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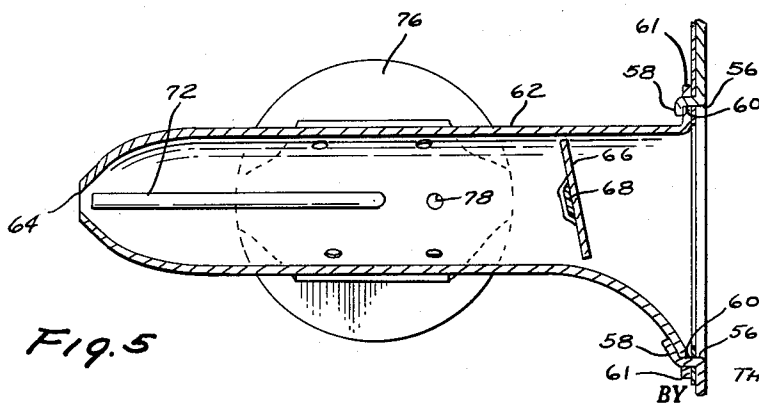
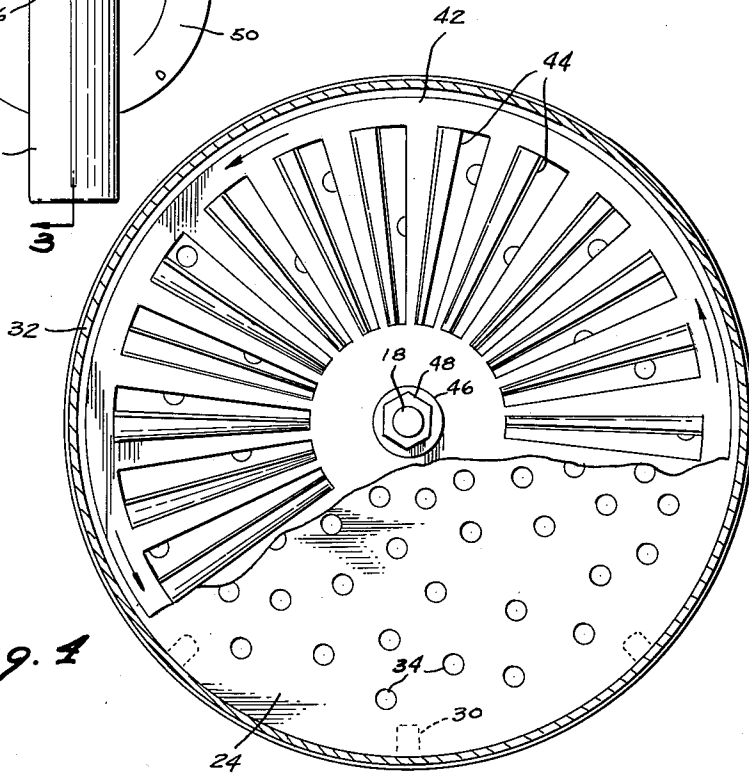
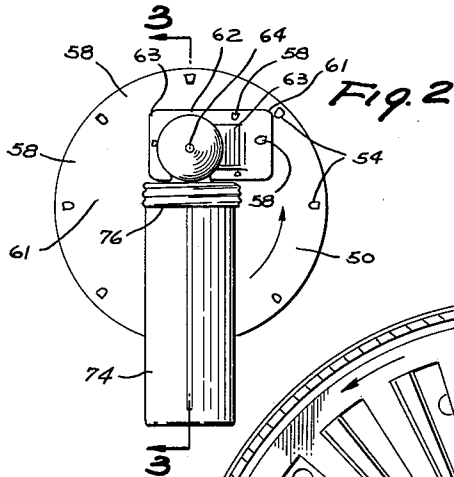
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SPRAY GUN ATTACHMENT FOR PORTABLE ELECTRIC DRILLS

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2 Sheets-Sheet 2



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## SPRAY GUN ATTACHMENT FOR PORTABLE ELECTRIC DRILLS

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2 Claims. (Cl. 299-89)

This invention relates to spray guns or related spraying devices, and more particularly has reference to a device of this nature that is especially adapted for connection to a conventional portable electrical drill, in such a manner as to cause rotation of the drill shaft to be effective for bringing about a high velocity spray of finely divided liquid droplets from the spray gun device.

The main object of the present invention is to provide a generally improved spray gun device, specifically intended as an attachment for a conventional portable electric drill, the spray gun device constituting the present invention being so designed as to permit the same to be connected to the drill chuck speedily and with a minimum of effort, the connection of the device to the drill in this manner causing the device to be linked to the drill operatively, whereby to produce a highly effective spray when the switch of the drill is thrown.

Another object of importance is to provide a device of the type stated which will be so designed as to include a rotary blower that is rotated at high speed by the shaft of the drill, said blower being specifically designed to cause air to be discharged at high velocity past the outlet end of a liquid supply tube leading from an atomizer assembly incorporated in the invention, the air rushing past the outlet end of said tube being adapted to cause liquid to be drawn upwardly through the tube and discharged as a fine spray.

Another object is to provide a spray gun attachment of the character stated which will be light and readily portable, thus to permit its use in locations in which the positioning of a spraying device might otherwise be a difficult matter.

Still another object is to provide a spray gun attachment for portable electric drills which will be so designed as to permit the device to be held in one hand while the drill is held in the other hand, in such a manner as to allow the nozzle of the device to be accurately aimed when the device is in use.

Yet another object is to provide a spray gun attachment for portable electric drills which will include a manually operable valve so located relative to a hand grasping the spray gun as to allow the valve to be easily adjusted to selected positions for controlling the amount of air flowing through the nozzle portion of the apparatus, the valve handle being so disposed as to permit rotation of the same without affecting adversely the aim of the user during operation of the device.

Still another object is to provide, in a device of the nature referred to, means for constructing the device at a minimum of cost, the device being so designed as to permit a substantial number of the components thereof to be easily stamped or cut from inexpensive sheet metal material.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawings, in which like reference characters designate like parts throughout the several views, and wherein:

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Figure 1 is a side elevational view of a spray gun device formed in accordance with the present invention, as it appears when connected to a conventional portable electric drill;

5 Figure 2 is an end elevational view of the device as it appears when seen from the left of Figure 1;

Figure 3 is an enlarged longitudinal sectional view taken substantially on line 3-3 of Figure 2;

10 Figure 4 is a transverse sectional view taken substantially on line 4-4 of Figure 3, showing the blower assembly; and

Figure 5 is a longitudinal sectional view through the nozzle portion of the apparatus, taken substantially on line 5-5 of Figure 3.

15 The reference numeral 10 has been applied generally in the drawings to designate a conventional, portable electric drill. The drill 10, as is usual, is provided with a chuck 12, and in accordance with the present invention, a short stub shaft 14 is adapted at one end for engagement in said chuck. As a result, when the trigger or switch of the drill is depressed to cause the drill to go into operation, the stub shaft 14 will be rotated at high speed.

20 That portion of the stub shaft projecting out of the chuck 12 has a circumferential stop collar 16, said collar providing an abutment for a blower housing to be described hereinafter. The collar 16 is located intermediate the opposite ends of the stub shaft 14, as best shown in Figure 3, and on the outer or forwardly projecting end of the stub shaft threads 18 are provided.

30 Fitted upon the stub shaft, and engaged against the abutment or collar 16, is a bushing 20. The bushing 20 has an axial, smooth walled bore receiving a correspondingly smooth surfaced portion of the stub shaft, thus to allow the stub shaft to rotate freely within the bushing, the bushing thus constituting a bearing for the stub shaft. The bushing 20, at one end, has an enlarged part which is non-circularly formed, thus to permit the bushing to be grasped by a wrench or similar tool. At its other end, the bushing 20 is reduced and threaded as 40 into a center opening formed in a flat, circular back plate 24 of a blower housing. A nut 26 is threaded upon the reduced part 22, against the inner surface of the back plate 24, thus to fixedly secure said back plate in place upon the bushing.

45 In the marginal area of the back plate 24, and spaced equal distances apart throughout the circumference of said back plate, are provided slots 28, receiving bendable tabs 30 integrally formed upon one edge of a ring member 32, said ring member 32 being comparatively narrow in width as best shown in Figure 3 and defining the side wall of a flat, circular blower housing. The ring member 32, as shown in Figure 3, is secured fixedly 50 to the back plate 24 through the medium of the slot and tab interengagement, the tabs being bent inwardly after being extended through the slots.

55 Formed in the back plate 24, over the full area of said back plate, are air inlet ports 34. The ports 34, as shown in Figure 4, are disposed in an irregular array over the area of the back plate, but quite possibly, a completely regular port arrangement could be employed in a commercial embodiment of the invention, without departing from the spirit of the invention as hereinafter claimed. The provision of the ports 34 imparts to the back plate 24 a foraminous characteristic, this characteristic being desirable so as to assure the free inflow of air into the blower housing during operation of the device.

60 After application of the nut 26 to the reduced part 22 of bushing 20, a washer 36 is positioned upon the stub shaft 14, said washer abutting against the adjacent end

of the reduced part 22 as best shown in Figure 3. Thereafter, a nut 38 is threaded on the stub shaft, abutting against the washer 36, a washer 40 then being applied to the shaft 14 and being engaged against the nut 38.

After the washer 40 has been positioned upon the stub shaft 14, a blower 42 is mounted upon the threaded end portion of the stub shaft to rotate therewith in the direction of the arrows shown in Figures 2 and 4, the blower having a center opening in which the stub shaft is loosely received. The blower 42 can be formed from a single piece of sheet metal or the like, said piece of sheet metal being of circular formation when in blank and being so cut as to permit a circumferential series of equidistantly spaced, radially extending blades 44 to be struck therefrom. The blades 44, when struck out of the plane of the circular blank, define openings through which air will be drawn after said air has been drawn inwardly through the foraminous back plate. The pitch of blades 44 is such as to cause a substantial quantity of air to be drawn inwardly through the foraminous back plate and through the opening defined by striking the blower blades, it being understood in this regard that the blower would be rotated at high speed, during operation of the electric drill. The blower 42, in this connection, is secured to the stub shaft for rotation therewith, and to this end, a washer 46 is positioned against the center portion of the blower, said washer 46 being circumposed about the stub shaft, a lock nut 48 then being threaded upon the stub shaft against the washer 46.

It will be seen that the arrangement is such as to cause the blower housing to remain stationary if held by a user during operation of the spray gun attachment. Although the blower housing is held stationary, the stub shaft 14 will rotate at high speed therein, the blower 42 rotating at a corresponding speed since it is secured fixedly to the shaft 14.

The blower housing includes not only the back wall 24 and side walls 32, but also a flat front wall 50 that is disposed in a plane parallel to the back wall 24. The front wall 50 is formed, in its marginal area, with equidistantly spaced slots 52 receiving tab elements 54 formed upon the adjacent edge of the side wall 32 of the blower housing. After the tabs 54 have been extended through the slots 52, they are bent inwardly to secure the front wall 50 fixedly to said side wall 32.

By reason of this arrangement, a flat, hollow, circular blower housing is provided, which blower housing can be held against rotation in a manner to be presently made apparent.

The front wall 50 of the blower housing is not foraminous in the manner of the back wall. Rather, the front wall has a single outlet opening 56 for air discharged from interiorly of the blower housing. The single outlet opening 56 is of substantial size, and is preferably rectangular. Opening 56, it may be noted, is bounded by equidistantly spaced tab elements 58 integrally formed upon the edge of the opening 56, said tab elements 58 being extendable inwardly through slots 60 formed in the rectangular inner end portion 61 of an elongated, cylindrical nozzle 62. The tab elements 58, after being extended through the slots 60, are bent inwardly to secure the nozzle 62 fixedly to the blower housing. The nozzle 62, it may be noted, projects forwardly from the housing, and accordingly, provides a handle that can be grasped for the purpose of holding the blower housing against rotatable movement during operation of the device.

It is important to note that at its inner end, the nozzle 62 is of substantial cross sectional area. The cross sectional area of the nozzle is rapidly and progressively reduced, however, at said inner end portion through the provision of an inclined side wall 63 provided upon the inner end portion. After the interior cross sectional area of the nozzle has been reduced to a desired extent, it remains constant to the outer or discharge end of the nozzle. At said outer or discharge end of the nozzle, the

nozzle is tapered as best shown in Figure 5, and is formed with a centrally located, small, discharge aperture 64 through which air will be discharged at high velocity during rotation of the blower 42.

It will be appreciated that when the blower 42 is rotated at high speed, it will draw air inwardly through the foraminous back wall of the blower housing, and will cause all of said air to be forced out of the blower housing into the nozzle 62. Thereafter, the nozzle 62 will discharge the air through the small aperture 64, and since all the air brought into the blower housing will be discharged through said nozzle aperture 64, it will obviously be discharged at substantial velocity.

It is desirable that the amount of air fed through the nozzle 62 be controlled by the user, and accordingly, a butterfly valve 66 is mounted within the nozzle 62, in the constant diameter part thereof, said butterfly valve 66 being mounted upon a valve rod 68 having a flattened mid-length part secured to the valve body. The valve rod has its opposite ends journaled in openings formed in the nozzle wall, one end of the valve rod being extended downwardly a substantial distance below the nozzle and being angularly bent to provide a handle which can be grasped by a user during operation of the valve. It may be noted, in this regard, that ordinarily it would not be required that the user grasp the handle of the valve tightly, and with little difficulty, the user can adjust the valve to selected positions merely by exerting pressure against the angularly bent portion of the valve rod with the thumb of one hand.

An atomizer means is carried by the nozzle 62, and includes a liquid supply tube 70 of inverted L-shape having a horizontal extension 72 the outlet end of which terminates fairly short of the aperture 64. At its inlet end, the tube 70 is located well below the normal level of a quantity of liquid L contained in the receptacle 74 detachably connected to the nozzle by means of a cap or lid 76 riveted or otherwise attached to the nozzle wall. The receptacle 74 is preferably of transparent material such as glass, thus to allow the level of the liquid to be readily observed.

It is of course necessary that atmospheric pressure be maintained upon the liquid L within the receptacle 74, and accordingly, the receptacle is vented as at 78 to the interior of the nozzle.

In use of the device, one would grasp the receptacle 74 and its associated nozzle 62 with one hand, as for example the left hand, said user disposing the thumb of said one hand in position to actuate the valve 66. The other hand would be used to hold the drill 10, and it will be seen that when one holds the drill and the spray gun in this manner, the spray gun can be effectively and accurately aimed. On depression of the trigger of the drill, the blower 42 will be caused to rotate at the same speed as the drill shaft, and air will thus be discharged at high velocity through the aperture 64 of the nozzle. Said air will set up a partial vacuum in the region of the outlet end of the tube 70, causing liquid to be drawn upwardly within the tube and fed into the path of the air forced out of the aperture 64. The liquid will thus be broken up into a finely divided spray, for coating a surface with paint, insecticide, etc.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A spray gun attachment for a portable electric drill

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comprising: a rotary shaft adapted at one end for engagement in the chuck of a portable electric drill; a flat housing lying in a plane normal to the axis of rotation of the shaft and having a rear wall formed with a center opening in which the shaft rotates; a blower made fast to the other end of the shaft within the housing and rotating in the plane of the housing, said rear wall being of foraminous characteristics defining air inlet openings occurring over substantially the entire area of the blower at one side thereof; a discharge nozzle attached at one end to the front wall of the housing in the marginal region of the blower area, at the other side of the blower, and extending forwardly from the housing in communication with the interior thereof and in perpendicularly to the plane of blower rotation, the nozzle having an outlet aperture at the other end; the atomizer means connected to and extending within the nozzle and arranged to feed a jet of liquid into the path of air flowing through the aperture, thereby to cause said air to be broken up into finely divided droplets, for discharge as a spray from the nozzle.

2. A spray gun attachment for a portable electric drill, comprising: a rotary stub shaft adapted at one end for engagement in the chuck of a portable electric drill, and threaded at its other end; a circumferential stop collar formed upon the shaft intermediate the opposite ends thereof; a flat housing lying in a plane normal to the axis of rotation of the shaft and having a rear wall formed with a center opening, the threaded end of the stub shaft extending through said opening into the housing; a bushing having an axial bore in which the shaft is journaled, said bushing being formed at one end with an enlarged part bearing against said stop collar to prevent movement of the bushing in one direction axially of the shaft, the bushing being reduced at its other end with the reduced end engaging in the center opening of the

rear wall of the housing, said rear wall bearing against the enlarged part of the bushing to prevent movement of the housing axially of the shaft in one direction, the reduced end of the bushing being threaded within the housing; a nut threaded upon the reduced end of the bushing against the rear wall of the housing, thereby to engage the rear wall of the housing between the nut and the enlarged part of the bushing, thus to fixedly connect the housing to the bushing; a blower mounted upon said other end of the shaft within the housing; nuts threaded upon said other end of the shaft at opposite side of the blower, to hold the blower fast to the shaft, said last-named nuts bearing against the bushing to cooperate with the stop collar in preventing movement of the bushing in opposite directions axially of the stub shaft, said rear wall being of foraminous characteristics defining air inlet openings occurring over substantially the entire area of the blower at one side thereof; a discharge nozzle attached at one end to the front wall of the housing in the marginal region of the blower area, at the other side of the blower, and extending forwardly from the housing in perpendicularly to the plane of blower rotation, the nozzle having an outlet aperture; and atomizer means connected to and extending within the nozzle and arranged to feed a jet of liquid into the path of air flowing through the aperture, thereby to cause said air to be broken up into finely divided droplets, for discharge as a spray from the nozzle.

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