June 15, 1943. E. W. SIMPSON 2,322,165

SPRAY GUN

Filed Feb. 17, 1940

Fig. 1.

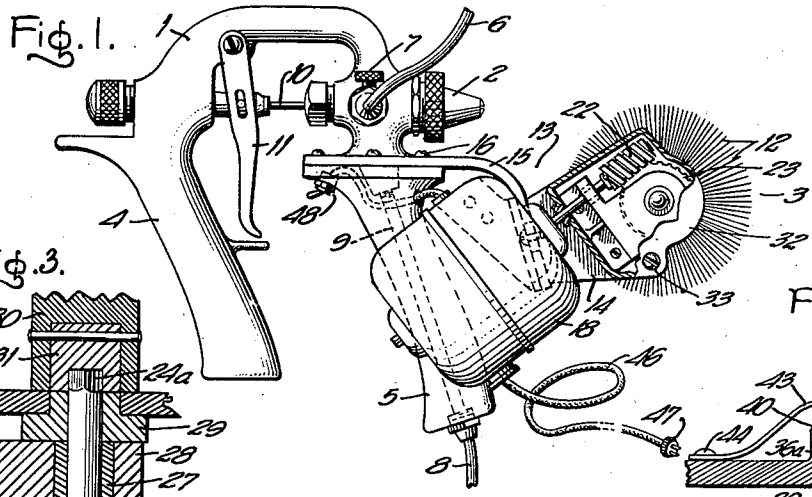


Fig. 3.

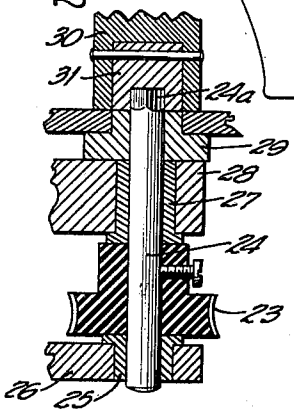


Fig. 4.

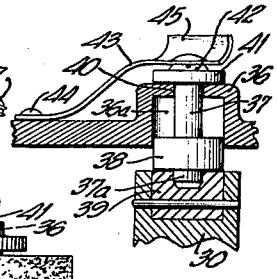


Fig. 2.

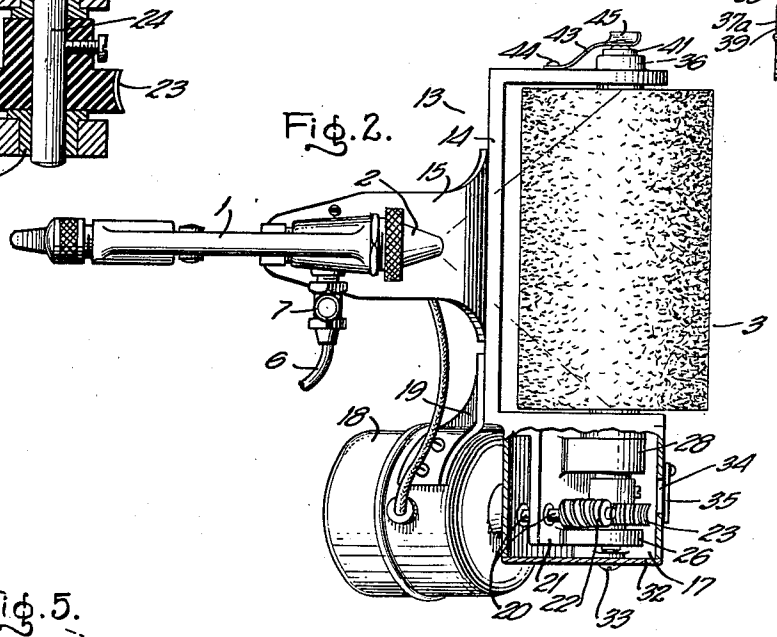
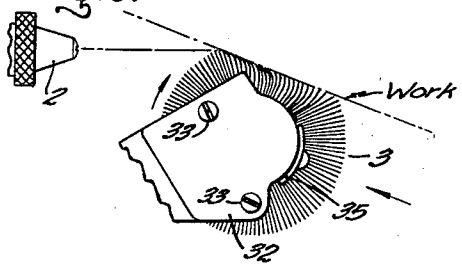


Fig. 5.



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2,322,165

SPRAY GUN

Earl W. Simpson, Walton, N. Y.

Application February 17, 1940, Serial No. 319,485

6 Claims. (Cl. 91—25)

My invention particularly relates to a device comprising a nozzle or other suitable means for discharging a fluid such, for example, as a paint or lacquer, preferably in spray form, and a brush element arranged and adapted to be disposed substantially in the path of the fluid or spray discharged from said nozzle.

It is well known that liquid-spraying devices, commonly termed spray guns, are employed for painting and finishing purposes. These spray guns atomize liquids such as paints, lacquers and the like, and discharge the atomized liquid in the form of a fine spray which when directed upon the work serves to deposit the paint or other solutions thereupon in small particles. The great disadvantage in using spray guns, however, lies in the fact that the spray is not wholly confined to the surface being treated but, in part, travels in practically all directions.

It is the primary object, therefore, of my invention, to provide a spray gun which is arranged so that substantially all of the atomized liquid or the spray discharged therefrom is confined to the surface upon which it is directed. More particularly, the primary object of my invention, resides in the provision of a spray gun comprising a nozzle or other suitable means for discharging a fluid preferably in spray form and a brush or brush-like element adapted to be disposed substantially in the path of said spray. A further object resides in providing a device of the foregoing character wherein the brush element is rotatably mounted and disposed substantially in the path of the spray discharged from the nozzle. A still further object resides in providing a rotatably mounted brush having radially extending bristles and of a cylindrical shape whereby the bristles thereof may be substantially continuously in contact with the work toward which the spray is directed as the brush is rotated; and another object resides in providing, in a device of the above character, a rotatably mounted brush and means for rotating said brush.

With these and other objects in view, my invention includes the novel elements and the combination and arrangements thereof described below and illustrated in the accompanying drawing, in which—

Fig. 1 is a side elevation view of the embodiment of my invention illustrated and described herein;

Fig. 2 is a plan view thereof;

Fig. 3 is a fragmentary, sectional view of a portion of the driving mechanism and support for one end of the rotatable brush element;

Fig. 4 is a fragmentary, sectional view of the support for the other end of the brush element; and

Fig. 5 diagrammatically illustrates the manner in which my invention may operate relative to the work upon which it is used.

It will be understood that I have merely illustrated an exemplary form of my invention and that variations and changes may be made therein within the scope of the present invention.

Referring first to Figs. 1 and 2, 1 indicates generally a supporting structure for the nozzle 2 and to which a brush, indicated generally at 3, is connected. The structure preferably comprises a pair of handles 4 and 5, respectively, by means of which the operator may support the device in proper operating position relative to the work. The nozzle 2 may be of any suitable construction and the orifice thereof is preferably so arranged as to discharge a generally flabelliform spray of atomized liquid. An atomizing medium, such as air, is supplied through the tube 6 to the nozzle 2 and a control valve 7 may be provided in the line between the supply tube 6 and nozzle 2.

The liquid to be atomized, such as a paint, lacquer or the like, is supplied through the tube 8 which communicates with a duct 9 extending through the handle 5 and which in turn communicates with a passage through which the liquid is supplied to the nozzle. The discharge of an atomized liquid from the nozzle 2 is controlled through a suitable valve to which an operating rod 10 is connected and a control lever 11 serves, in the usual manner to operate the rod and valve.

In accordance with my invention, a brush or brush-like element is connected to the supporting structure and is adapted to be disposed substantially in the path of the spray or atomized liquid discharged from the nozzle 2. Preferably, the brush is adapted to be so disposed that the center line of the spray will lie close to the ends of the bristles or will intersect the brush substantially adjacent the ends of the bristles when the bristles are not pressed against the work being treated. Furthermore, the brush and nozzle are preferably so arranged that the longitudinal axis of the brush extends crosswise of the flabelliform spray, and, the brush is preferably of such length and so spaced from the nozzle that the width of the spray in the zone of the brush does not substantially exceed the length of said brush as indicated by the broken lines representing the general spread of the spray in Fig. 2.

In the embodiment illustrated, the brush 3 is generally cylindrical in form and comprises the

radially extending bristles 12 which are adapted, as the brush is rotated, successively to engage the work upon which the spray is directed. The mounting for the brush, indicated generally at 13, comprises a yoke 14 upon which the brush and driving means therefore are mounted and a laterally extending arm 15 which is secured to the supporting structure 1 by means of screws 16 as illustrated. One end of the yoke 14 is provided with an open-ended compartment 17 within which are disposed the worm and worm wheel which serve to connect the brush with the driving means therefor such as the electric motor illustrated.

An electric motor 18 is suitably secured to the yoke by means of the strap 19 and the shaft 20 of said motor extends through a bushing in a wall of the compartment 17 and through a bearing in a bearing plate 21 suitably mounted within the compartment 17. Upon the end of the motor shaft 20 is mounted a worm 22 which is arranged to mesh with a worm wheel 23 secured to a stub shaft 24 (see also Fig. 3).

One end of shaft 24 is journalled in a bearing 25 mounted in lug 26 which may be integral with the bearing plate 21 and the shaft is also journalled in a second bearing 27 mounted in a second lug 28 which, likewise, may be integral with the bearing plate 21. A flanged bushing 29 is preferably disposed about the shaft 24 and between the bearing 27 and the inner end of the compartment 17 to close the opening in the rear wall of said compartment. With this construction, as clearly shown in Fig. 3, the worm wheel 23 is retained in proper position to mesh with the worm 22 while the shaft 24 and the associated parts may be readily disassembled.

The end 24*a* of the shaft 24 which passes through the inner end of the compartment 17 is preferably square in cross section and is adapted to enter a complementary recess in the end of the hub 30 of the brush 3. If desired, an insert 31 may be pinned within a recess in the end of the hub 30, as illustrated, and arranged to receive the squared end of the shaft 24.

After the parts are mounted within the compartment 17, a suitable lubricant may be supplied thereto and the open end of the compartment then closed by means of a plate 32 which may be secured in position by screws 33 which are threaded into lugs provided on the interior walls of the compartment.

An opening 34 is provided in the side of compartment 17 through which a screw driver may be inserted to engage the set screw on the hub of the worm wheel 23 and a resilient disc 35 pivotally secured to the exterior of said compartment serves as a closure member for said opening. This opening may also be used for supplying lubricant to the brush-driving mechanism within the compartment.

The opposite end of yoke 14 is provided with a boss 36 in which a shaft 37, substantially aligned with shaft 24 and adapted to support the other end of brush 3, is slidably disposed. In the embodiment illustrated and as shown in detail in Fig. 4, the boss is provided with a cylindrical recess 36*a* in which a cylindrical shoulder 38 on the shaft 37 is adapted to slide while the end 37*a* of shaft 37 is adapted to enter a cylindrical recess in the end of the hub of brush 3. Like the opposite end thereof, the hub 30 of brush 3 may have pinned therein an insert 39 provided with a cylindrical opening in which the end of shaft 37 may enter to function as a trunnion upon which the brush may rotate. Shaft 37 extends through an opening 40 in the boss 36 and has secured thereto a head 41 by means of a screw 42. The recess 36*a* is of sufficient depth to permit axial movement of shaft 37*a* a distance at least equal to the length of the end 37*a* of said shaft and the length of the squared end 24*a* of shaft 24. Furthermore, when shaft 37 occupies the position illustrated in Fig. 4, shoulder 38 thereof is moved outwardly from the recess in boss 36 sufficiently to maintain the squared end of shaft 24 and the end 37*a* of shaft 37 within the recesses in the ends of the hub 30 of the brush. Hence, when shaft 37 is retracted within recess 36*a*, it may be moved a sufficient distance to withdraw the end thereof from the recess in hub 30 and, at the same time, permit the brush to be disengaged from the end of the drive shaft 24. With this construction, the brush may be readily removed from the yoke and, likewise, readily mounted therein for rotation and operatively connected with the drive shaft.

To hold shaft 37 in hub-engaging position, I prefer to employ a resilient element 43 which is pivotally fastened at one end thereof to the yoke 14 as by means of a rivet or screw 44, as illustrated, and the other end thereof may be provided in its lower surface with a concavity adapted to engage the screw 42 on the end of shaft 37. Element 43 may also be provided with an upstanding lip 45 which facilitates operation thereof into and out of engagement with the end of shaft 37. Obviously when it is desired to remove brush 3 from the yoke, the element 43 is moved out of engagement with the end of shaft 37 and the shaft may then be retracted within the boss thereby permitting the removal of the brush. Of course, element 43, when snapped over the end of shaft 37, retains the end 37*a* of the shaft in one end of the brush hub and the other end of said hub on the end of drive shaft 24.

In the embodiment illustrated, the motor is provided with a suitable lead or cable 46 housing electrical conductors which are connected to the motor and to the prongs of an electrical plug 47 provided at one end of the lead. I also prefer to mount an electrical switch, indicated at 48, upon the supporting structure 1 for controlling the operation of motor 18. The switch 48, of course, is connected in the circuit to the motor and is preferably so mounted, as illustrated, that it may be operated by the thumb of the hand grasping the handle 5.

It will be understood that I prefer to rotate the brush comparatively slowly, that is, at a speed at which the paint or other liquid will not be cast therefrom due to centrifugal force, for example, at a rate of approximately 60 R. P. M., and I prefer to rotate the brush in the direction of the arrow shown in Fig. 5. Furthermore, I prefer to so relatively arrange the nozzle 2 and brush 3 that the spray will strike the surface being treated fairly close to the bristles or, in fact, so close that some of the spray will impinge upon the ends of the bristles adjacent the surface. Therefore, by relatively arranging the nozzle and brush in this way, when the device is applied to the work in the manner intended with the brush pressed against the surface being treated as shown in Fig. 5, the bristles will be overbent, as shown, in close proximity to, or, substantially in the zone where the center line or central portions of the spray strike the surface of the work.

It will be observed that by applying the brush and spray to the surface being treated in the foregoing manner the brush will not scatter the spray nor cast off the liquid which has accumulated thereon but, on the other hand, will prevent any substantial loss thereof and confine the sprayed liquid practically wholly to the work being treated. Furthermore, I prefer to move my spraying gun along the work with the spray preceding the brush, as indicated by the arrow in Fig. 5, and since the brush is rotated slowly during the spraying operation, the liquid coming in contact therewith will be applied to the surface of the work.

While I have described my invention in its preferred embodiment, it is to be understood that the words which I have used are words of description rather than of limitation. Hence, changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrough provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, and a brush rotatably supported in spaced relation to and in front of said nozzle, said brush comprising bristles arranged crosswise of and substantially at right angles to the fluid sprayed from said nozzle and with the free ends of said bristles extending in the path of said fluid sprayed from said nozzle.

2. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrogh provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, a brush, and means for rotatably supporting said brush to rotate substantially in the path of fluid sprayed from said nozzle, the axis of rotation of said brush lying at an appreciable angle to the axis of said nozzle and the fluid sprayed therefrom.

3. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrough provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, a brush, and means for rotatably supporting said brush to rotate substantially in the path of fluid sprayed from said nozzle, the axis of rotation of said brush lying at an appreciable angle to the axis of said nozzle and the fluid sprayed therefrom, and means for rotating said brush.

4. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrough provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, a brush generally cylindrical in form and means for rotatably supporting said brush to rotate on its axis and with the free ends of the bristles thereof passing, when said brush is rotated, substantially in the path of fluid sprayed from said nozzle, the axis of said brush lying at an appreciable angle to the axis of said nozzle and the fluid sprayed therefrom.

5. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrough provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, a brush generally cylindrical in form and means for rotatably supporting said brush to rotate on its axis and in spaced relation to said nozzle, the axis of said brush lying at an appreciable angle to the axis of said nozzle and being so supported that the free ends of the bristles thereof, as said brush is rotated, will pass within the spray of fluid issuing from said nozzle, and electrical means for rotating said brush.

6. In a spray gun of the character described, a nozzle comprising means forming a passage for the flow of a fluid therethrough provided with an orifice through which said fluid may be discharged, means for supplying a liquid to said nozzle, a brush, and means for rotatably supporting said brush to rotate substantially in the path of fluid sprayed from said nozzle, the axis of rotation of said brush lying at an appreciable angle to the axis of said nozzle and the fluid sprayed therefrom and said brush having a length substantially at least equal to the width of the fluid spray in the zone thereof in which it rotates whereby the spray throughout substantially its entire width may in part impinge on the brush bristles.

EARL W. SIMPSON.