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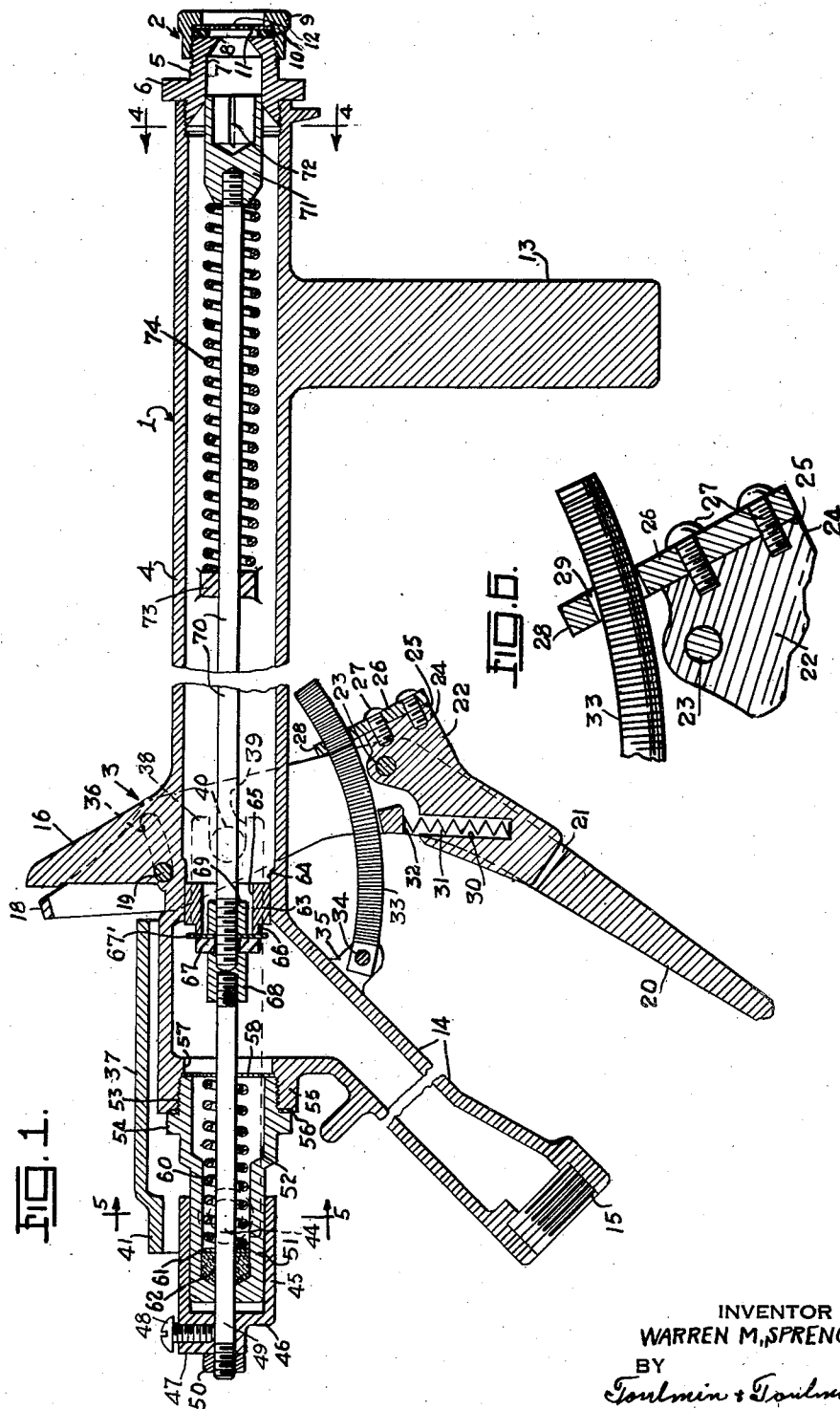
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SPRAY GUN

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2 Sheets-Sheet 1



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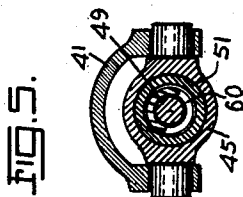
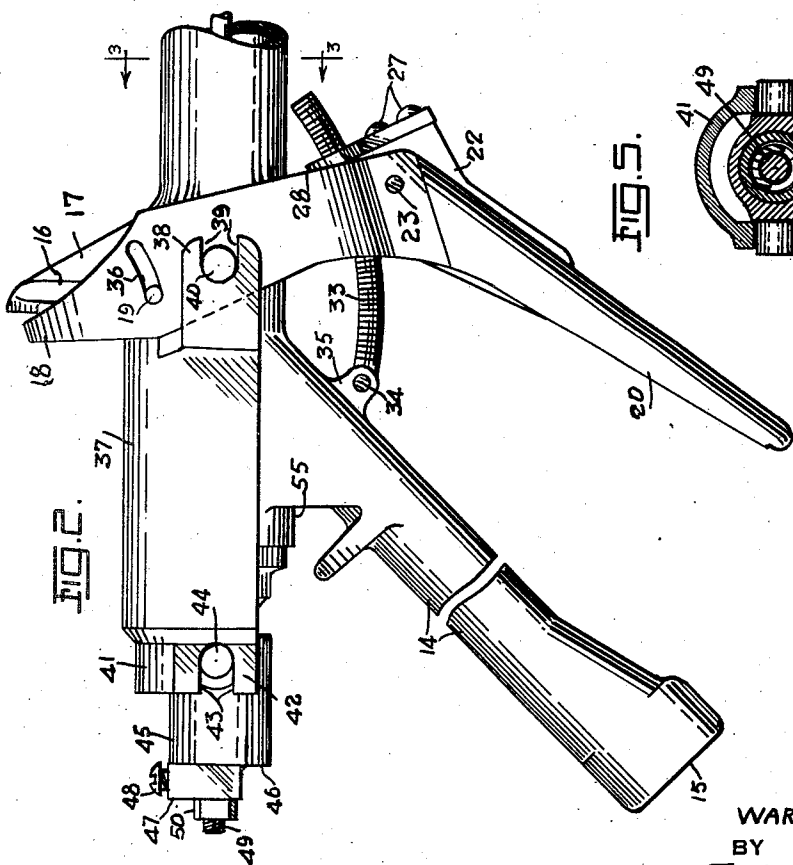
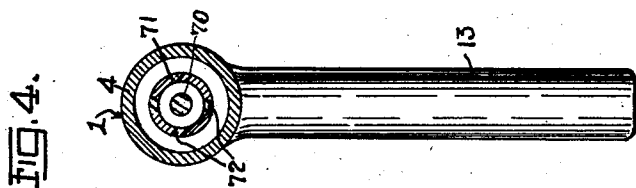
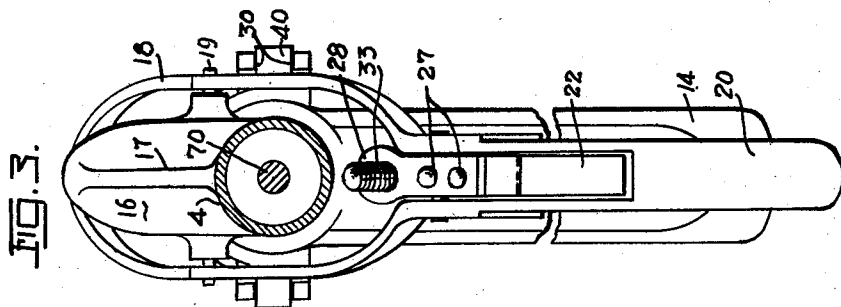
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SPRAY GUN

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3 Claims. (Cl. 299—150)

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The present invention relates to spray guns for distributing solutions over surfaces, and more particularly for applying insecticides to plants, bushes and trees.

In spray guns of this character various forms of control over the shape and size of the spray are provided as well as an on and off valve and these controls are sometimes effected at two different positions on the gun and by separately operating mechanism. While this arrangement has been found to be satisfactory, guns so equipped are somewhat difficult to operate because usually the on and off valve is operated by means of a trigger at the rear grip of the gun and the spray control is operated by an intermediate handle or grip placed nearer the nozzle end and often it becomes necessary to adjust each of the valve and the spray controls simultaneously as well as to manipulate the gun.

Again, prior designs of the spray gun have employed a trigger for actuating the on and off valve and the trigger had no intermediate position so that either this element was at one limit of its movement or at the other end of its movement and the valve would be fully open or completely closed. In accordance with one aspect of my invention the spray adjusting device is controlled by the same mechanism that opens and closes the valve and the arrangement is such that the mechanism is provided with intermediate positions so that the spray control device can be adjusted throughout its entire travel and the movement of the on and off valve be given a corresponding adjustment. The forward handle of the gun is retained even though this handle does not contribute to but simply serves as a combined gun manipulating device and a support.

Accordingly, the primary object of the invention is to provide an improved gun in which the on and off valve and a spray control device are operated by one and the same mechanism without sacrificing any intermediate adjustment of the spray control element so that closeness of control of the spray can be obtained.

Another object of the invention is to provide a spray gun in which the amount of fluid passing the shut-off valve is regulated in accordance with the requirements of the spray as determined by the setting of the spray control element.

These objects are attained in brief by providing at the trigger end, wherein control of both the shut-off valve and of the spray adjusting device are effected, a structure by which the trigger may be locked in any intermediate position, as well as at the maximum open position of the

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shut-off valve and the spray adjusting device so as to provide any intermediate adjustment of each of the shut-off valve and the spray control device. Other objects and features will be apparent in the following description and accompanying drawings in which:

Figure 1 represents a longitudinal sectional view of the complete gun.

Figure 2 is an elevational view of the trigger end of the gun, while

Figure 3 is an end view of the gun portion shown in Figure 2 and looking at a position broadly indicated by the arrowed line 3—3 in that figure.

Figure 4 is a sectional view taken along line 4—4 in Figure 1, while

Figure 5 is a similar view taken along line 5—5 in the same figure.

Figure 6 is a fragmentary sectional view of a portion of the trigger mechanism and the locking device to show the manner in which the intermediate locking effect is obtained.

Referring more particularly to Figure 1, the improved spray gun is constituted essentially of the three main parts, namely the barrel which is generally designated by reference character 1, the combined nozzle and spray control device indicated at 2 positioned at one end of the barrel and the combined trigger shut-off and spray operating mechanism 3 at the other end of the barrel. The barrel 1 is made up of as many lengths of piping as are desired and, as indicated there is a single length formed by the tubing 4, preferably made of aluminum or other light metal. The nozzle 2 consists of a head casting or screw cap 5 having a hexagonal head indicated at 6 and a bore 7 which tapers down to a small opening indicated at 8. There is a cap 9 which screws over a small diameter portion of the member 5, this cap serving to clamp a pair of washers 10, 11 to the right hand surface of the member 5. The washer 10 is made of rubber or other suitable material and constitutes a gasket and the washer 11 is composed of a hard non-corrosive metal having a very small opening 12 through which fluid issues as a spray.

The barrel 1 is provided near its nozzle end with a combined handle and support 13 and terminates at its other end in an angularly directed tubular piece 14 which has a threaded opening 15 for receiving the hose from a source of liquid. The tubing 14 constitutes a hand grip and the downwardly extending piece 13 constitutes the other hand grip. At the top of the barrel near the handle 14 there is an upstanding bracket or

abutment 16 preferably cast integral with the barrel and being suitably reinforced by webs 17 (Figure 3). The purpose of this abutment will be explained hereinafter.

There is an oval shaped yoke member 18 mounted diagonally across the barrel near the trigger end on a pair of pivots 19 which extend outwardly from each side of the abutment 16. The yoke terminates at the lower end in a trigger 20 which is slotted as indicated at 21 just below the lower surface of the yoke portion to receive a latch 22 which is pivotally mounted in the trigger as indicated at 23. This latch is provided with a portion 24 which extends upwardly and to the right (Figure 1) and has a flat edge 25 for receiving a small bar 26 of hardened steel. The latter is secured to the portion 24 of the latch by means of screws 27 and terminates at its upper end in a circular eyelet 28 having an opening 29.

The latch is provided with an opening 30 for loosely receiving a compression spring 31 which bears at its upper end against a surface 32 on the yoke member. The purpose of the spring 31 is to cause the lower end of the latch to be pushed to the right out of the trigger as far as possible. Consequently, when the latch is pressed toward the trigger the spring is placed under compression.

The eyelet 28 receives a rod 33 of curvilinear or arcuate configuration and constituted of case hardened steel. The rod 33 is roughened preferably by means of shallow grooves extending circumferentially around the rod and placed close together. This rod is pivoted at its left hand end (Figure 1) as indicated at 34 to a small lug 35 cast integral with the handle 14. The size of the rod 33 is slightly less than the opening in the eyelet 28 and the arrangement is such that when the latch is depressed i. e., moved into alignment with the trigger 20, the opening in the eyelet is brought into concentricity with the rod 33 and there is so little contact between the rod and the eyelet that the latter can be moved freely along the rod. Thus, the latch to which the eyelet is connected and the trigger which carries the latch can be readily swung about the trunnion pivots 19. An arcuate slot 36 may be cut in each of the side portions of the yoke member 18 for freely receiving the two pivots 19 and thereby to accommodate the swinging effect of the yoke. During the initial movement of the trigger a fulcrum is obtained between the pivots 19 and the trunnion bearings 40 which makes available a considerable force to crack the valve open because the distance between the fulcrum points is fairly short. As the trigger is moved still further, the points of leverage change to a fulcrum obtained between the upper end of the lever 18 and the trunnions 40, thus causing greater movements of the valve and spray control device on account of the greater distance between fulcrum points.

It is apparent that the trigger and yoke can be swung freely only so long as the latch 22 is depressed because on releasing the latch the opening in the eyelet 28 becomes eccentric with respect to the corrugated rod 33 and serves to lock the latch and its attached trigger in any desired position. Directly surrounding the barrel to the rear of the handle 14 there is a circular hooded member 37 which is provided on opposite sides thereof with a wing portion 38 having a slot 39. A pair of trunnion bearings 40 extend outwardly from the vertical sides of the

yoke 18 and are received by the slots 39 so that when the yoke is swung about its pivots 19 the member 37 is also caused to move to the left (Figure 1). The latter terminates in a shouldered portion 41 which is provided at each side with a flattened surface indicated at 42 and having slots 43 for receiving pins 44. These pins are positioned at opposite sides of a tubular member 45 open at its right hand end but closed at the other end as indicated at 46 and provided with a lug 47. A screw 48 projects vertically downward through the lug to contact with a rod 49 which extends longitudinally of the barrel. This rod is threaded at its left hand end as seen in Figure 1 to receive a nut 50. There is a relatively long, multi-shouldered cylindrical member 51 which fits snugly within the tubular member or cap 45 and is provided with a counterbored opening 52 so as to leave this member open at the right hand end but closed at the opposite end. The closed end is bored in order snugly but slidably to receive the rod 49. The cylinder 51 at its open end is provided with a threaded portion 53 having a shoulder 54. This threaded portion engages the threads of a hollow boss 55 formed integral with the main barrel. If desired a gasket 56 may be inserted between the shoulder 54 and the immediately adjacent surface of the boss 55. The latter is provided with a shouldered bore as indicated at 57 against which abuts a circular plate or washer 58 having an opening for slidably supporting the rod 49. A compression spring 60 surrounds the rod 49 to the left of the circular plate 58 and presses against a smaller washer 61 which in turn serves to compress a quantity of packing material 62 contained between the washer and the left hand end of the bore 52.

There is a sleeve 63 preferably of hardened steel such as stainless steel, fitted tightly and securely within a specially prepared bore 64 within the barrel 1, this sleeve having an opening 65 and a shouldered extension 66 projecting to the left (Figure 1). A washer 67 of rubber or a composition backs up a thin stainless steel disc 67 which bears against the left hand surface of the shoulder 66 and constitutes an opening and closing valve. Positioned on the left hand side of the washer 67, there is a small sleeve 68 which is provided with a threaded opening for receiving the rod 49 and a rod 70 which extends through the barrel 1. Another small sleeve 69 at the right of disk valve 67 and also the washer 67 are threaded to receive the rod 70. It will be noted that the rod 70 is threaded into each of the sleeve 69, the washer 67 and the sleeve 68, whereas the rod 49 is threaded only into the sleeve 68. Thus, the elements 67, 68 and 69 are secured together and in turn hold the adjacent ends of the rods 49 and 70 in alignment.

Considering the operation of the gun up to this point, when the latch 22 is depressed and the trigger 20 is moved to the left the trunnion pivots 40 which are integrally secured to the yoke 18 cause the hooded member 37 to move to the left. The latter presses against the tubular member 45 through the pivot and slot arrangement 43, 44 and assuming that the screw 48 is tightened against the rod 49 and the nut 50 is tightened against the end of the member 45, the rod 49 is caused to move to the left carrying with it the washer 67 and the valve 67, also the rod 70. An annular opening is therefore provided between the valve 67 and the left hand surface of the sleeve 63, the size of the opening being deter-

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mined by the amount of movement given the trigger 20. It has been pointed out that the size of the opening can be maintained greater or less by simply releasing the latch 22 at the desired position of the trigger at which time the opening in the eyelet 28 takes an eccentric position with respect to the trigger in the desired intermediate position.

The spray control device may comprise a thimble-like member 71, the solid portion of which is secured as by threads to the right hand end of the rod 70. The open end of the member 71 has an outer diameter slidably to fit within the bore 7 of the cap 5 and is provided with longitudinally extending slots 72 which serve to give a whirling effect to the liquid which flows through the nozzle. It is apparent that as long as the spray control device 71 remains within the bore 7 the only access given to the liquid is through the slots 72 and the effective length of these slots is controlled by the distance that the member 71 enters the bore. It is also apparent that as the member 71 recedes from the bore and is entirely clear thereof, a new passageway is opened up to the liquid about the outside surface of the member 71. Consequently, by simply moving the thimble member 71 with respect to the bore 7, including a movement by which the thimble is moved entirely out of the bore, the character of the spray can be readily changed from a fine mist to a pencil stream as it passes through the opening 12. There is a lug 73 cast into the interior surface of the tubular member 4 and a compression spring 74 which loosely surrounds the rod 70 is interposed between the lug 73 and the left hand end of the spray control device 71. As the rod 70 is moved to the left in accordance with the operation of the trigger 20, the shut-off valve 67' is automatically opened and the spray control device 71 is also moved through the same distance. It is apparent that under these conditions the spring 74 is compressed and this serves to exert a strong restoring force to assure a complete closing of the valve at 67' and a complete entrance of the thimble 71 into the bore 7 at the nozzle end when the latch is depressed. Thus, the trigger 20 is caused to move to the right when relieved of hand or finger pressure assuming that the member 22 has been unlatched. When the rod 70 slides to the left on movement of the trigger, and the latter is released at the latch, the rod is caused to return to its original position by the action of the spring 74. The spring 60 serves to maintain compression of the packing 62 around the rod 49 to prevent leakage.

It is apparent that I have provided many positions within the gun at which adjustments can be obtained and perhaps the most accessible adjustment is that accorded by the nut 50 which serves to move the valve 67' away from its seat and the spray control thimble 71 out of the bore 7 without affecting the position of the trigger 20. Moreover, the relative distance between the valve element 67' and the spray control device 71 can also be controlled by predetermining the distance along the rod 70 over which these two elements are threaded. In view of these many adjustments it is entirely possible and feasible that such adjustment may be obtained to permit the exact amount of spray solution to pass through the valve 67' as can be accommodated by a particular setting of the spray control device 71 at any and all positions of the trigger 20, including the intermediate positions. Thus, when it is desired to spray low positions with an insecticide solution

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the rate of flow of the spray solution need only be relatively small and the whirling effect obtained by the slots 72 should be quite large in order to give the proper degree of mist. Under such circumstances, the trigger 20 would be moved only a relatively short distance to open the valve a little and to move the spray control device 71 only a short distance within the bore 7, making sure that there is no free annular passageway for the liquid around the element 71. On the other hand, when a tall tree is to be sprayed, which requires a stream of strong carrying power and little or no mist effect, the trigger 20 would be moved to its extreme left hand position which would cause the valve 67' to open wide and the device 71 to be moved entirely away from the bore 7 and thus to present a large annular opening about the device for the liquid which in turn provides a strong solid stream at the nozzle. Thus, by a single trigger 20 I am enabled to control not only the on and off valve but also the character of the spray and in addition obtain any intermediate spray effect by moving the trigger to a position between its extreme limits of travel. When once the valve has been set with respect to its valve seat and the spray control device 71 with respect to the whirling chamber, the same adjustments would apply throughout all positions of the trigger 20 and thus optimum results are obtained over the entire range of application of the gun. By pivotally mounting the arcuate rod 33 so that it can readily assume an eccentric position with respect to the opening 29 in the eyelet, a strong locking effect is secured at the intermediate positions to offset the urge of the spring 74. Inasmuch as the rod 33 and the eyelet 28 are made of hardened steel, the life of the locking device should be fully as long as the life of the gun. It might be added that even in the absence of the corrugations on the rod 33, a substantial locking effect is possible due to the eccentric position that the rod assumes about its pivoted end. The corrugated surface is provided merely to accentuate this locking effect.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A spray gun comprising a barrel having at one end a nozzle and at the other end a grip member and an opening and closing valve, a trigger for moving said valve and means for locking said trigger in an intermediate position, said means comprising an eyelet element secured to the trigger and having an opening which loosely receives an arcuate shaped rod pivotally mounted on the grip member, the arrangement being such that at an intermediate position of the trigger the rod and the eyelet are caused to take eccentric positions with respect to one another and thereby to introduce a locking effect.

2. A spray gun comprising a barrel having at one end an opening and closing valve, a trigger for actuating said valve and a latch for locking the trigger, said latch being pivotally mounted on the trigger, an eyelet element secured to the latch, a rod projecting from the gun and through the eyelet, said rod taking a concentric position with respect to the eyelet when the latch is depressed so as readily to permit movement of the trigger but when the latch remains in an un-

depressed position the rod and the eyelet assume an eccentric relation with respect to one another in order to lock the trigger in the last set position.

3. A spray gun comprising a barrel having at one end a nozzle and at the other end a grip member and an opening and closing valve, a trigger for moving said valve and means for locking said trigger in an intermediate position, said means including a latch pivotally mounted on said trigger and a corrugated rod extending from the grip member and adapted to be engaged by said latch when the latter is in an undepressed condition, but adapted to be disengaged when the latch is depressed whereby the latch will fix the position of the trigger with respect to said corrugated rod.

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