Aug. 5, 1941. R. LEE 2,251,457

PAINT SPRAYER

Filed April 8, 1939 2 Sheets-Sheet 1

FIG. 3

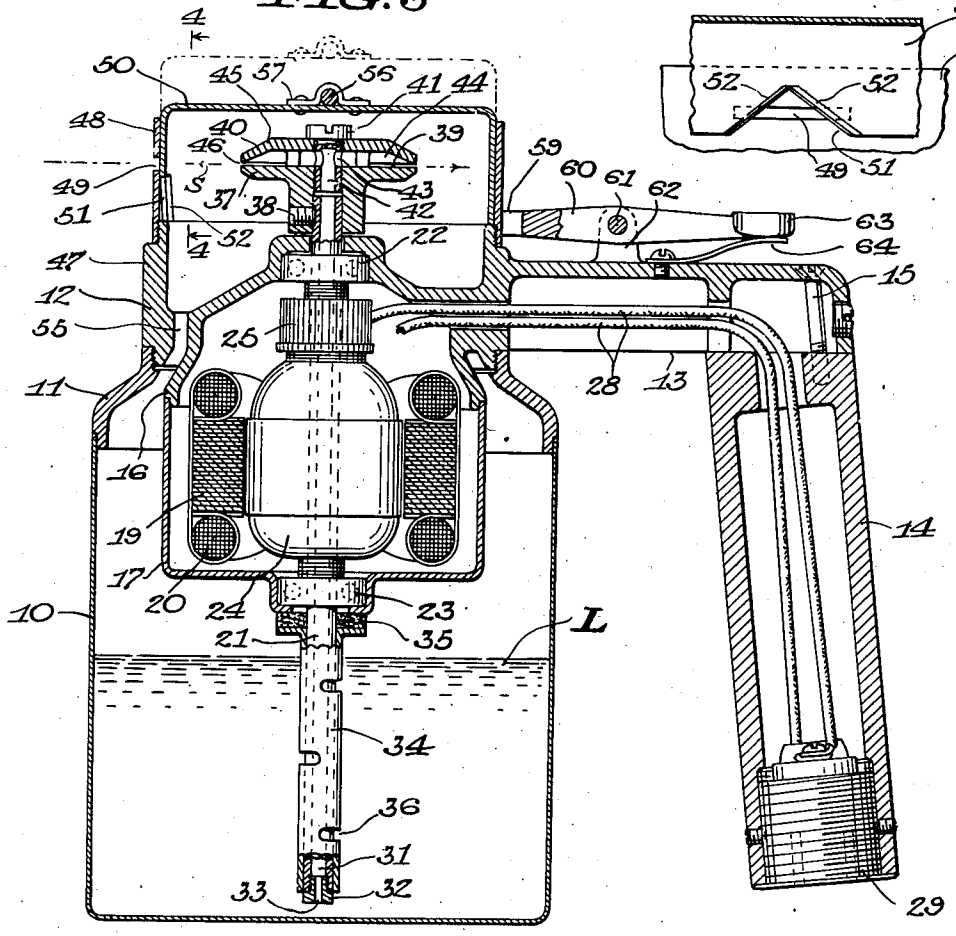


FIG. 4

FIG. 1

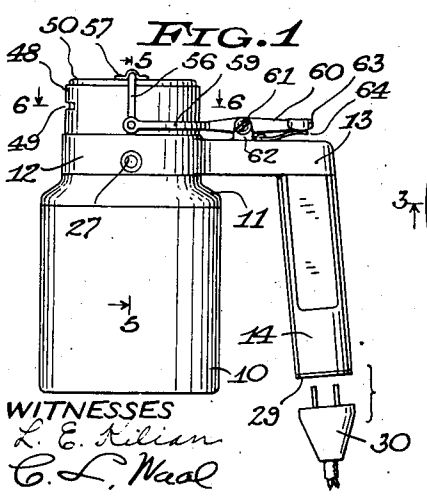
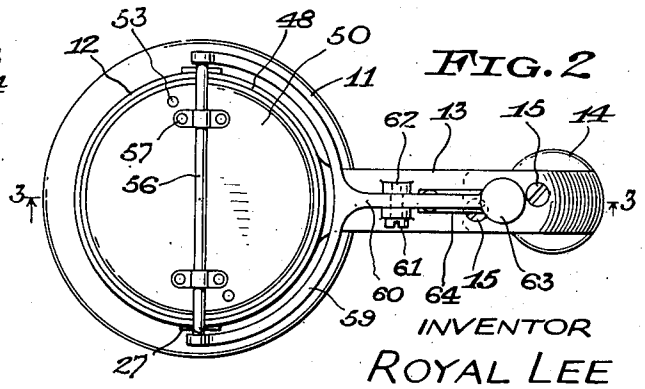


FIG. 2



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PAINT SPRAYER

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FIG. 6

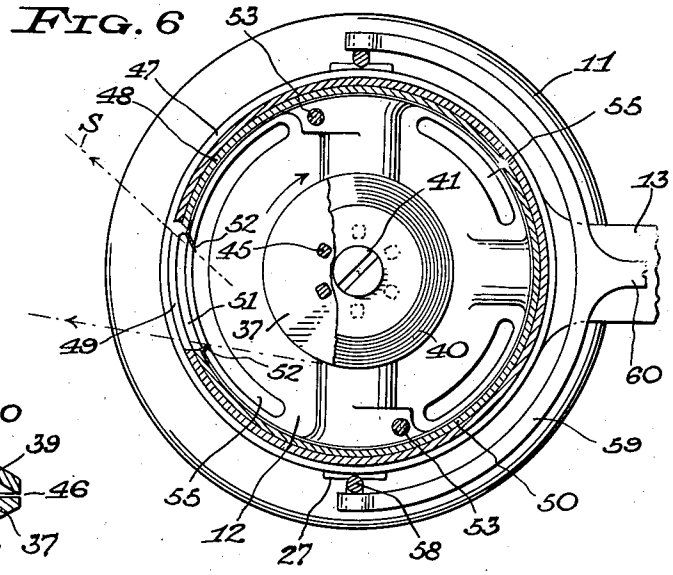


FIG. 7

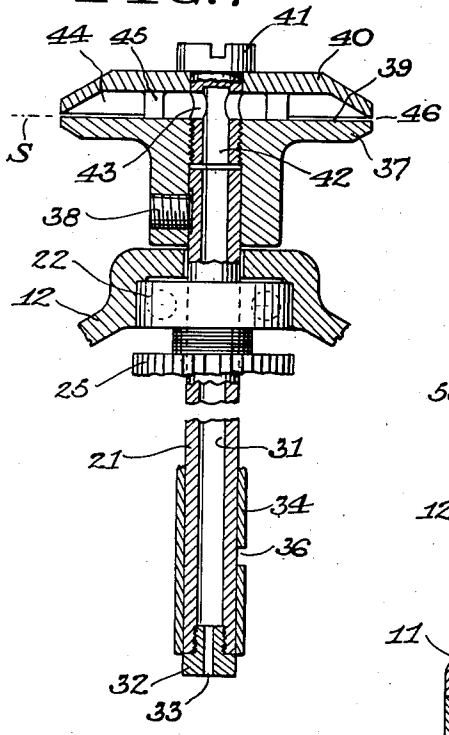
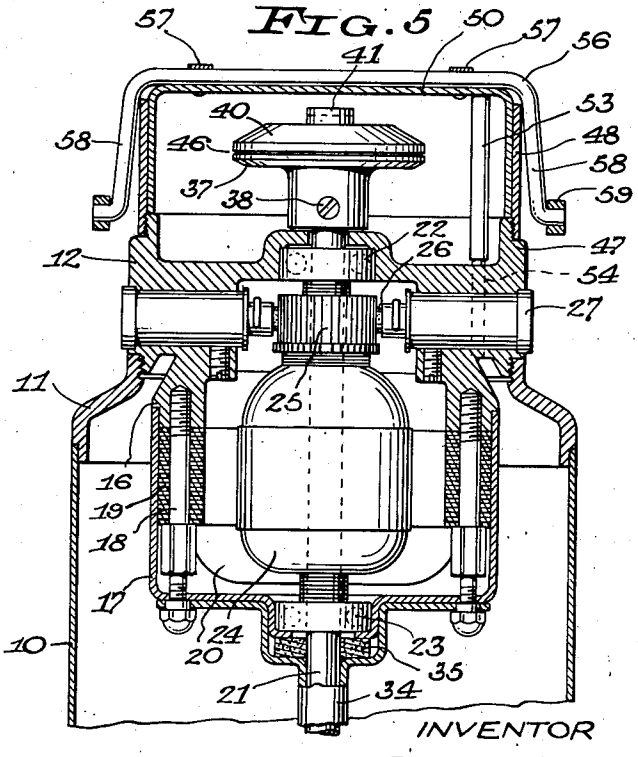


FIG. 5



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2,251,457

UNITED STATES PATENT OFFICE

2,251,457

PAINT SPRAYER

Royal Lee, Milwaukee, Wis.

Application April 8, 1939, Serial No. 266,784

8 Claims. (Cl. 299—63)

This invention relates to apparatus for spraying paint and other liquids.

In the operation of the usual types of paint sprayers, paint is atomized or diffused in the form of a mist or fog. The spraying of paint in this manner is open to objection, as some of the paint is lost by dispersion in the surrounding air and a health hazard may be created.

It is an object of the present invention to provide an improved sprayer which will minimize the loss of sprayed liquid by dispersion and which will permit economical and accurate application of the liquid to a surface to be coated or treated.

Another object is to provide simple but effective means for producing a sheet-like liquid spray.

A further object is to provide improved means for controlling the quantity of liquid in the spray.

A still further object is to provide simplified means for elevating the liquid to the spraying zone.

The invention further consists in the several features hereinafter described and claimed.

In the accompanying drawings, illustrating one specific embodiment of the invention,

Fig. 1 is a side elevation of a paint sprayer constructed in accordance with the invention, a spray-controlling aperture thereof being closed;

Fig. 2 is a top view of the sprayer;

Fig. 3 is a sectional elevation taken generally along the line 3—3 of Fig. 2, the spray-controlling aperture being closed, and a raised position of a spray-adjusting member being indicated in dotted lines;

Fig. 4 is a detail sectional elevation taken generally along the line 4—4 of Fig. 3, the spray-controlling aperture being adjusted to an intermediate size;

Fig. 5 is a sectional elevation taken generally along the line 5—5 of Fig. 1;

Fig. 6 is a sectional view taken generally along the line 6—6 of Fig. 1, the spray-controlling aperture being adjusted to its maximum size, and

Fig. 7 is a sectional elevation of a rotor of the sprayer.

In the drawings, 10 designates a cylindrical container having at its upper end a neck ring 11. Detachably screw-threaded on the upper portion of the neck ring is a frame member 12 having a hollow radial arm 13 to the outer end of which a hollow downwardly projecting handle 14 is secured, as by screws 15.

The frame member 12 has a lugged annular skirt 16 which extends centrally within the neck ring 11. A cup-shaped motor casing 17 is secured by studs 18 to the skirt 16, Fig. 5, and carries therein a laminated field member 19, the latter being secured in place by the studs and having a field winding 20. A vertical motor shaft 21 is journalled in upper and lower ball bearings 22 and 23 mounted in the frame member 12 and motor casing 17, respectively, and carries an armature 24 rotatable in the field member 19. The shaft 21 also carries a commutator 25 to which current is conducted by brushes 26 carried in brush-holders 27 mounted in the frame member 12. Motor lead-in conductors 28 extend through the hollow arm 13 and hollow handle 14 and are connected to a receptacle 29 mounted in the lower end of the handle, the receptacle being adapted for detachable connection with a cord plug 30, Fig. 1.

The motor shaft 21 extends above the frame member 12 and below the motor casing 17 and has an axial passage or bore 31 therethrough, the lower end of the shaft having a screw-threaded plug 32 with an axial inlet passage or bore 33 which is smaller in diameter than the bore 31 and which communicates with the latter bore. The lower portion of the conduit-forming motor shaft extends into the paint L or other liquid held in the container 10, as seen in Fig. 3.

As the inlet bore 33 is smaller than the bore 31 thereabove, centrifugal action on the liquid in the hollow motor shaft 21, produced by rotation of the shaft, will cause the liquid to be thrown outwardly toward the walls of the bore 31 and to rise in the shaft above the liquid level in the container. This upward flow of the liquid could also be produced by forming an upwardly divergent tapered bore in the shaft, but it is more convenient to provide a cylindrical main bore communicating with a somewhat smaller cylindrical bore at the lower end of the shaft, as above described.

The lower portion of the motor shaft 21 is encased in a stationary tubular member 34 which is suitably secured at its upper end to the motor casing 17, the upper portion of the tubular member retaining in place a felt sealing washer 35 surrounding the shaft. The purpose of the tubular member is to prevent a vortex motion of the liquid and possible downward passage of air along the shaft to the inlet bore 33. The tubular member 34 is provided with a number of slot-like openings 36 permitting the liquid to come into contact with the shaft at intervals so as to provide a sealing effect against the downward passage of air between the shaft and the tubular member.

The upper end of the motor shaft 21 carries a hubbed liquid-throwing disk 37 which is secured thereto by set-screws 38, the disk having a substantially flat top surface 39. A domed cover plate 40 is mounted above the disk to form therewith a rotatable runner and is secured to the disk by a central hollow screw 41 which has an axial bore 42 communicating with lateral bores 43 above the level of the top surface of the disk, there being a chamber 44 formed between the top plate and disk to receive liquid discharged from the bores 43. The bottom face of the top plate has a circular series of projections 45 which rest on the disk 37. These projections may be conveniently formed by cutting notches in a rib-like annular flange on the disk. The disk 37 and top plate 40 have the same diameter and their peripheries are spaced apart by the projections 45 to form a slit-like peripheral orifice 46 through which the liquid is projected in all horizontal directions in a substantially flat sheet S extending at right angles to the motor shaft axis. The peripheral orifice is preferably, but not necessarily, continuous. The cover plate 40 is not entirely essential in all cases but is preferably provided to limit the thickness of the projected liquid sheet and to more definitely confine the projected liquid to a flat sheet.

The frame member 12 has an annular upstanding rib 47 concentric with the motor shaft 21. A cylindrical collar 48 is screw-threaded or otherwise secured to the rib 47 and forms, in effect, an upward extension of the annular rib 47. The collar has a narrow slot 49 in the plane of the runner orifice 46 to permit the passage of a portion of the projected liquid sheet, the slot being at the portion of the collar remote from the handle 14. An inverted cup-shaped member 50 slidably fits in the collar 48 for vertical movement therein and has a downwardly widening V-shaped notch 51 in its lower edge, Fig. 4, to variably expose the slot 49 in the collar, and thus vary the effective width of the portion of the liquid sheet passing out through the slot. The inclined edges of the notch are preferably provided with inturned lips 52 to limit the width of the emergent sheet-like spray and to avoid dripping on the outside of the collar 48. The cup-shaped member 50 forms a casing for intercepting the spray thrown from the runner. The upper and lower edges of the slot 49 and the inclined edges of the notch 51 define an aperture of variable length through which the sheet-like spray emerges. Although the width of the slot 49 is somewhat greater than the width of the runner orifice 46, the upper and lower edges of the slot are still sufficiently close to the spray plane to intercept any stray particles which may be projected in paths too far from the spray plane.

The cylindrical collar 48 may form a guiding surface for the cup-shaped casing member 50 therein, but preferably separate guiding means are provided, such as parallel vertical pins 53, Figs. 5 and 6, rigidly secured to the top wall of the member 50 and slidable in bores 54 formed in the frame member 12. Only a part of the projected liquid sheet passes out of the sprayer, and the excess drains back to the container 10 through arcuate slots 55 formed in the peripheral portion of the frame member 12.

A wire bail 56 has its top portion pivotally secured to the top wall of the movable aperture-controlling casing member 50 by clips 57 and has downwardly projecting arms 58 which are pivotally secured to the ends of a fork 59 formed on a thumb lever 60. The lever extends above and along the arm 13 of the frame member 12 and is pivotally mounted by a screw 61 on lugs 62 upstanding from the arm. The outer end of the lever has a thumb rest 63, and the lever is urged to aperture-closing position by a leaf spring 64. The bail 56 or fork 59, or both, are resilient so as to permit springing of these parts to connect and disconnect the bail. When the bail is released from the lever the casing member 50 may be removed from the sprayer.

When the sprayer is to be used, the paint L or other liquid is introduced into the container after screwing off the frame member 12 from the neck ring 11, or, alternatively, after removing the casing member 50. The sprayer is then reassembled and the motor is started in operation. The rotation of the hollow motor shaft 21 causes the liquid to rise in the shaft by centrifugal force, as hereinbefore explained. The liquid rises in the shaft to the chamber 44 formed above the spray disk 37 whereupon the liquid is urged by centrifugal force along the top face 39 of the disk to the periphery of the disk and is thrown from the disk in a substantially flat sheet normal to the motor shaft axis, each individual particle being projected in a substantially tangential direction with respect to the disk, as indicated in Fig. 6. The projected liquid sheet is intercepted by the surrounding barrier formed by the collar 48 and casing 50 and drains back into the container through the slots 55. When it is desired to apply a spray to a surface to be coated or treated, the casing member 50 is raised by the thumb lever 60 to expose the slot 49, whereupon some of the liquid sheet passes out of the casing, as indicated by dotted lines in Fig. 6, the spray being in the form of a flat fan-like sheet. The width of the emergent spray is controlled by moving the casing member 50 axially within the collar 48 to different elevations, the notch 51 in the casing member variably exposing the slot 49 in the collar 48. When the casing member 50 is raised, the spray aperture is extended about equally at both ends, the vertical median line of the adjusted aperture remaining in a substantially fixed position with respect to the sprayer frame 12 and its handle 14, so as to facilitate the handling and guiding of the sprayer by the operator.

As the emergent spray is more or less confined to a sheet, the dispersion or diffusion of paint or other liquid into the surrounding air is minimized, thus avoiding waste of paint and preventing contamination of the air. The character of the spray also permits relatively accurate application of the spray to the surface to be coated. The spray is above the driving motor and near the upper end of the sprayer, thus affording good visibility for the operator whose line of sight usually extends over the casing member 50.

While the invention is here shown to be embodied in a paint sprayer, the features of the invention are also applicable to the spraying of other liquids.

What I claim as new and desire to secure by Letters Patent is:

1. In a sprayer of the type adapted to be manually carried and guided, the combination of a frame having a handle, a rotatable liquid-impelling member for centrifugally throwing liquid thereabout in a sheet-like spray, means carried by said frame for driving said rotatable member and comprising a motor below said member, a

barrier around said rotatable member for intercepting said sheet-like spray and having an aperture of variable size permitting the passage therethrough of a variable portion of said spray, and means for varying the effective size of said aperture comprising operating linkage having a shiftable finger-actuated member adjacent to said handle.

2. In a sprayer, the combination of a frame having a handle, means carried by said frame for projecting a substantially flat liquid spray sheet, a barrier for intercepting said sheet and having an aperture permitting the passage therethrough of a portion of said sheet, and means for varying the effective size of said aperture and for closing said aperture, the median line of said aperture transverse to the spray plane being substantially fixed with respect to said handle in all adjustments of said aperture.

3. In a sprayer, the combination of rotatable means for projecting a substantially flat liquid spray sheet, and a barrier surrounding said rotatable means for intercepting said sheet and comprising a pair of relatively movable members forming an aperture to admit therethrough a portion of said sheet, one of said members being axially movable for variably closing said aperture.

4. In a sprayer, the combination of rotatable means for projecting a substantially flat liquid sheet, and a pair of inner and outer annular wall members surrounding said rotatable means for intercepting said sheet, one of said wall members having an opening to permit the passage therethrough of a portion of said sheet, and the other wall member being axially movable and having a portion to variably expose said opening.

5. In a sprayer, the combination of rotatable means for projecting a substantially flat liquid sheet, a wall member surrounding said rotatable means and having an opening to permit the passage therethrough of a portion of said sheet, and a controlling member shiftably fitting in said wall member and having a portion axially movable to variably expose said opening, said last-named portion having cutting-off edges for the sheet to confine drip to the interior of the controlling member.

6. In a sprayer, the combination of a conduit-forming rotor having a longitudinal liquid-conducting passage therein and adapted to extend into a liquid, and a guard tube surrounding said rotor and having its lower portion submersible in said liquid to prevent swirling of said liquid.

7. In a sprayer, the combination of a conduit-forming rotor adapted to extend into a liquid, and a guard tube surrounding said rotor and having its lower portion submersible in said liquid to prevent swirling of said liquid, said tube having a lateral opening in its submersible portion to permit sealing contact of the liquid with said rotor.

8. In a sprayer, the combination of a conduit-forming rotor adapted to extend into a liquid, and a guard tube surrounding said rotor and having its lower portion submersible in said liquid to prevent swirling of said liquid, said tube having a plurality of longitudinally spaced lateral openings in its submersible portion to permit sealing contact of the liquid with said rotor.

ROYAL LEE.

CERTIFICATE OF CORRECTION.

Patent No. 2,251,457. August 5, 1941.

ROYAL LEE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 10, claim 5, after "having" insert the word --inturned--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of September, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.