Aug. 24, 1965 W. G. KAUTZ ETAL 3,202,363

AUTOMATIC FOGSPRAY DEVICE

Filed July 1, 1963

Fig. 2

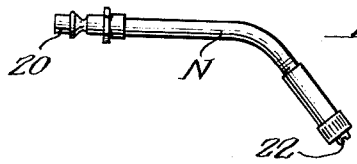


Fig. 1

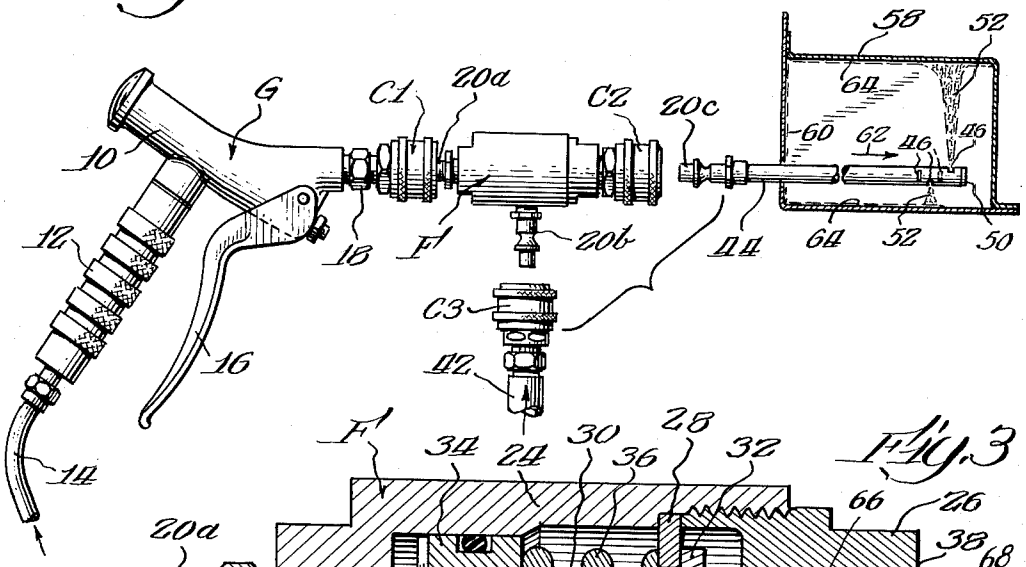


Fig. 3

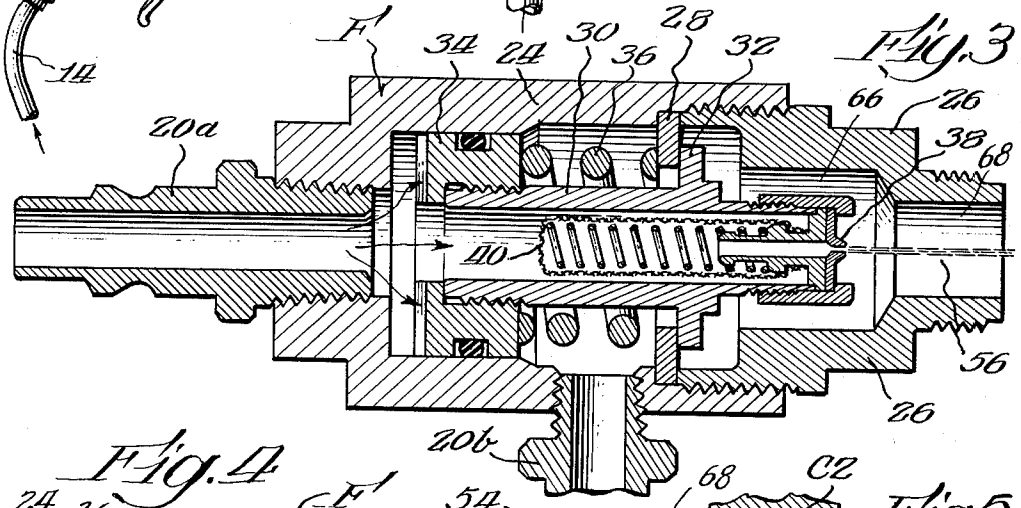


Fig. 4

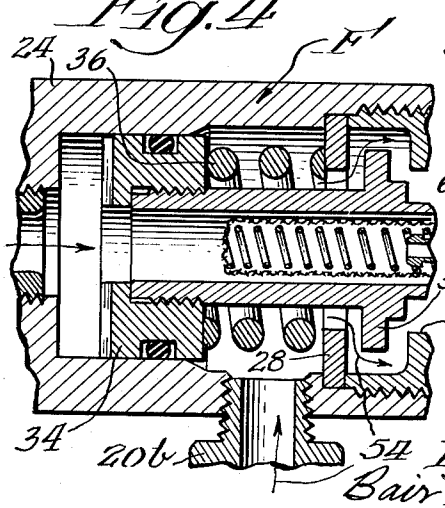
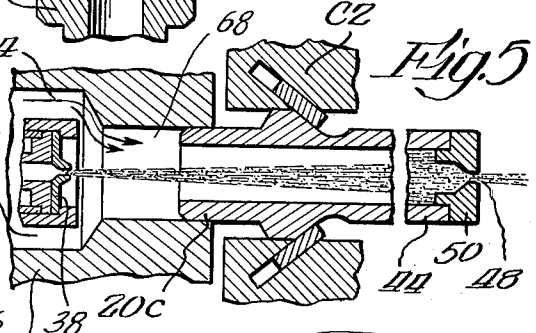


Fig. 5



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3,202,363

AUTOMATIC FOGSPRAY DEVICE

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11 Claims. (Cl. 239—413)

This invention relates to an automatic fogspray device for an airless spray gun.

In the field of automobile preservation, an effective anti-rust undercoat program is desirable, and involves not only the objective of anti-rust underbody undercoating but the objective of anti-rust body undercoating. Heretofore underbody undercoating has been practiced wherein anti-rust material is applied to the underbody chassis and running gear which gives considerable protection to the vehicle but does not protect the automobile body itself from the scourge of rusting. A really effective anti-rust program must include those areas within the body itself where corrosion starts and advances through the thickness of the metal and finally appears as unsightly rust on the outside surface of the body where it is readily seen. This rust appears at fender beads or lips, front and rear bumper splash panels, headlight areas and rocker panels, and in certain areas of vertical posts, doors, trunk lids and the like, many of which are "boxed in" areas difficult to get at with the ordinary type of spray equipment.

For undercoating the underbody, an "airless" spray nozzle is preferable to minimize overspray or fogging, but in box sections such as doors, posts and the like which are usually accessible only through blind openings, airless spraying is not suitable. On the other hand, a "fogspray" from a discharge tube or "wand" is much more efficient for this purpose providing the end of the wand is completely or nearly closed and there are discharge openings 360° around the circumference of the wand adjacent such end. One device for accomplishing fogspray is shown in the copending application of Kautz, Serial No. 248,616, filed December 31, 1962, while another device is disclosed herein.

An object of our present invention is to provide a fogspray device for use in conjunction with an airless spray gun, the fogspray device being in the form of a unit which can be substituted for the spray nozzle of the airless spray gun and the spray nozzle or a discharge tube or wand connected with the discharge end of the unit instead of having to use two separate spraying devices, one the airless spray nozzle and the other a fogspray nozzle.

Another object is to provide a fogspray device that can be removed for normal use of the airless spray nozzle or readily attached for using the spray gun and the fogspray unit as a fogspray gun particularly suitable for spraying the inside surfaces of box sections.

Still another object is to provide the combination with an airless spray gun of a fogspray unit having a hollow body which can be coupled to the spray gun in place of its usual spray nozzle and has an internal airless spray nozzle therein which coacts with an elongated spray tube carried by the hollow body and in alignment with the internal nozzle therein, the tube having a completely or nearly closed end remote from the nozzle and provided with lateral discharge openings inwardly of this closed end, means being provided to introduce air under pressure into the hollow body between the internal nozzle and the spray tube to fog the material from the nozzle as it is discharged from the discharge openings of the spray tube.

A further object is to provide automatically operable means within the hollow body responsive to the pressure of fluid from the spray gun to automatically open a passageway for the air that subsequently mixes with the stream of fluid from the internal nozzle whereby only the valve on the spray gun need be operated for discharging both the spraying fluid and the air that mixes therewith for producing a fogspray.

Still a further object is to provide the fogspray units so constructed that the air is introduced a fraction of a second after the hydraulic pressure is applied to the internal nozzle, and conversely cuts off automatically when hydraulic pressure is discontinued but with a slower response time in order to air-purge the fogspray wand.

An additional object is to provide quick coupling connections between the spray gun and its spray nozzle which may be quickly disconnected, and between the fogspray unit and the spray gun as well as between the fogspray unit and its fogspray wand.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our automatic fogspray device, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in detail on the accompanying drawings, wherein:

FIG. 1 is a side elevation of an airless spray gun with which my fogspray unit is illustrated as attached, a compressed air line and a fogspray wand being shown in position for attachment thereto;

FIG. 2 is a side elevation of a spray nozzle usually attached to the spray gun for airless spraying operations;

FIG. 3 is an enlarged vertical sectional view through the fogspray unit shown in FIG. 1 and showing the parts thereof in normal position for an airless spray operation immediately prior to producing a fogspray;

FIG. 4 is a similar sectional view of a portion of FIG. 3 showing another position of the parts, and

FIG. 5 is a sectional view of a portion of FIG. 3 showing the same position as in FIG. 4 and illustrating a fogspray operation.

On the accompanying drawing we have used the reference character G to indicate in general a spray gun and F a fogspray unit. The gun G comprises a valve body 10 having a suitable shut-off valve therein, a handle 12 to which a supply hose 14 is connected, a valve lever 16 for opening the valve in the body 10 and a discharge fitting 18. A quickly operable coupling C1 such as one of the type shown in Gorrell et al., Patent No. 2,823,934, is mounted on the discharge fitting 18 and is adapted to receive a nipple 20 of a spray nozzle N shown in FIG. 2 having a nozzle tip 22, or a nipple 20*a* of the fogspray unit F selectively as desired.

The spray gun G may be operated as an airless spray gun when the nozzle N is substituted for the fogspray unit F, in which case the material to be sprayed such as paint, undercoating grease, oil or mastic sound deadener under high pressure such as 1,000 to 4,000 p.s.i. hydraulic pressure is supplied through the hose 14. When fogspray is desired, however, the coupling C1 can be manipulated for releasing the nipple 20 of the nozzle N and for quickly receiving the nipple 20*a* of the fogspray unit F.

The fogspray unit comprises a hollow body 24 into one end of which the nipple 20*a* is screwed, and has an extension 26 at its other end to be connected with a second coupling C2 as shown in FIG. 1. The parts 24 and 26 are screwed together with a valve seat washer 28 between them. A sleeve 30 is slidable through the washer 28, having a valve disc 32 on one end to normally seat against the valve seat washer 28 and an O-ringed piston 34 on its other end. A spring 36 normally seats the disc 32 against the seat 28. At the downstream end of the sleeve 30 an orifice disc 38 is provided, a strainer sleeve 40 being provided in advance thereof. The extension 26

has a first tubular portion 66 surrounding the orifice disc 38 and a tubular discharge portion 68 downstream of the disc.

An air nipple 20*b* is threaded in the side of the body 24 and is adapted for a third coupling C3 to coact therewith, such third coupling being connected to a compressed air supply hose 42. The air nipple 20*b* is immediately upstream from the valve seat 28 so that when the valve disc 32 is unseated as in FIG. 4 the compressed air is introduced directly from behind and around the orifice in the disc 38 as will be evident from an inspection of FIG. 5. Arrows 54 in FIGS. 4 and 5 indicate the path of air flow.

A fogspray wand 44 is provided with a nipple 20*c* to coact with the coupling C2 and has its bore in alignment with the orifice disc 38 as shown in FIG. 5. The wand 44 has an outer end which is partially or completely closed as shown in the copending application of Kautz, Serial No. 248,616, filed December 31, 1962. FIG. 5 shows the former which involves one or more spray orifices 48 in an end member 50 of the wand while FIG. 1 shows the end closed. Inward from the outer end a series of slots 46 is provided arranged laterally of the wand and spaced around it with their ends in overlapping relationship to insure that fogspray therefrom may be discharged in all directions 360° around the wand.

Practical operation

In the operation of the spray gun and our fogspray device above described, when coating a surface that is accessible (such as the underbody surfaces of an automobile) with coating material such as paint, grease, oil or mastic, the fogspray unit F is removed and the spray nozzle N is used whereupon an airless spray produced by the material under high hydraulic pressure as hereinbefore mentioned is sprayed directly against the accessible surfaces. High pressure hydraulic spray is preferred for these heavy or viscous liquids as there is very little overspray or fogging whereas conventional air atomization broadly distributes the spray in droplet size. The fine droplets which fail to reach the surface being coated contaminate the surrounding air and fall to the floor thereby being wasted. By subjecting the coating material to high hydraulic pressure there is high impact of the material on the work, droplets of the material being effectively carried into recesses of the work and penetrating rough surfaces. There is no splatter of large droplets when spraying grease or heavy viscosity liquid. The atomizer effect resulting from hydraulic pressure produces a more uniform and finely atomized material than air atomization. It is very directional and covers the target and not much else.

When spraying box sections inside the doors, rocker panels, posts, etc., however, the gun G alone does a good job of coverage only with very thin water-like liquids. This is because it is easy to "fog" thin liquids with hydraulic pressure but not heavy ones. Thin liquids, however, are unsatisfactory as an effective coverage medium. The usual procedure is to use thick grease-like materials for open target areas and a similar material or grease greatly thinned with solvent in the closed box sections. In these locations it is common to use air atomization for maximum fogging. This, however, requires two pieces of equipment and there is resistance to the sale and use thereof.

Accordingly, we provide the fogspray unit F which requires only the one gun G shown in FIG. 1 for either hydraulic or fog atomization. The unit F converts the airless gun into a combination airless-air atomizing gun. We have found the airless gun plus the fogspray unit very effective in fogging the material as indicated at 52 in FIG. 1 so that after the openings 46 have just entered the box section 58, the hydraulic spray may be turned on and the air from the nipple 20*b* will flow as indicated by the arrows 54 in FIGS. 4 and 5 to mix with the hydraulic spray 56 shown in FIG. 3. This produces fog as indicated by stippling in FIG. 5, thereby coating even the back surface of the box section 58 as shown at 60. As the tube 44 advances as indicated by the arrow 62 the sides of the box section will be coated as indicated at 64. The closed end 50 shown in FIG. 1 may be advanced until it strikes the far end of the box section and the spray continued for a short period and it will coat such end also due to the fogging of the spray. On the other hand, the orifice 48 of FIG. 5 may be provided to aid in spraying the far end of the box section.

Our automatic fogspray device makes it possible to supply one piece of equipment (pump, hose 14 and gun G) which is available for all operations. Additional use of the fogspray unit F makes it possible to produce effective air-atomizing to thereby fog grease or the like as if it were a thin liquid. The tube 44 gives the advantage of a long, small diameter probe or wand to fit into small holes in box sections, and the fogging operation gives the advantage of diffusing the spray in all directions covering all interior surfaces of the box section. If desired, the wand may be flexible to facilitate its most effective use, or may be omitted in those cases where fogspray is desirable directly from the extension 26 of the hollow body 24 as in FIG. 3.

From the foregoing description it is obvious that we have provided a combination gun in which hydraulic spraying of airless type in the normal manner is accomplished when the fogspray unit F is omitted. After readily accessible surfaces of the automobile are sprayed, then the fogspray unit F may be mounted on the gun G and the wand 44 manipulated to spray the interiors of box sections and other surfaces not readily accessible by the hydraulic spray from the spray nozzle N when connected with the coupling C1, the surfaces being coated by fogspray in a very efficient manner. Many box sections already have blind openings or drain holes, or holes can be drilled in non-critical structural areas of posts, doors and the like to permit entrance of the wand 44 into hollow sections that should be interiorly sprayed.

Some changes may be made in the construction and arrangement of the parts of our automatic fogspray device without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

We claim as our invention:

1. Automatic fogspray means comprising the combination with a high pressure hydraulic spray gun of a hollow body having therein a hydraulic spray nozzle receiving from said gun liquid to be sprayed, an elongated spray tube carried by said body in alignment with the discharge orifice of said nozzle, means for introducing air under pressure into said body to ented said spray tube with the material issuing from said nozzle, said spray tube having a substantially closed end remote from said nozzle and lateral discharge openings spaced inwardly with respect to said end to direct and distribute the material as it is discharged from said spray tube, an air valve seat in said hollow body, a valve disc, means normally biasing said valve disc seated on said valve seat, and means automatically operated by hydraulic pressure from said spray gun when the gun is operative for unseating said valve disc relative to said valve seat.

2. Automatic fogspray means in accordance with claim 1 wherein said nozzle is carried by said valve disc.

3. Automatic fogspray means in accordance with claim 2 wherein said hollow body has a bore, and a piston is provided therein for carrying said valve disc and said nozzle, said piston being subject to the hydraulic pressure entering said hollow body.

4. Automatic fogspray means in accordance with claim 1 wherein said hollow body has a quick coupling connection with said spray gun.

5. Automatic fogspray means according to claim 4 wherein said spray tube also has a quick coupling connection with said hollow body.

6. Automatic fogspray means comprising the combination with a high pressure hydraulic spray gun of a hollow body having therein a hydraulic spray nozzle receiving from said gun liquid to be sprayed, said hollow body having a first tubular portion surrounding said spray nozzle and a tubular discharge portion downstream of said first tubular portion, means for introducing air under pressure into said body to enter said first tubular portion and mix in said tubular discharge portion with liquid issuing from said hydraulic spray nozzle, an air valve seat in said hollow body, a valve disc, means normally biasing said valve disc seated on said valve seat, and means automatically operated by hydraulic pressure from said spray gun when the gun is operative for unseating said valve disc relative to said valve seat.

7. Automatic fogspray means in accordance with claim 6 wherein said nozzle is carried by said valve disc.

8. Automatic fogspray means in accordance with claim 7 wherein said hollow body has a bore, and a piston is provided therein for carrying said valve disc and said nozzle, said piston being subject to the hydraulic pressure entering said hollow body.

9. Automatic fogspray means in accordance with claim 6 wherein said hollow body has a quick coupling connection with said spray gun.

10. In automatic fogspray means for an airless spray gun, the combination with an airless spray gun of a

hollow body adapted to be connected thereto in place of a disconnectible spray nozzle normally provided for said spray gun, said hollow body having a bore, a piston slidable therein, a valve seat in said hollow body, a valve disc carried by said piston, a spring normally seating said valve disc on said valve seat, hydraulic pressure from the spray gun being effective on said piston to compress said spring and thereby unseat said valve disc from said valve seat, a compressed air connection to said hollow body between said piston and said valve seat, a hydraulic spray nozzle also carried by said piston, and a spray tube in alignment with said nozzle to receive hydraulic spray therefrom and compressed air from said air connection when said valve disc is open relative to said valve seat for fogging the hydraulic spray before it issues from said spray tube.

11. Automatic fogspray means in accordance with claim 10 wherein said spray tube has lateral discharge openings for the fogged spray.

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