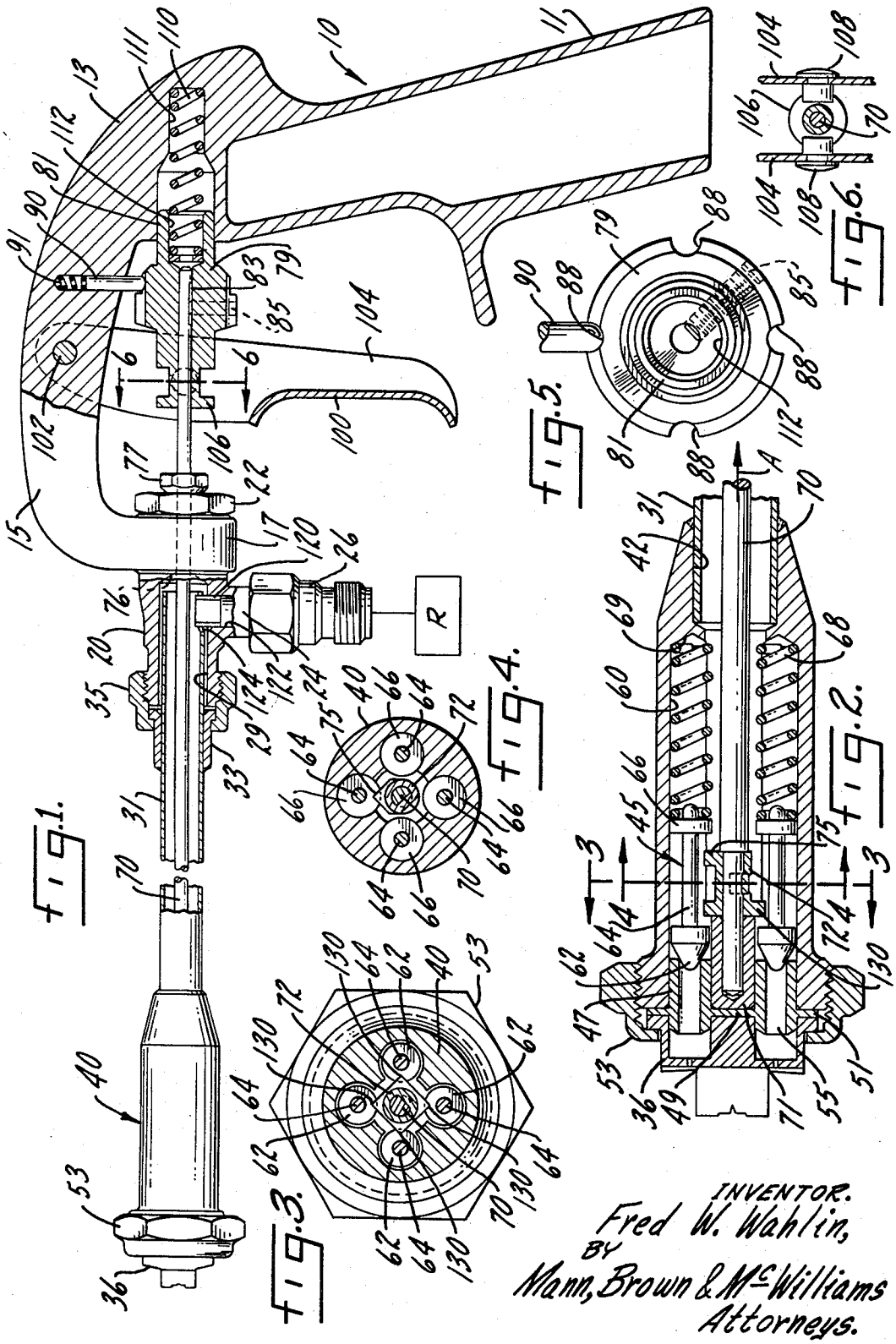
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MULTIORIFICE SPRAY GUN

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MULTIORIFICE SPRAY GUN

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The present invention relates to spraying equipment, and more particularly to a spray gun having a multiple spray pattern capability.

Particularly, although not exclusively, in the disbursement of industrial and commercial insecticides, it often becomes necessary to spray into restricted areas such as behind base boards or walks, or in cracks. Heretofore, it has been necessary, in order to reach the many different areas to be covered, to change the spraying equipment being used in order to obtain the proper spray pattern to reach the previously inaccessible areas involved. In so doing, a spray tip providing a specialized pattern of emission is usually mounted in place. Many such tips may be required for a given job. This requires that the user maintain a stock of specialized tips and take the time necessary to mount the proper tip required for each specific circumstance encountered.

It is an object of the present invention to provide spraying equipment, and specifically a spray gun capable of selectively producing one of a number of individually distinct spray patterns for special uses without resort to the exchange or replacement of the spray tip or related spray equipment.

It is another object of the invention to provide a multipurpose spray gun which is readily manipulated at a convenient place remote from the tip itself to provide a selected one of a variety of available spray patterns at the tip thereof, to thereby permit coverage of otherwise inaccessible areas.

Still another object of the invention is to provide a spray gun having a multiple spray tip assembly with controls at the operating handle for selectively connecting one of a number of spray tips directly with the fluid supply to the gun.

The foregoing, as well as other objects and advantages of the present invention will appear from the following detailed description when taken in conjunction with the appended drawings, wherein:

FIG. 1 is a side elevation, partially fragmented and sectioned, of a hand operated spray gun assembly constructed in accordance with the present invention;

FIG. 2 is an enlarged, partially sectioned view of the spray tip and associated control parts of the gun of FIG. 1;

FIG. 3 is a section taken along lines 3—3 of FIG. 2;

FIG. 4 is a section taken along lines 4—4 of FIG. 2;

FIG. 5 is an end view of the selector ring; and

FIG. 6 is a section taken along lines 6—6 of FIG. 1.

It will be appreciated that the invention is susceptible of some modifications and alternative constructions without departure therefrom. A preferred illustrative embodiment is, however, shown in the drawings and will be described below in considerable detail. It will be understood that there is no intention to limit the invention to the specific form disclosed, but, on the contrary, to include all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

With reference now to the drawings, and more particularly to FIG. 1, a spray gun constructed in accordance with the present invention is there illustrated and identified at **10**. The gun is a hand gun having a handle comprising a gripping portion **11** with a shoulder portion **13** formed integrally therewith and a bridge portion **15** extending outwardly and terminating in a supporting ring **17**.

In the illustrated construction, the supporting ring **17** supports an inlet fitting **20** which passes through the ring and is secured on the other side thereof by a nut **22**. The inlet fitting is provided with a nipple **24** to which a connector **26** is secured in any known manner. The connector is part of a fluid inlet line leading from a reservoir containing the material to be sprayed.

The fitting **20** is elongated and is provided with an internal bore **29**. The bore **29** is adapted to receive a barrel **31** of any desired length. The barrel **31** is cantilevered in the fitting **20**, and the bore **29**, therefore, is suitably long, and of such a diameter as to provide a close sliding fit with the barrel diameter.

A combination guide and supporting ring **33** is secured about the barrel and connected to the fitting **20** by means of a collar **35**, thereby providing necessary support against removal of the barrel under fluid pressure.

The invention, in one of its aspects, provides a novel multiple spray tip arrangement at the end of the barrel **31**. Referring to FIG. 2, such a spray tip assembly is indicated in toto at **36** and comprises a ring formed of suitable material such as brass, having a multiplicity of orifices either formed in, or otherwise fastened thereon. In the present instance, four such orifices are provided and each is designed to emit spray in a specific pattern. It will be appreciated that any combination specific desired patterns may be provided by simply forming on, or otherwise securing to, the ring **36**, the necessary orifice arrangement for providing that spray. For example, a spray tip of the type shown might have the capability of providing a flat fan-shaped pattern, a conical spray pattern, with either a full pattern or a ring-shaped pattern. There may be provided a tip which provides a particularly wide pattern, one which employs a square pattern, and even one which creates a whirling motion to provide wide angle coverage.

In keeping with the invention, the desired spray pattern may be selectively chosen by the user without resort to changing or modifying the equipment being used. Accordingly, a control head, indicated generally at **40**, is provided at the end of the barrel **31** remote from the handle. Referring to FIG. 2, the control head may be press fitted or otherwise fastened to the barrel **31**, and depending on the material used, it may be formed directly thereon. In the assembly illustrated, the end of the barrel is pressed into an opening **42** and a solder connection is provided between them.

In order to permit selective use of any one of the spray tips provided in the tip **36**, a cluster of poppet valves indicated generally at **45** are mounted within the control head **40**. Each of the valves is aligned with a ported valve seat **47**, all of which are mounted or formed in a cross member **49** and disposed immediately behind, and in alignment with, the orifice ring **36**. The cross member is provided with a peripheral flange **51** sandwiched between the spray tip **36** and the control body. In this manner, when retaining ring **53** is secured to the control body **40**, the spray tips are held in engagement with the orifice seals, thereby completing direct connection between ports **55** in the valve seat members and the spray tip orifices.

The control body is, in this instance, formed with four bores **60**, which define housings and guides for the poppet valves **45**. The valves themselves comprise a conical head portion **62**, which seats in line contact against the seats **47**, and a stem portion **64**. A spring retainer flange or collar **66** is formed or otherwise fastened on the end of the stem remote from the head, and a compression spring **68** is provided between the valve stem and the rear

wall 69 of the bore to maintain the same in a normally closed position against the seat 47.

In order to provide operation of the spray gun with the pre-selected desired spray pattern, a novel valve control arrangement is used, which includes an elongated control rod 70 extending, in the illustrated embodiment, from the handle of the gun through the barrel and into the control head 40 where the end thereof is supported in a retainer member 71 for limited reciprocal movement. Near the end of the rod, and within the control head 40 there is a cam member 72 which is attached in any suitable fashion to the rod. As seen in FIG. 2, the cam member is located on the rod so as to be generally positioned between the valve head 62 and the spring retainer 66 thereof.

It is the purpose of the cam member to provide selective opening of one of the valve members provided in the control head. This is accomplished, in accordance with the invention, by an upstanding upset cam portion 75 which, as seen in FIG. 4, comprises a narrow outward extension of the cam member in one quadrant. The cam portion 75 is extendable into any one of the bores 60 by an amount sufficient to selectively engage the face of a retainer ring 66 secured to the rear of the valve in that particular bore. Since the cam portion lies in a single quadrant, rotation of the rod 70 will permit selection of any one of the four quadrants in which the valves 45 lie, and therefore any of the valves may be actuated without interference with the others.

The end of the control rod remote from the control head 40 passes through the fitting 20, a rear supporting cross wall 76, through a combination seal and guide nut 77 and into a selector ring 79 which is rotatably secured within the shoulder 13 of the handle by means of a rearwardly extending boss 81. As seen in FIGS. 1 and 5, the end of the rod which extends into the selector ring is slotted as at 83 and a set screw 85 engages the slot to assure fixed alignment of the rod 70 and the ring 79.

With reference to FIG. 5, it will be seen that the ring 79 is provided with four equally spaced grooves 88. These grooves are formed on the ring so as to provide a prearranged relationship with the valves in the control head. Thus, in view of the pre-alignment of the rod 70 and the ring 79, the slots 88 are capable of providing a precise indication of the location of the cam projection 75 with respect to the valves in the control head.

As will be seen in FIG. 1, a trigger member 100 is pivotally secured at 102 on the bridge of the handle. The trigger, as seen in FIG. 6, is bifurcated, having side members 104 extending upwardly on either side of the selector and a forwardly projecting portion 106 of the selector ring 79. Fasteners 108 pivotally secure the legs 104 to the selector ring to permit reciprocal movement of the selector ring by squeezing and releasing the trigger 100. A spring 110 is provided between a bore 111 in the shoulder of the handle and an aligned passage 112 in the selector ring to thereby maintain the selector ring and rod 70 in a position normally outwardly of the gripping portion 11 of the handle. This position, as seen in FIG. 2, centers the cam member 72 within the control head and all of the valves 45 are therefore seated by the springs 68, rendering the spray gun inoperative.

In order to provide proper alignment of the valve members with the previously positioned cam, and the selector ring 79, the barrel 31 of the gun is formed so as to easily be positioned in proper alignment within the fitting 20. This is accomplished, in accordance with the invention, by providing a small guide tube 120 which is pressed or otherwise secured in the inlet passage 122, so as to project into the bore 29 within the fitting. The tube 31 is slotted as at 124. The slot is precisely located with respect to the valves to provide fixed alignment when the tube is inserted about the fitting 120. The slot 124, as seen in FIG. 1, is adapted to engage and circumvent the upstanding tube 120. Accordingly, the tube may be positioned within the fitting in only one pre-determined and precisely preselected position. Proper alignment is, therefore, assured.

The desired spray tip is thus readily chosen by rotation of the selector ring through the use of the selector post 90 until one of the slots 88 is engaged by a guide detent 125 biased downwardly from the bridge 15 of the handle in which it mounts, toward the selector ring by a spring 127. Thus, the cam 75 is located in a desired quadrant in line with one of the four retainers 66. Squeezing of the trigger 100 will cause the rod to be withdrawn in the direction of the arrow A (FIG. 2), and the cam projection will engage the ring and upseat the valve 45 against the bias of the spring 68. Fluid under pressure from the reservoir R passes through the tube and past the valve seat 47 and is ejected through the orifice, which happens to be aligned with the particular valve unseated. Should another spray pattern be desired, the trigger is released, closing the unseated valve, and a new position of the ring is selected. The trigger is then depressed to emit through the newly chosen orifice.

In order to permit removal of the multiple orifice spray tip without freeing the valve members 45, the cam member 72 is formed with inhibitor projections or stops 130 which, as seen in FIG. 2, are located forwardly of the operating cam projection 75. These projections are so positioned as to be engageable with the retainers 66 of the valves, thereby inhibiting their removal from the passages in which they normally ride. Accordingly, the spray tip may be removed for cleaning, repair or replacement without fear of inadvertent disassembly of the control head.

From the foregoing, it will be seen that a high degree of versatility is permitted with a minimum amount of manipulation, and a multi-purpose hand type spray gun is provided which is the equivalent of four such guns. It will also be appreciated that while four tips have been described and illustrated, any suitable number may be employed without departure from the invention.

I claim as my invention:

1. A spray gun providing a plurality of selectable spray patterns comprising a handle, a barrel supported in said handle and connected with a source of fluid under pressure, a spray tip mounted on said barrel and having a plurality of distinct orifices therein, a control head in said barrel between said spray tip and the fluid source, said control head having a plurality of valves therein, each said valve being in fluid communication with one of said orifices in said spray tip, means biasing said valves to normally restrict fluid flow thereby, and means for selectively operating one of said valves against the bias thereon to thereby cause fluid to be ejected from one of said orifices.

2. The spray gun as set forth in claim 1 wherein each of said valves have a projection thereon, and said control means includes a cam selectively movable against a selected one of said projections for opening a selected valve.

3. The spray gun as set forth in claim 2 wherein said cam is mounted on a rod, and means is provided at said handle for rotating said rod to thereby align said cam with one of said projections, and for reciprocating said rod to operate said valve.

4. The spray gun as set forth in claim 3 wherein a selector member is provided at said handle and connected with said rod in a predetermined fashion so as to thereby indicate the position of said cam in said control head.

5. The spray gun as set forth in claim 3 wherein means is provided for aligning said valves with respect to said cam.

6. The spray gun as set forth in claim 3 wherein a fitting is mounted with said handle, said fitting having a bore therein for receiving said barrel, said fitting having a projection therein extending into said bore, and a means defining a notch in said barrel, said notch being engageable with said projection for aligning said barrel on said fitting.

7. The spray gun as set forth in claim 1 wherein said

valves are disposed circumferentially about said control head, and said cam is centrally disposed therein.

8. The spray gun as set forth in claim 7 wherein means is provided on said rod for limiting movement of said valves against the bias thereon.

9. The spray gun as set forth in claim 8 wherein said cam and said limiting means are integrally formed and mounted on said rod.

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WALTER SOBIN, *Primary Examiner.*