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HIGH PRESSURE PAINT SPRAY GUN

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2 Claims. (Cl. 239-575)

This invention relates to apparatus for spraying materials such as paint subjected to high pressures without admixture with air.

In the paint spraying field, a serious problem of spray nozzle contamination has existed without appreciable alleviation as far as is known. In spraying paints and other similar materials on surfaces by means of power equipment, it becomes necessary to utilize nozzles having various types of small cross-section orifices. The orifice shape and related structure is changed for differing types of spray patterns; however, in each instance the orifice cross-section must be very small, for example, an equivalent diameter in the order of .011" to .018".

Inasmuch as the orifice size is very small, clogging of the orifice becomes a serious problem. Even with the high quality non-abrasive light pigmented paints, the spray gun can usually be operated only for about an hour before cleaning of the gun is required. When non-abrasive heavy pigmented paints are used, clogging of the orifice occurs in even shorter periods of time, for example, 10 to 30 minutes. Heavy pigmented abrasive paints will cause clogging almost immediately.

Hence it can be seen that poor operation occurs during the use of even the high quality non-abrasive light pigmented materials. It is impractical to utilize the equipment for the heavy pigmented and abrasive materials. Many attempts to provide satisfactory filtering for the various materials have been suggested over the years but so far as is known no commercially satisfactory solution has been provided prior to applicant's improved filter-spray gun construction. Applicant has found a filtering structure which, when combined in a particular manner with a spray gun, provides improved, commercially acceptable operation of the spray apparatus.

Applicant's solution to this problem is far from obvious. It is well known in the art that the orifice of the spray tip must be placed in close proximity to the control valve. As small a space as possible must be provided between the orifice inlet and the control valve outlet to provide satisfactory operation. If this space is too large, the material in the space, upon closure of the control valve, will drip from the end of the spray tip. Subsequent opening of the control valve causes a more serious problem. In the event that the space is too large, the initial shock of high pressure material coming through the control valve into the space causes material in the space to splatter on the surface being covered rather than to be directed in a fine spray pattern against the surface. Hence, it is not possible to make changes in this space at will without expecting to encounter splattering problems.

Applicant has found that the use of a disk-like screen in a small space between the spray gun orifice and the spray gun control valve extends the operation time prior to required cleaning from 1 hour to 2 or 3 hours; however, clogging of the orifice under these circumstances now appears to be caused primarily by the inability of screen materials to withstand the movement of the materials at high pressures therethrough. The screen material was found to dimple and finally rupture. Upon rupture, the filtering action is lost and the orifice clogs in approximately 1 hour as is the case without the filter.

This problem is even more serious when heavy pigmented materials and abrasive materials were used. The dimpling and rupture by heavy pigmented materials was

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found to occur in periods as short as ½-1 hour. However, this would at least make the use of the apparatus feasible for the heavy pigmented materials.

However, abrasive materials cause dimpling and rupture in intervals as short as 3 and 4 minutes and therefore it was still impractical to utilize the apparatus for abrasive materials.

Applicant subsequently found that the simple expedient of securing a small rivet to the central portion of the screen material generally in alignment with the control valve opening eliminated the dimpling and rupturing problem. It now becomes possible to utilize the apparatus for heavy pigmented materials and abrasive materials for periods in the order of 2 hours without shutdown for cleaning. With this improved structure a completely acceptable answer was provided for the handling of the major portion (90%) of the materials which are the non-abrasive, small pigmented type. With this latter type of paint, continuous operation without shutdown for cleaning can be assured for an 8-hour period. Since it is desirable to clean the spray gun at the end of a working day, 8 hours of continuous operation is all that presently appears to be required.

Applicant then discovered that the use of a fine cylindrical strainer in the spray gun upstream of the control valve in combination with the fine disk screen filter downstream of the control valve provides significantly improved operation for the heavy pigmented and abrasive materials. Continuous operation for periods in the order of 4-8 hours is now possible for the heavy pigmented materials as well as for abrasive materials. In addition, since the cylindrical screen can be provided at a relatively low price, it is desirable to utilize it even for the small pigmented materials.

It can therefore be seen that by the provision of two very inexpensive elements, as simple solution to a very difficult problem has been provided.

Accordingly, it is a primary object of the invention to provide in a spray gun an improved filtering means for non-abrasive small pigmented materials and also for heavy pigmented and abrasive materials.

A feature of this invention is the provision of a fine mesh disk-like screen interposed between the orifice of a spray nozzle and a control valve with a strengthening rivet or its equivalent in the center portion of the screen generally in alignment with the control valve outlet.

Another feature of this invention is the provision of a cylindrical fine screen in the spray gun upstream of the control valve.

Other objects and features will be extended upon a perusal of the following description taken in conjunction with the accompanying drawing in which:

FIG. 1 is a side elevation view of a spray gun incorporating applicant's improved filter means;

FIG. 2 is a partial elevation view showing the improvement in section; and

FIG. 3 is a perspective view of the improved disk-like filter.

The spray gun 1 is of a generally conventional construction except as modified by the improved filtering means. The gun includes a pistol-type handle 2, a nozzle structure 3, and an actuating trigger 4. The nozzle assembly 3 includes a barrel 5 defining a material inlet 6 and a material chamber 7.

The barrel 5 carries a control valve seat assembly 8. The assembly 8 includes a hollow screw 10 including a material passageway 12. The disk-like valve seat 14 is positioned transversely in the passageway 12 and the screw 10 is swaged to firmly retain the seat.

A coupler 16 is screwed on to the barrel 5 and retains a nozzle 18 and a disk-like filter 20 firmly against the screw 10.

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The trigger 4 operates a needle valve element 22 in a well known manner against the force of a biasing spring (not shown). The spring urges the needle valve element toward the left (FIG. 2) in sealing engagement with a valve opening 24 in the seat 14.

The nozzle 18 comprises a generally annular body 26 with a slot 28. A generally cup-shaped spray tip 30 having a central orifice 32 is positioned in the body 26 with the orifice disposed axially at the central portion of the slot 28. A retainer ring 34 is pressed into the body 26 to hold the element 30 in place.

The filter 20 includes a metallic supporting and spacing ring 36. A disk-like piece of fine wire mesh 38 is suitably secured to the ring 36. The central portion of the screen carries a rivet 40. The ring 36 is preferably made of a soft metallic material so that under assembly pressure it will give slightly to provide a reliable seal between the nozzle body 26 and the screw 10. In addition, the axial length of the ring 36 is made as short as possible. This will assure a minimum amount of space between the valve seat 14 and the orifice 32 for reasons described earlier. Prior art devices incorporated a disk-like nylon sealing element (not shown) having a central aperture interposed between the screw 10 and the body 26. It has been possible to substitute the filter 20 for the nylon element without substantially increasing the space between the orifice 32 and the valve seat 14 and at the same time provide a similarly reliable seal.

A second filter assembly 50 is secured to the barrel 5. The assembly 50 includes a body 52, a filter 54, and a coupler 56 rigidly retaining the body 52 and the filter 54 on the barrel 5.

The filter 54 comprises a cylindrical element 58. The element 58 has an outwardly extending flange 60 at its upper end rigidly held between juxtaposed shoulders on the body 52 and the coupler 56. Axially spaced peripheral milled slots 62 are provided on the wall of the element 58 to define radial fluid inlets. A fine mesh screen 59 in the shape of a cylinder is fitted over the outside periphery of the element 58. The lower end of the element 58 is thickened at 64 to receive a screw 66 which retains the screen 59 in place against the flange 60. The body 52 has an inlet 68 and a chamber 70. The screen 59 is positioned radially inwardly from the inner peripheral wall of the body 52 to permit fluid flow from the chamber 70 through the screen and slots 62 into a chamber 72 in the element 58. The chamber 72 connects with the spray gun inlet 6.

During operation of apparatus utilizing the spray gun 1, a lubricant pump (not shown) supplies a material from the reservoir (not shown) under high pressure, for example in the order of 1500 p.s.i., to the inlet 68. This pressure is normally maintained at all times during use. The control valve trigger 4 is then actuated each time that it is desired to spray an accessible surface. When

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the trigger is actuated, the high pressure material flows through the valve opening 24 through the screen 38 and the orifice 32.

While there has been described what is believed to be the preferred embodiment of the invention, it will be understood that various changes and modifications may be made therein; and it is contemplated to cover in the appended claims all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a device for spraying liquid materials of the type in which a spray nozzle forms a small cross-section aperture to define a spray pattern and in which a valve positioned in close proximity to the aperture controls the flow of material under high pressure through an opening therein to the aperture, the improvement comprising the combination therewith of a disk-like fine mesh screen between the aperture and valve, a central strengthening structure for the screen generally in alignment with the valve opening, said structure being spaced from the edges of the screen so that it is disposed entirely within the area of the screen, and a fine mesh screen upstream of the valve.

2. In a device for spraying liquid materials of the type in which a spray nozzle structure forms a small cross-section aperture to define a spray pattern and in which a barrel structure connected to the nozzle structure includes a valve positioned in close proximity to the aperture controls the flow of the material under high pressure through an opening therein to the aperture, the combination therewith of a disk-like filter including an annular sealing ring compressibly held between the nozzle and barrel structures to provide a seal therebetween, a fine mesh screen carried at its edges by the ring between the aperture and the valve opening, and a central strengthening rivet supported solely by the screen spaced from the edges thereof and generally in alignment with the valve opening.

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