

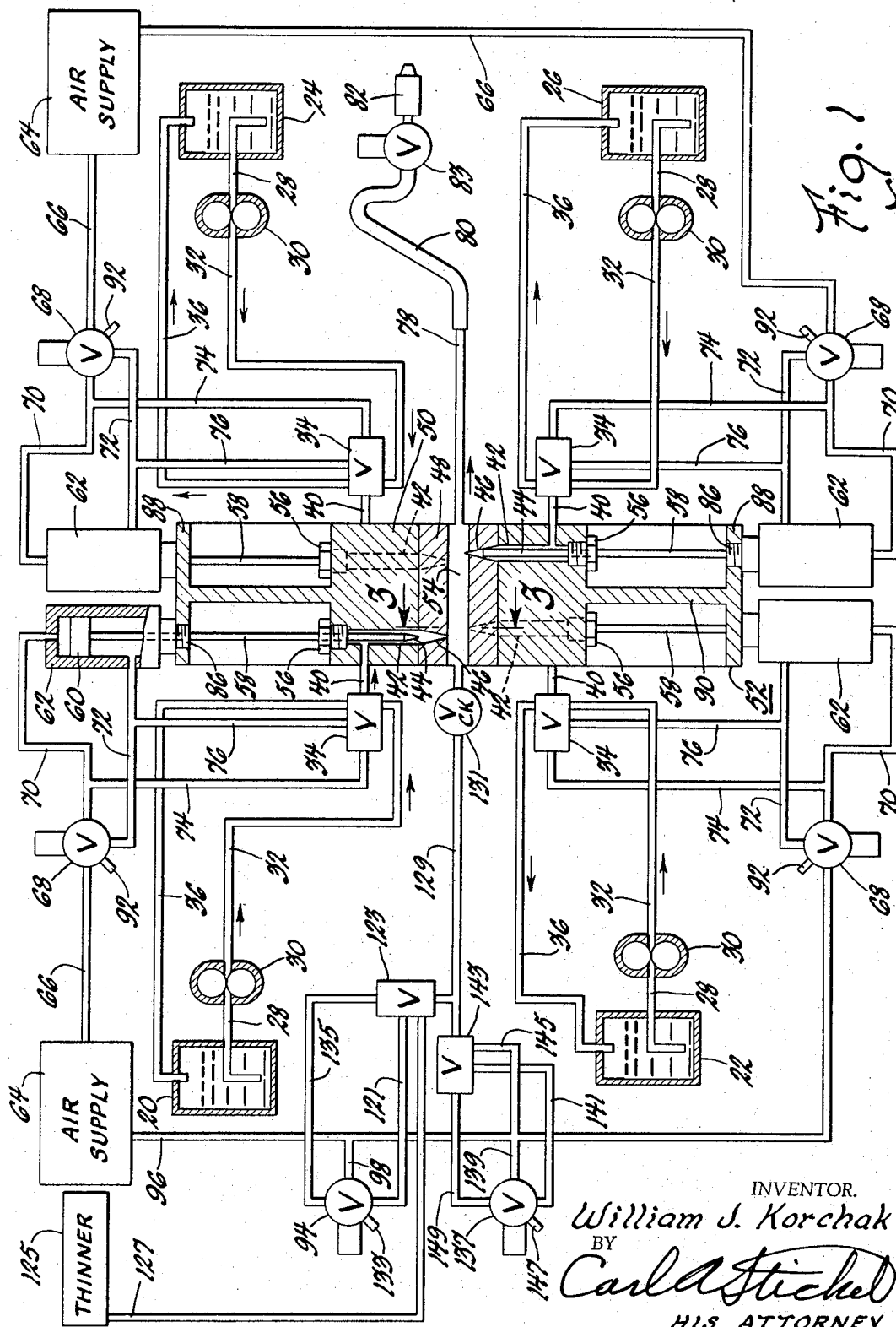
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MULTIPLE FLUID DELIVERY SYSTEM WITH LIQUID
AND GAS PURGING MEANS

3,373,762

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2 Sheets-Sheet 1



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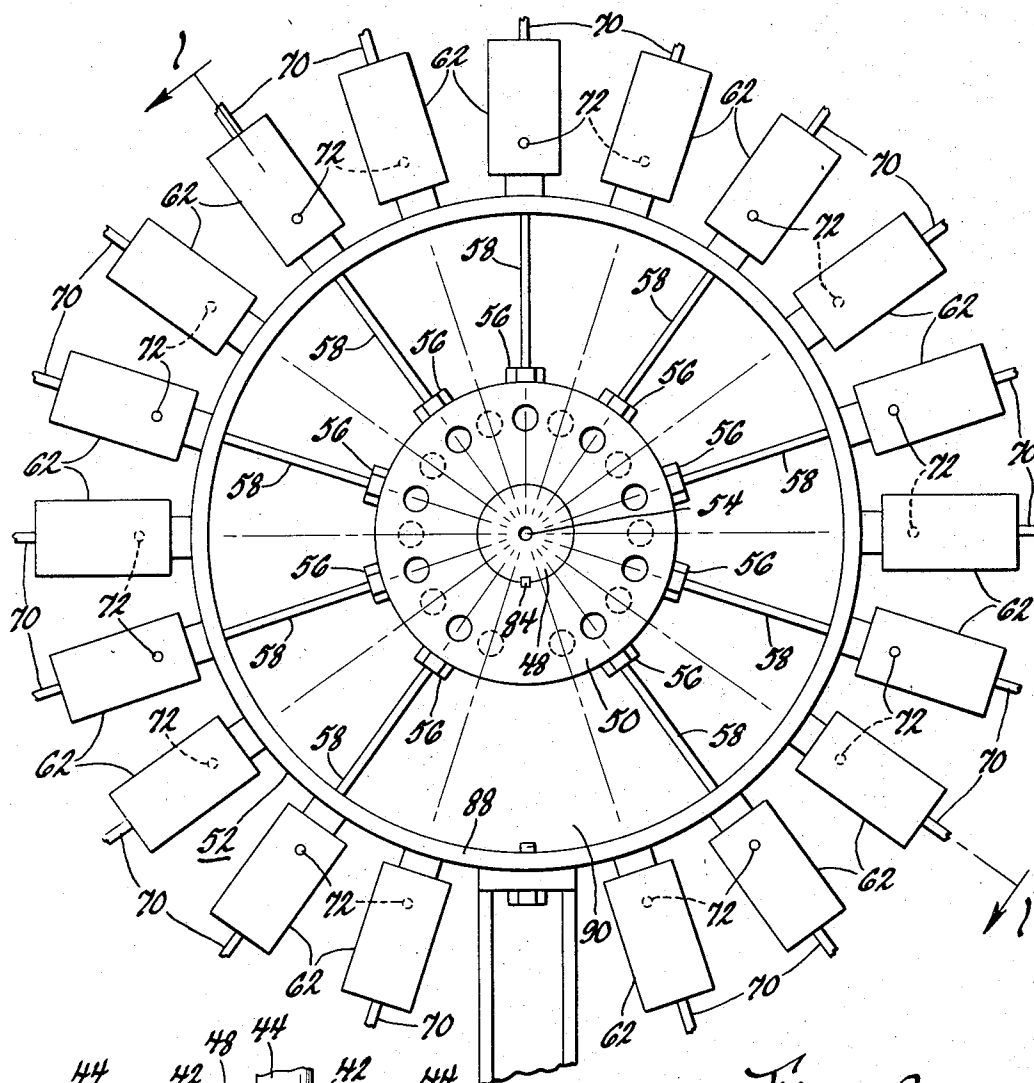


Fig. 2

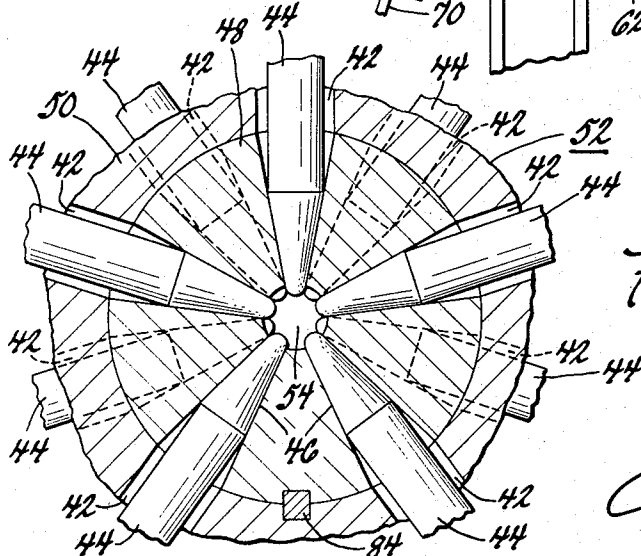


Fig. 3

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MULTIPLE FLUID DELIVERY SYSTEM WITH LIQUID AND GAS PURGING MEANS

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5 Claims. (Cl. 137—240)

This invention pertains to a multi-color paint spray system and more particularly to an arrangement wherein any one of many colors can be selected in any desired sequence.

In the merchandising of a wide variety of products, the availability of a wide selection of colors is important. The need for selection of colors makes necessary frequent changes of paint colors and other surface coatings in manufacturing operations requiring rapid effective cleaning of the common paint supply lines and the connections between each change of paint color to prevent contamination of the different paint colors supplied.

It is an object of this invention to provide a multiple fluid delivery system which can effectively and rapidly purge between each change of fluids with a minimum of waste and a minimum of contamination.

It is another object of this invention to provide a multiple fluid delivery system in which the portions of the system common to all of the fluids have a minimum of volume arranged in a short narrow straight passage providing a straight-through flow of purging fluids from end to end.

It is another object of this invention to provide a multiple fluid delivery system in which the individual valve outlets are concentrated about a short passage which is provided with a straight through flushing arrangement.

These and other objects are attained in the form shown in the drawings in which a plurality of air operated needle valves are arranged radially in a staggered arrangement about a centrally located passage into which the paint flows after passing through the needle valve. The paint flows from this passage directly to the spray gun. In between each change of paint, purging fluids are introduced at the end of the centrally located passage opposite the end which is connected to the spray gun for straight through effective flushing.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a diagrammatic view of a multi-color paint delivery system including a portion in section taken along the line 1—1 of FIGURE 2;

FIGURE 2 is a side view of the multiple color selector shown in section in FIGURE 1; and

FIGURE 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIGURE 1 with the needle valves shown in elevation.

Referring now more particularly to FIGURE 1, there is shown a paint system including four paint supply tanks 20, 22, 24, and 26 which are representative of the 18 supply tanks, each containing a different color paint or surface coating material. These 18 tanks are normally used with the 18 needle valve arrangement shown more particularly on the drawing. Each paint supply tank is connected to a supply conduit 28 connecting with a delivery pump 30 which delivers paint to the discharge conduit 32 connecting with an air operated valve 34 from which the paint is returned through a restricted outlet and a return conduit 36 to the paint supply tank. The valves 34

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and the pumps 30 connected to each paint tank 20—26 for example, are identical as are the systems for all the 18 various color paints which supply paint to the various needle valves. These valves 34 include a side air pressure supply connection 76 arranged to open the valve 34 for the delivery of paint through the delivery conduit 40 to the valve chamber 42 containing the needle valve 44 which co-operates with the needle valve seat 46 in the stainless steel sleeve 48 provided in the hub 50 of the wheel-shaped member 52. The seats 46, the valve chambers 42 and the valves 44 are arranged radially about the axis of the central bore 54 of the sleeve 48. The valve 42 is provided with a packing gland 56 through which extends the valve stem 58 connecting with a double acting piston 60 in a double ended air cylinder 62.

A compressed air supply 64 delivers air through the supply conduit 66 through a two-way solenoid operated paint selector control valve 68 either through the valve closing conduit 70 to the outer end of the cylinder 62 or through the valve opening conduit 72 connecting with the side of the cylinder 62. The conduit not connected to the compressed air supply may be connected to the air exhaust connection 92. The conduit 70 is also connected through the branch conduit 74 with the outer end of the valve 34 to keep the valve 34 closed to prevent delivery of paint through the conduit 40. The conduit 72 has a branch conduit 76 connecting with the side of the valve 34 to open the valve 34 to allow delivery of the selected paint from the circulating paint system 20, 28, 30, 32, 36 to the delivery pipe 40 for flow through the valve chamber 42 and the valve seat 46 which opens and delivers into the central bore 54 for delivery through the bore 54 and the conduits 78 and 80 to the paint spray gun 82 which may be provided with a solenoid control valve 83. The valve 34 preferably has a double acting piston and a double ended air cylinder similar to the piston and cylinder 60 and 62 and has a valve stem and an outlet valve for closing its connection to the delivery pipe 40. The use of the two valves 34 and 44 is designed to provide double assurance for the prevention of any leakage into the passage 54. Any such leakage could cause contamination of the paint.

As is better shown in FIGURE 3, the central bore 54 is relatively small and the individual valve seats 46 extend to the center bore with the ends of the needle valves 44 closing the valve seats 46 all the way to the junction of the seats with the bore 54. The tips of the needle valves as shown in FIGURE 3 actually project into the bore 54. The seats 46, the valves 44 and the valve chambers 42 are arranged radially in two series of nine each, about the axis of the bore 54. Each series is staggered with the valves 44 in one series being arranged in a group of five, 72° apart and a second group of four also with a 72° spacing and staggered relative to the group of five and offset axially as indicated by the valve chamber 42 in FIGURE 1. A key 84 is provided for assuring exact orientation between the sleeve 48 and the hub 50 located 72° from the four needle valves and seats in the second group. However, if desired, some other system of keying or orientation might be used between the sleeve 48 and the hub 50 thereby making room for one or more additional valves, valve chambers, seats and paint supply systems in each series.

The eighteen cylinders 62 each have an inner boss 86 threaded into an integral transverse flange 88 projecting on opposite sides of an integral radial web 90 which is formed integral with the hub 50. One series of nine pistons 60, cylinder 62, valve stems 58, needle valves 44, valve chambers 42 and valve seats 46, is arranged on one side of the web 90 and the second series of nine which is identical to the first series is arranged on the opposite side of the web 90. The selection of colors is made by the selective energization of any one of the paint selector solenoid valves 68.

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According to my invention, when it is desired to change colors, the solenoid valve 68 of the paint being currently supplied is deenergized to cause it to discontinue the supply of air pressure through the conduits 72 and 76 to the side of the air cylinders 62 and the side of the valve 34 and to connect these conduits to the air exhaust connection 92, while air under pressure is supplied through the conduit 70 to the end of the cylinder 62 and through the conduit 74 to the end of the valve 34 to close the valves 34 and 44 to stop the supply of that particular color paint to the bore 54.

Immediately the solenoid valve 94 is energized to provide a supply of compressed air from the compressed air supply 64 through the supply conduit 96, the branch conduit 98 through the valve 94 and the conduit 121 to the side of the valve 123 which will then open. This provides for a flow of paint thinner or other suitable solvent from the thinner supply source 125 through the thinner supply conduit 127 and the open valve 123 into the common purge conduit 129 which connects through the check valve 131 with the end of the bore 54 which is opposite the end to which is connected the delivery conduit 78. After there is sufficient flow through the bore 54 and conduits 78 and 80 and the spray gun 82 to clear all of the paint therefrom, the valve 94 is deenergized to connect the conduit 121 to the air exhaust 133 while the branch conduit 98 is connected to the conduit 135 connecting with the outer end of the valve 123 to close the valve 123.

The thinner is expelled from these parts by a blast of air initiated by the energization of the solenoid valve 137 which connects the branch conduit 139 with the conduit 141 connecting with the side of the air valve 143. This opens the air valve 143 to allow a blast of high pressure air to flow from the conduit 96 through the branch conduit 145, the common purge conduit 129, the check valve 131, the bore 54, the conduits 78 and 80 and the spray gun 82 which has its solenoid valve energized to open to expel all of the thinner from these enumerated parts. Thereafter, the solenoid valve 137 is deenergized to connect the conduit 141 to the exhaust 147 and to connect the branch conduit 139 to the conduit 149 connecting with the end of the valve 143 to close this valve 143.

After this, any other paint selector solenoid valve 68 may be energized to open another needle valve 44 to supply another color paint to the bore 54, the conduits 78 and 80 and the spray gun 82. The discharge from the spray gun 82 is controlled by the energization and deenergization to open and close the valve 83. With this arrangement the supply of the paint and thinner which is lost during each change of paint colors is minimized because of the small volume of the bore 54, the complete closing

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of the needle valve seats to their very entrance into the bore. The arrangement of the purging connection and the paint delivery conduit connection 78 at the opposite ends of the short straight bore 54 insures thorough and rapid removal of the paint and thinner between each color change. The number of color paints provided may be increased by spacing the valves and valve chambers closer and by providing additional series of valves and valve chambers in the hub 50 and sleeve 48.

While the embodiments of the present invention as here-in disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A multiple fluid delivery system including tubular means having an axially extending passage and a plurality of transversely positioned passages extending to said axial passage, each provided with a valve seat, each of said transverse passages being provided with a valve positioned transversely relative to said tubular means cooperating with the valve seat therein, means for delivering different fluids to said transverse passages for delivery under the control of the valves provided therein to said axially extending passage, a fluid discharge means connected to one end of said axially extending passage and purging means connected to the opposite end of said axially extending passage for delivering a purging fluid to said axially extending passage for conduction therethrough.

2. A fluid delivery system as defined in claim 1 in which said purging means comprises means for delivering a liquid solvent and means for delivering a gas.

3. A fluid delivery system as defined in claim 1 in which each of said valves are connected to a double acting fluid motor.

4. A fluid delivery system as defined in claim 1 in which said transverse passages and valves are arranged in two series extending generally circumferentially about the axis of the tubular means.

5. A fluid delivery system as defined in claim 1 in which said transverse passages and valves are arranged in a staggered circumferential arrangement around the axis of said tubular means.

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Disclaimer

3,373,762.—*William J. Korchak*, Arlington, Tex. MULTIPLE FLUID DELIVERY SYSTEM WITH LIQUID AND GAS PURGING MEANS. Patent dated Mar. 19, 1968. Disclaimer filed June 26, 1972, by the assignee, *General Motors Corporation*.

Hereby enters this disclaimer to claims 1, 2 and 3 of said patent.

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