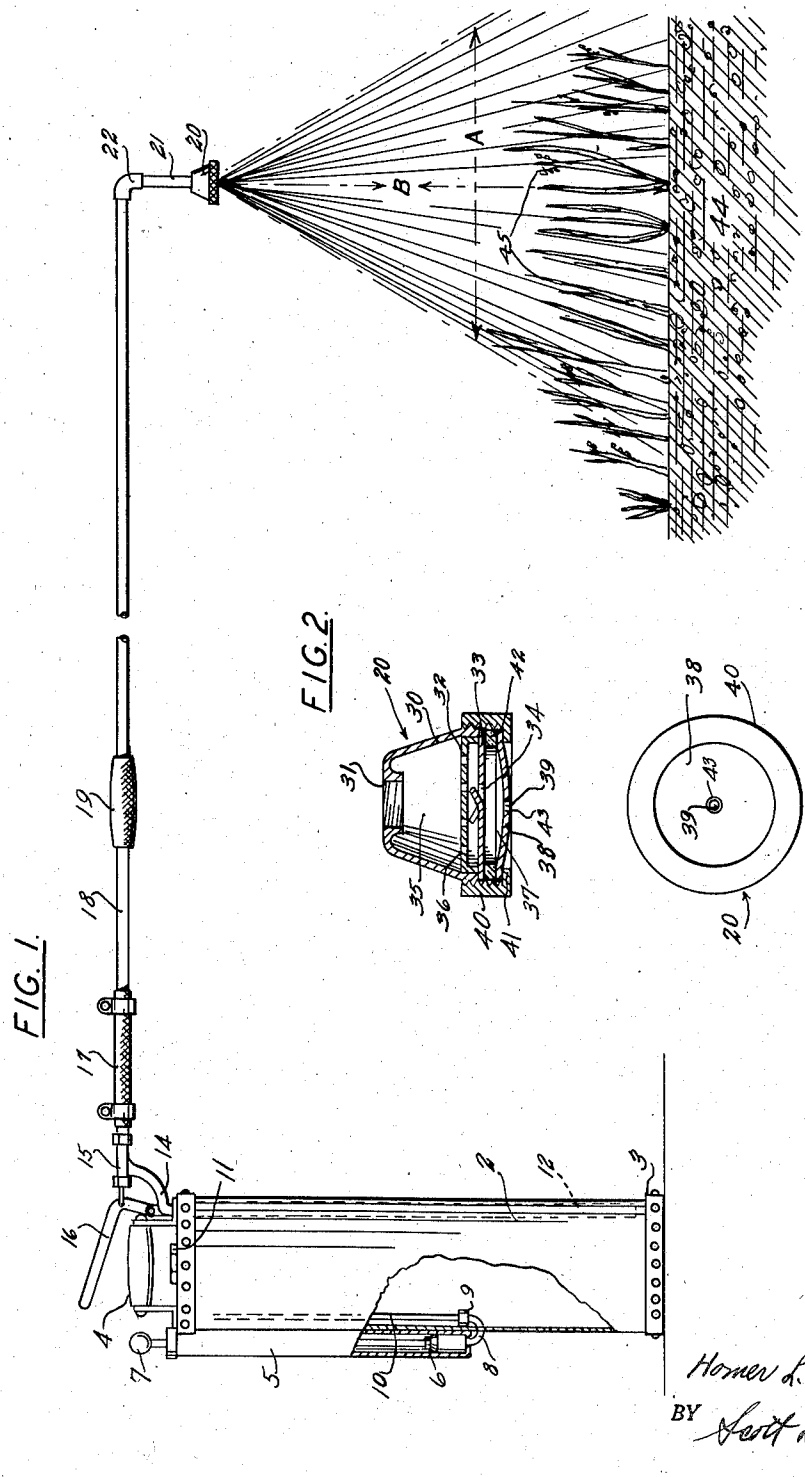
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APPARATUS FOR DESTROYING NOXIOUS PLANTS

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APPARATUS FOR DESTROYING NOXIOUS PLANTS

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1 Claim. (Cl. 299—120)

My invention pertains to apparatus for destroying noxious plants such as weeds or other undesirable growths, by the use of heat and flame.

The object of my invention is to provide an improved spray nozzle construction in kind of apparatus referred to in the preceding paragraph.

Figure 1 is a side elevational view of the general assembly of my apparatus; Figure 2 is a mid-sectional elevation of a preferred type of burner nozzle drawn on an enlarged scale, and Figure 3 is a plan view thereof as viewed from the bottom of said nozzle.

Similar numerals refer to similar parts in the several views.

While the type and size of the oil containing tank is not critical, I prefer to use the type herewith illustrated which consists of a steel cylinder 2 having the bottom and top ends riveted or welded in place to withstand internal pressures and outside usage. The bottom rim of this tank is turned downward and provided with a collar 3 to form a base as a means of support. I prefer to make this tank about two and one-half to three feet high so that the handle 4, at the top, is just below the level of the operator's hand. Therefore, when the tank is lifted, it is necessary for him to stoop only a slight distance to grasp the handle and lift the base collar 3 from the ground. This construction makes the tank easily manually transportable.

Attached to one side of the tank is an air pump 5, provided with the plunger 6 and handle 7. Air from this pump passes into the tank through tube 8, check valve 9, and is then discharged into the upper portion of the tank through tube 10. The tank is filled with fuel oil through an air tight plug 11. Oil is discharged through the tube 12 which reaches to the bottom of the tank. At the upper end of this tube the fitting 14 is attached, which includes a plunger valve 15 controlled by handle 16 which extends immediately over the handle 4 on the tank. These handles are relatively positioned so that when the fingers of the operator's hand extend under handle 4, his thumb is in a convenient position to grasp handle 16, and to press it downwardly in order to open and control valve 15. To the outer end of valve 15 there is attached a length of substantially heavy pressure hose 17, and this, in turn, is attached to a long length of steel tubing 18. Preferably, this tubing should be ¼ in. inside diameter, ½ in. outside diameter and 14 feet in length. In all cases the size should be sufficient so that the burner, at the outer end, will be easily supported without too much wobble or vibration.

To afford further support, a second handle 19 is adjustably secured to pipe 18. This handle may consist of a sleeve of any heat insulating material easily grasped, and is slipped on to pipe 18 which it fits tight enough to be ordinarily retained in position but yet permitting longitudinal adjustment. It is intended that while one hand of the operator grasps handle 4 on the tank and operates valve 16, the other hand grasps handle 19 and controls and directs nozzle 20 at the end of the feed pipe 18. Nozzle 20 is positioned at the lower end of a downwardly extending nipple 21 which is connected to the feed pipe 18 by an L 22. This forms a chamber having a capacity sufficient to contain a quantity of fuel oil to feed the nozzle a small amount to maintain a pilot flame and act as an igniter for the oil spray. I have found that, for ordinary purposes, a nipple one-half inch in diameter and 4 inches long is sufficient. Oil contained in this downwardly disposed nipple chamber will descend by gravity, its own weight being sufficient to furnish the small amount necessary to maintain a small pilot flame when the valve 15 is closed. This feed will be maintained independent of the supply valve, and although it is shut off.

My preferred type of burner nozzle is more particularly shown in Figures 2 and 3. Here 30 represents the outer case of the nozzle having a threaded hole 31 at the upper end, adapted to receive the lower end of nipple 21. Within this body there is a strainer 32, and just below this, a diaphragm 33 having directive orifices 34, made by the upward bending of tongues cut from the material of the diaphragm at two or more diametrically opposite positions, so that oil entering from the chamber 35 through the holes 36 of the strainer, is given a circular or rotary motion as it enters the lower discharge chamber 37. This latter chamber is closed by an outwardly bulging or convex diaphragm 38, provided with a centrally positioned orifice 39 at its center. All these parts are held together by thimble 40, which screws onto the body 30 and has an annular lip 41 adapted to force the outer diaphragm 38 against an annular bushing 42 which, in turn, seals chambers 37 and 35.

It is to be understood that oil in the lower chamber 37 has an active rotary motion. Upon discharge through the orifice 39, this oil is broken into a fine spray which also has a rotary motion upon exit. The result is that the oil spray issues in the shape of a cone. The extent of the sides of this cone shaped spray may be governed by the shape and bevel of the lip of orifice 39.

Thus, in some instances, it is desirable to form a slightly angular annular bevel 43 around the rim of this orifice. The size and shape of this orifice is, for the purposes here intended, such that the oil will be broken into a conical spray which is approximately 3 feet in diameter, when the nozzle 20 is held approximately 2½ feet from the ground. These distances are represented by the broken lines in Figure 1, wherein the line "A" denotes the outside boundaries or edges of the spray cone on a plane intermediate the nozzle and the ground, and the line "B", the height of the nozzle from the ground 44, on which the weeds or foliage 45 grows.

In operation, the tank 2 is filled with fuel oil through the cap 11, pressure is pumped up with the pump 5 and oil permitted to enter the discharge pipe 18. By a downward movement and manipulation of valve handle 16, a small amount of oil is permitted to trickle from the orifice 39 in the nozzle 20. This is ignited by any convenient means and burns slowly with an open flame only sufficient to slightly warm the nozzle. This forms a pilot or igniter flame. It is not intended that the nozzle or nipple 21 be raised to vaporizing temperatures. In fact, the converse is true since the fresh oil descending downwardly through nipple 21 is not subjected to a sufficient degree of heat to cause vaporization.

Now, when valve 15 is opened by depressing handle 16, a spray of oil, as previously described, issues from orifice 39. This spray is immediately ignited by the pilot flame. This burning spray produces a cone of burning oil and flame, the edges of which are defined by line A and which is carried downward by the force of the spray until it impinges upon the surface of the earth 44. This spray of burning oil and the flame accompanying it quickly destroys the vitality of any plant life on the surface of the ground. A portion of the flame upon striking the ground surface spreads outwardly and a small portion at the rim of the conical area extends upwardly, but this is only a small part,—the principal part being directed downwardly.

During this operation, the operator grasps the handle 16 regulating the degree of burning by the amount of oil supplied through valve 15, at the same time controlling the area of burning by grasping handle 19 and directing the spray issuing from the nozzle 20. Best results are obtained when nozzle 20 is held approximately 2½ feet from the ground, as represented by line B. It is conceivable that a larger burner with a larger orifice, supplying a greater amount of oil, at a greater pressure, would cause the issuance of a larger spray and correspondingly cover a larger area.

However, I have found the plan that produces the greatest effect to be as follows: Oil must be supplied under a pressure sufficient so that the droplets comprising the spray will issue with sufficient force to carry them from the nozzle to the ground in a direct line, that is, they must be directed with a force greater than that supplied by gravity. Second, the droplets must be small enough so that they are intimately mixed with the air surrounding the nozzle as they issue to ignite easily from the pilot flame, and yet large enough so that they are not entirely burned or consumed before reaching the leaves of the weeds or plants to be destroyed. It is important that a portion of the spray impinges upon the foliage while burning. This is one of the distinguished characteristics of my invention since I have found that this type of flame more effectively and permanently destroys foliage than even a greater heat supplied by burning of gasified or vaporized oil. For the purpose of distinction, I term this "wet flame" as distinguished from the "dry flame" produced by burners heretofore used for this purpose.

However, there are limits to the size of the droplets of the spray. They should not be so large that the oil contained in each droplet is not entirely burned while the flame is played upon the plant. If too large, an unburned oily residue will be left upon the plants. This latter may be washed into the ground, canals and ditches, producing a film which is undesirable and damaging to crops and other growths. Preferably, orifice 39 should not exceed 1 millimeter in diameter. In removing weeds and other noxious growths from ground with this apparatus, the spray is directed downwardly at right angles to the plane of the ground where the same is level,—the nozzle is moved from side to side until the foliage is wilted and burned sufficiently and the operator then picks up the tank and moves to a new location. At all times during this burning, the exact amount of spray and fire required is governed by valve 15 through a manipulation of its valve handle 16. Thus, where there is a patch of heavy growth, a greater flame is supplied and vice versa. This ease of manipulation conserves the oil used, and makes for economical operation.

Where weeds are to be removed from the spreading sides of a canal bank, or the like, the supply pipe 18 is moved until it is substantially parallel to the slope of the bank. Flexible tube 17 easily permits this adjustment. By control through handle 19 the operator may direct the nozzle so that the blast of the spray therefrom is directed at right angles to the plane of the bank of the ditch or canal. It is then moved to and fro as before until the foliage is seared and its vitality destroyed. The arrangement of the parts, as explained, including portable tank 2, its handle 4, the closely associated valve handle, the flexible tube and the handle 19 on the long supply pipe 18 permits of any adjustment conceivable within ordinary use.

I have found that by directing the spray downward or at right angles to the plane of the ground being treated, destruction is more complete than where the flame is directed horizontally or at an angle to the plane of the ground, as is necessary with the dry flame type of apparatus. It seems that the heat generated is more closely confined to the foliage being destroyed and that the burning oil is more deleterious than the dry heat supplied by these other burners. Further, since the nozzle 20 operates at a comparatively low temperature and no vaporization of oil takes place within it nor the nipple above it, there is no carbonization, due to fractional distillation of the fuel oil supply.

It is conceivable that, when desired, multiple nozzles may be attached to a long feed pipe, a large supply tank provided and the entire apparatus mounted upon wheels for the purpose of treating large level areas. Other changes and modifications will undoubtedly present themselves to the minds of those familiar with the art, all of which, however, would remain within the spirit of the invention. Therefore, I wish to be limited only by the following claim.

I claim:

A spray nozzle comprising a casing an inlet at

the upper end, an outlet at the lower end, and an exterior threaded portion adjacent said lower end, a strainer positioned within the lower end of the casing and having a peripheral flange terminating in alignment with the lower end of the casing, a diaphragm positioned against the lower end of the casing and contacting with the edge of the peripherial flange on the strainer, said diaphragm having a series of openings therein with directive vanes extending upwardly at an angle to the surface of the diaphragm and immediately above the openings, a convex diaphragm having a central discharge opening therein, an annular bushing interposed between the diaphragm and the convex diaphragm to space the convex diaphragm from the diaphragm, and a thimble having an inwardly extending lip at its lower end to engage the edge of the convex diaphragm and threadedly engaged with the exterior threads of the casing to hold the convex diaphragm, the diaphragm and the strainer in assembled relation on the casing.

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