Sept. 19, 1950 J. M. CARROLL 2,522,928

SPRAYING NOZZLE

Filed Nov. 18, 1947

FIG. 10.

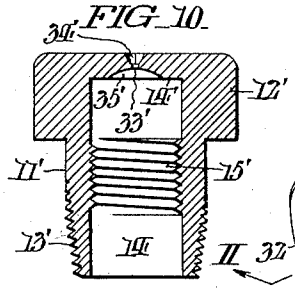



FIG. 1.

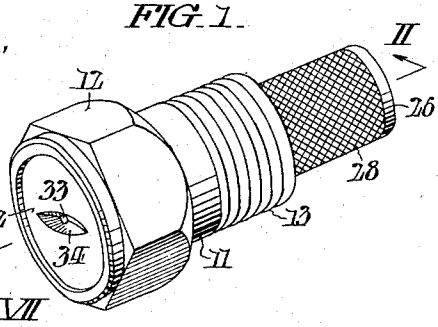



FIG. 2.

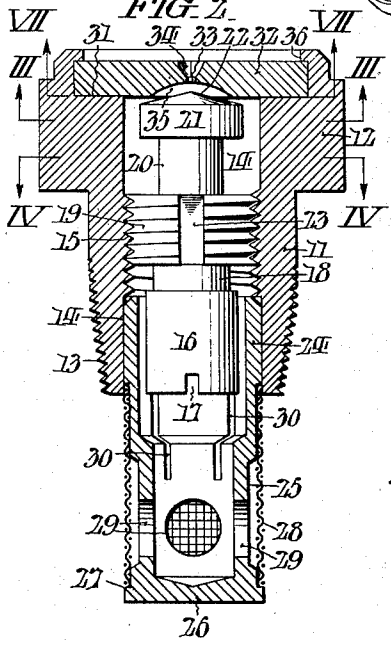



FIG. 5.

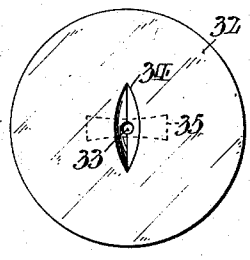



FIG. 8.

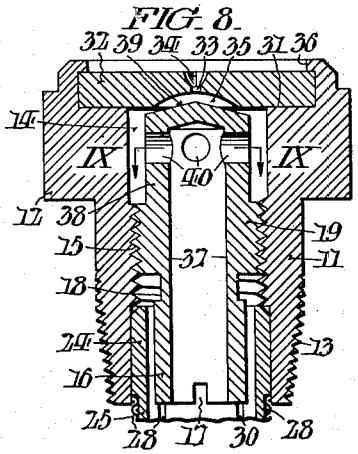



FIG. 6.

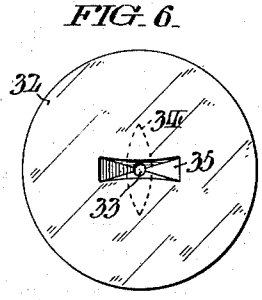



FIG. 9.

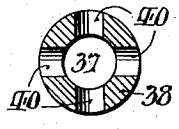



FIG. 3.

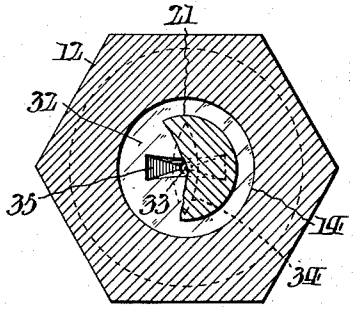



FIG. 7.

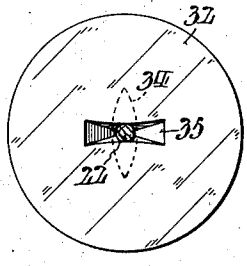
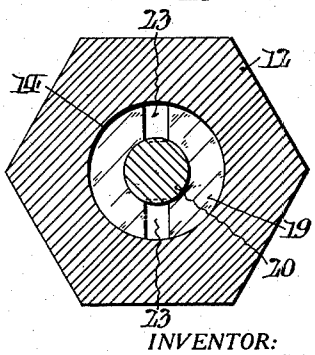



FIG. 4.




WITNESSES

Thomas W. Kerr, Jr.

A. J. Brittingham

INVENTOR:

James M. Carroll,

BY Paul & Paul

ATTORNEYS.

Patented Sept. 19, 1950

2,522,928

# UNITED STATES PATENT OFFICE

2,522,928

## SPRAYING NOZZLE

James M. Carroll, Philadelphia, Pa., assignor to Monarch Manufacturing Works, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application November 18, 1947, Serial No. 786,567

3 Claims. (Cl. 299—136)

1

This invention has general reference to liquid spraying nozzles and, more particularly, relates to nozzles designed to emit a direct sheet-like or flat flow of the liquid to be dispersed in fine particles. Nozzles of the type referred to for agricultural and horticultural usage for spraying water, insecticides and so forth under direct pressure, are customarily equipped in the jet end of the nozzle with a round disc having a fine bore or axial orifice, such disc being provided on one side with a V-section recess or groove centrally across the orifice and a corresponding section groove on the other side of said disc disposed at right angles in respect to the first mentioned groove. Frequently, when forming one or the other of the grooves aforesaid the disc has been slightly swiveled under the milling cutter with resultant lateral expansion of the outer ends of the groove against which the liquid being sprayed is delivered under pressure, whereby a sheet-like emission results that invariably includes substantial edge jets or streams. These heavy edge jets measured for instance one inch from the edge of the spray, or two inches out of an eighteen-inch width spray jointly comprise as much as 50% of the total liquid sprayed which is very objectionable and disadvantageous when an even spray is desired.

In farm work, for instance, it is common practice to attach a number of these nozzles at determinate intervals along a liquid supply pipe or "boom" so that the sheet-like spray edges meet; with the result that a very large amount of the sprayed liquid is deposited more or less along mergent lines due to the heavy jet-areas or streams aforesaid. In other words, the known manner of flat or sheet-like spraying is objectionable in that the liquid being sprayed is unevenly deposited with resultant differential degrees of saturation being imparted to the area treated.

It is a primary object of my invention to overcome the above noted disadvantages by providing an improved spraying nozzle of the indicated type so designed that it will effectively rid the flat or sheet-like spray from substantially any trace of edge streams or jets.

With the above stated general object, and ancillary advantages, in view, as will hereinafter appear or be specifically referred to, my invention essentially consists in the features of construction, combinations of elements and arrangements of parts hereinafter disclosed, and illustrated by the accompanying sheet of drawings; whereof:

Fig. 1 is a perspective view of one practical

2

embodiment of my improved flat spraying nozzle.

Fig. 2 is an enlarged axial longitudinal section taken approximately as indicated by the arrows II—II in Fig. 1.

Fig. 3 is a horizontal section, having a central part broken away, taken as designated by the arrows III—III in Fig. 2.

Fig. 4 is another horizontal section taken as indicated by the arrows IV—IV in Fig. 2.

Fig. 5 is a plan or outer face view of the nozzle tip disc.

Fig. 6 is a plan view showing the reverse face of said disc.

Fig. 7 is a horizontal section taken approximately as indicated by the arrows VII—VII in Fig. 2.

Fig. 8 is a similar, but broken-off, sectional view to Fig. 2 of a modified form of my invention.

Fig. 9 is a horizontal section taken within the limits of the arrows IX—IX in Fig. 8; and,

Fig. 10 is a longitudinal section of a slightly modified form of the nozzle body portion.

In describing the forms of my invention exemplified in the drawings herewith, specific terms will be employed for the sake of clarity, but it is to be understood the scope of said invention is not thereby limited; each such term being intended to embrace all reasonable equivalents which perform the same function for an analogous purpose.

Referring more in detail to the drawings my improved flat-spraying nozzle comprises a tubular body 11 preferably embodying a polygonal shaped head 12 at one end, with the other end taper or pipe-threaded at 13; while the bore 14 of said body portion 11 is relatively reduced, intermediate its ends, and screw-threaded at 15 for reception of a flow-diverting and distributor device.

This flow-diverting and distributor device or unit, it is to be remarked, conveniently although not essentially, embodies a round-section head 16 having a screw-driver slit 17 in its outer face for seating or removing said device, as hereinafter explained; a relatively reduced stem portion 18; an intermedate exteriorly screw-threaded section 19 for engagement in the body-bore threaded-portion 15 aforesaid; a further reduced stem portion 20; and a distributor head 21 preferably having a slightly coned terminal extension 22. In addition it is to be noted that the section 19 of the device or unit is provided with grooves 23, one of which is shown in Fig. 2.

Snugly fitting the bore 14 of the body portion 11, is a tubular element or plug 24 having the

outer major extent slightly reduced at 25, and a closed end 26 shouldered at 27; said reduction 25 and shouldering 27 affording support for a suitable strainer sleeve 28 having its other end engaged in the bore 14 of the pipe-threaded portion of the body 11, see Fig. 2. It is also noticeable the plug 24 is provided with opposing holes 29, proximate the closed end 26, and relatively-intervening longitudinal slots 30 enabling said plug to have friction grippage in the bore 14.

Fitted into a suitable recess 31 in the jet end of the nozzle portion 11 is a circular disc 32 of the desired thickness and having a fine axial orifice 33 with an outer V-section concaved diametric groove 34, centrally of such orifice, and an inner reversely concaved groove 35 preferably disposed at right angles in respect to the center of the first mentioned groove 34, see Figs. 5 and 6 to best advantage; or the jet portion 11 of the nozzle may be butt-ended and have the grooves formed therein, as shown in Fig. 10. The disc 32 is conveniently secured in the recess 31 by clinching over inwardly the surrounding edge of said recess, as indicated at 36, Figs. 2 and 8. Or, the nozzle portion may be in the form of a unit 11', see Fig. 10 and, have the orifice 33' and V-section grooves 34', 35' embodied therein, as readily understood by those conversant with the art, all other parts corresponding with those previously described being designated by like reference characters to avoid unnecessary repetition.

Referring now to Figs. 8 and 9 it will be seen that the modified type of flow and distributor device is in the form of a unit as before set forth, that is to say it embodies a head 16, with a screw-driver slit 17, a short stem portion 18, and a screw-threaded section 19 for engagement in the body portion threaded bore 15. Attention is directed to the fact, however, that the distributor device or unit, in this form of my invention, is provided with an axial bore 37; that the stem section 38, forwardly of the screw threaded section 19, is of the same diameter as the spreader head 21 previously described; and that said section 38 includes a slightly coned end 39 inwardly of which are diametrically opposed distributor apertures 40.

Having described the structural aspects of the embodiments of my invention it is well to note that the slightly coned forward end 22 or 39 of the respective flow and distributor devices are driven into contact with the inner face of the respectively associated nozzle-tip disc 32 or the corresponding butt-end of Fig. 10; also that the pressure influenced liquid being sprayed is supplied to the rear or inner face of said disc but not directly into the disc-slot 35, with substantially complete or total elimination of edge jets from the flat spray emitted by the nozzle, dependent upon the size of orifice 33 and the diameter and curvilinear formation of the respective grooves 35, 34, incidental to obstruction of direct flow of liquid to and through the disc groove 35 or 35' of Fig. 10. It is to be further particularly observed that the apex of the respective coned ends 22 or 39 must be central relative to the orifice 33, and a portion of the distributor head must contact and seat against the rear of the spray disc 32, or in the case of Fig. 10 against the inner flat end of the bore 14' to form an obstruction for suitably directing the flow to the slot 35' and orifice 33'. It will also be observed that the coned extension 22 of the distributor head 21 has a seating contact with the inner face of the disc 32 which is of less diametrical extent than the groove 35 and is seated intermediate the diametrical extremities of said groove. It will also be understood by those conversant with the art that when the distributing device is properly seated the spray will be maintained without any variable tendency, and devoid of side jets of relatively greater volume.



While my invention has been described with particularity it is obvious that modifications in the details will suggest themselves in adapting said invention to other forms but all such modifications are contemplated as fall within the terms and scope of the following claims.

I claim:

1. A spraying nozzle comprising a tubular body having a tip with a central orifice therethrough and diametric grooves in the inner and outer faces thereof and which relatively intersect said orifice; a flow-diverting distributor device within the bore of said tubular body, said device having a head with a seating surface thereon providing a seating contact of less diametrical extent than the groove on the inner face and being seated against the inner face intermediate the diametrical extremities of the inner groove; and said device and inner groove forming ports to produce indirect flow of liquid under pressure into the inner groove of the tip whereby side streams in the spray are prevented.

2. A spraying nozzle comprising a tubular body having a tip with an axial orifice therethrough and a diametric groove in the inner and outer faces thereof, said grooves having opposed curved section walls and intersecting said orifice; a flow-diverting and distributor device within the bore of said tubular body, said device having a head with a seating surface thereon providing a seating contact of less diametrical extent than the groove on the inner face and being seated against the inner face intermediate the diametrical extremities of the inner groove; and said device and inner groove forming ports to produce indirect flow of liquid under pressure into the outer ends of the inner groove in the nozzle tip whereby side streams in the spray emitted from the nozzle are eliminated.

3. The invention of claim 1 wherein the forward terminal extremity of the distributor insert is slightly coned outwards for contact with opposed edges of the nozzle tip inner groove; and wherein said insert is provided with a lengthwise bore having angularly related flow outlets therefrom in proximity to said forward terminal extremity.

JAMES M. CARROLL.


## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 825,290 | Barker | July 10, 1906 |
| 1,094,124 | Coen | Apr. 21, 1914 |
| 1,151,258 | Fischer | Aug. 24, 1915 |
| 1,500,384 | Hagerman | July 8, 1924 |
| 1,828,463 | Hammers | Oct. 20, 1931 |
| 1,917,216 | Bersted | July 11, 1933 |
| 1,940,171 | Huss | Dec. 19, 1933 |
| 2,121,741 | Lusher | June 21, 1938 |
| 2,242,680 | Schacht | May 20, 1941 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 441,542 | Germany | Mar. 3, 1927 |