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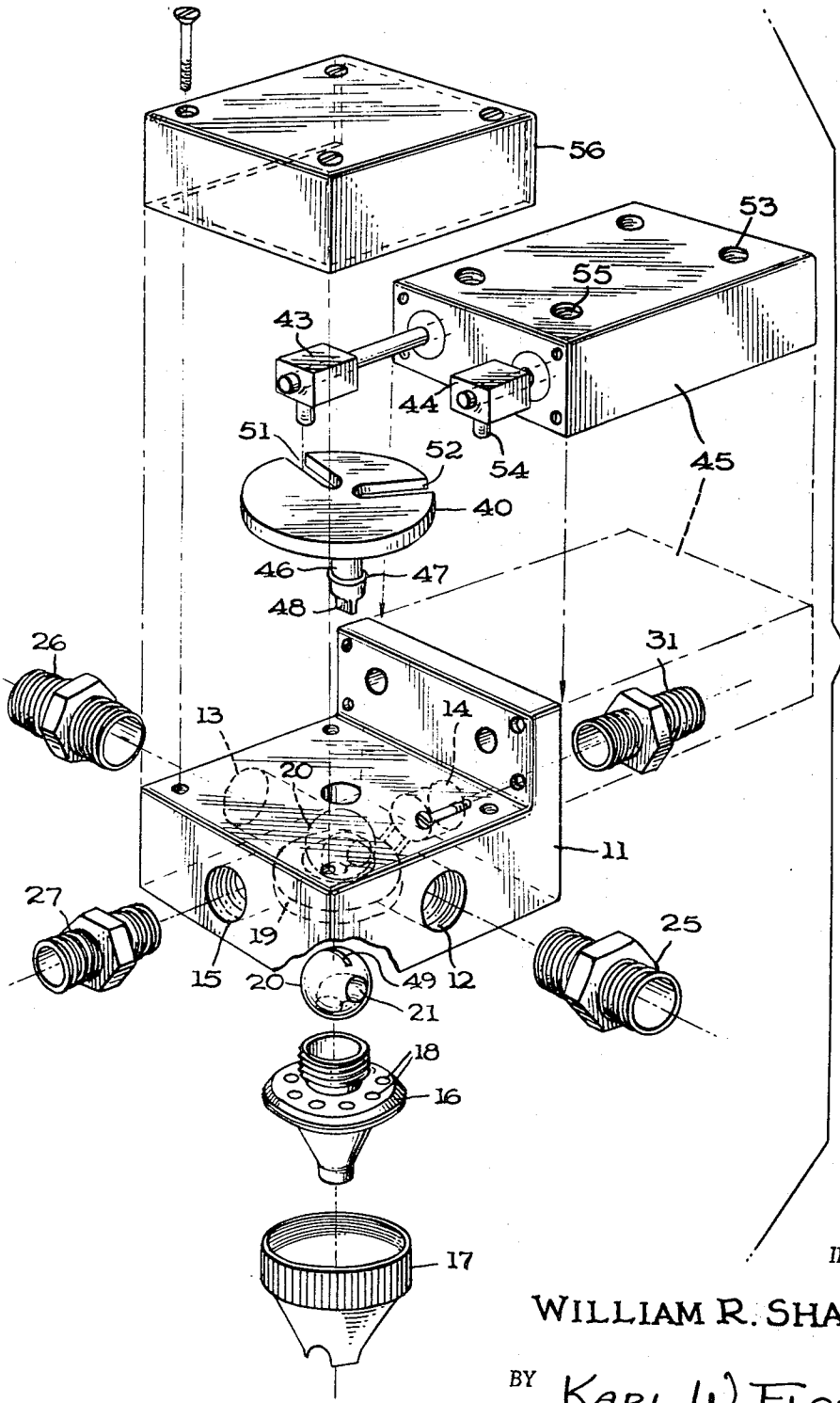
3,412,939

TWO-COLOR SPRAY GUN WITH BALL VALVE

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2 Sheets-Sheet 1

FIG. 1.



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FIG. 2.

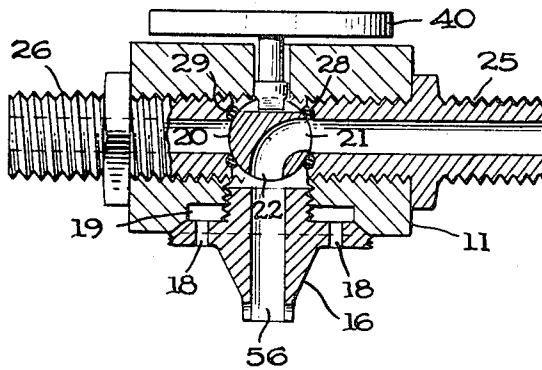


FIG. 3.

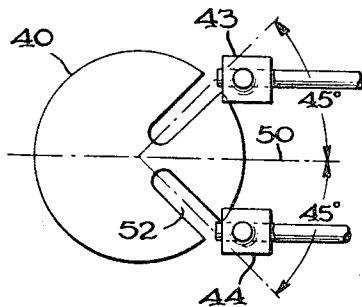
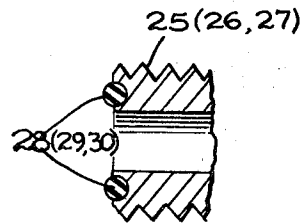


FIG. 4.

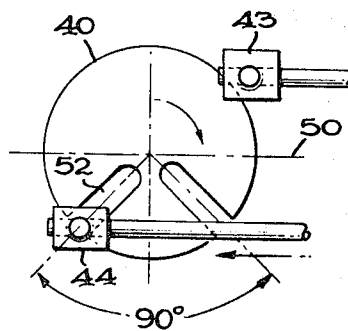


FIG. 5.

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TWO-COLOR SPRAY GUN WITH BALL VALVE
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ABSTRACT OF THE DISCLOSURE

A double-color gun with air pressure activated arms which turn an indexing wheel through 90° which in turn rotates a ball valve having a passage therethrough with different fluid inlets in different positions of rotation.

The present invention relates to a two-color spray gun which may be used for highway marking and more particularly to an air pressure operated mechanism for rotating a ball valve and controlling the color to be sprayed.

It is an object of the present invention to provide a two-color spray gun for highway marking which may be of simple design, remotely controlled, and quick acting.

It is a further object of the present invention to provide the spray gun with positive valving and a sharp cut-off with minimum contamination of one color with the other when a change is made in the color being used.

Additional objects of the present invention are to provide a device with a fluid tip capable of easily being cleaned and a device which may be easily maintained.

With the mechanism used with the double-color gun of the present invention, only about half the air is used that two single color guns would use.

With the present invention there is no exposed mechanism, and positive opening and closing of the valve means takes place. Also, the valve will remain in either open or closed position with continued operating air pressure or, in the alternative, can be made self-closing if spring return operating cylinders are used.

In addition, with the present device the packing can be made self-adjusting and, in addition, fluid passages can be easily cleaned and the tip removed without valving fluid lines to the spray gun.

Other objects and advantages will be apparent from a detailed description of the invention and from the appended drawings and claims.

In the drawings:

FIG. 1 is a perspective exploded view of the operating mechanism of the two-color spray gun of the present invention;

FIG. 2 is a sectioned detail drawing of the valve installation of the present invention;

FIG. 3 is a sectioned detail of a seal installation; and

FIGS. 4 and 5 are schematic views of the indexing wheel in neutral (off) position and one operating position, respectively.

An overall exploded view of the body assembly of the two-color spray gun is shown in FIG. 1. This body assembly consists of a body block 11 having two fluid ports 12 and 13, an atomizing air port 14 and a cleaning port 15. The bottom face of body block 11 is machined in a manner similar to a standard spray gun and will accept a standard type fluid nozzle 16 and air nozzle assembly 17. The fluid passages from ports 12 and 13 and the cleaning passage from port 15 intersect at a common point at approximately the geometric center of body block 11. The atomizing air port 14 connects with a passage or passages which pass through block 11 to an annular chamber 19 which distributes atomizing air to the ring of holes 18 shown on fluid nozzle 16 which

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air then passes out through the air nozzle assembly 17 in the usual fashion.

A ball type valve having a ball 20 is located in body block 11 at the intersection of passages from ports 12, 13 and 15. For the sake of clarity, ball 20 shown in full lines under a broken away portion of body block 11 is also shown in dashed outline in its operating position within block 11 in FIG. 1. The ball 20 is drilled with two passages 21 and 22 which connect within the ball 20. Passage 21 enters in a horizontal direction and passage 22 enters in a vertical direction as shown in FIG. 2.

The ball 20 may be inserted in body block 11 through either of the passages from fluid ports 12 or 13 and once in a center position in body block 11, the ball 20 is held in place by the ends of the fluid adapters 25, 26 and 27. The inside end of each of these adapters 25, 26 and 27 is fitted with a solvent resisting O-ring or similar type seal 28, 29 or 30, respectively. A detail drawing of adapter and O-ring seal is shown in FIG. 3. These seals 28, 29 and 30 prevent leakage past ball 20 and contamination of one liquid with another.

Atomization of the fluid passing through fluid adapters 25, 26 and 27 takes place within the internal mix air nozzle assembly 17 which mixes the air brought in under pressure through connector 31 into the passageway in body block 11 connected to port 14 and passed into annular chamber 19 and through holes 18 into air nozzle assembly 17.

The position of ball 20 is controlled by an actuating assembly consisting of indexing wheel 40 and actuators 43 and 44 each connected to a separate air cylinder and piston assembly enclosed in block 45. A shaft 46 supports the indexing wheel on body block 11 and connects it with ball 20 by means of end projection 48 fitted into a slot 49 in the top of ball 20. Leakage along shaft 46 is prevented by an O-ring shaft seal 47.

A specific angular relationship exists between passage 21 in ball 20 and slots 51 and 52 of indexing wheel 40. Slots 51 and 52 are located 90° apart from each other and when in the neutral or "off" position shown in FIG. 4, the opening 21 in ball 20 is in line with the passage in body block 11 from cleaning port 15. In this position both actuators 43 and 44 are free of indexing wheel 40. Also, it should be noted that in this position slots 51 and 52 are symmetrically located about the actuator center line 50.

To change the position of ball 20 when hole 21 is lined up with cleaning port 15, air is admitted to cylinder port 53. The valving of air to port 53 may, of course, be controlled from a remote location. The corresponding air cylinder located in block 45 connected to port 53 moves actuator 44 out of block 45, or to the left as shown in the change of position of actuator 44 from its position shown in FIG. 4 to that shown in FIG. 5. A pin 54 protruding from the bottom of actuator 44 engages slot 52 of indexing wheel 40 and as actuator 44 continues moving outward from block 45, to the left (FIG. 5) it rotates indexing wheel 40 and shaft 46 attached thereto which, through its protrusion 48 in slot 49 of ball 20, causes ball 20 to rotate clockwise through an annular displacement of 90°. At this point in the rotation of indexing wheel 40 actuator pin 54 would be free to leave slot 52 but does not do so because the cylinder in block 45, and therefore actuator 44, has reached its travel limit. This extended condition of actuator 44 is shown in FIG. 5. Opening 21 in ball 20 is now aligned with the passage in body block 11 from fluid port 13 and now receives the fluid, which is usually a paint of one color that passes through fluid adapter 26, and permits the flow of this fluid through ball 20 and out of vertical opening 22 through passageway 56 in fluid nozzle 16.

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Through the application of air under pressure to cylinder port 55, an air cylinder connected between cylinder ports 53 and 55 in block 45 is caused to move actuator 44 inward in relation to block 45 and in so doing to rotate indexing wheel 40 counterclockwise to its neutral position shown in FIG. 4 and opening 21 in ball 20 to a position in line with cleaning port 15.

If a single acting cylinder with a spring return is used in block 45 connected to air under pressure at cylinder port 53, a second cylinder port 55 connected to that air cylinder would not be necessary, but air pressure would have to be maintained through cylinder port 53 until a return of indexing wheel 40 and ball 20 to a neutral position is desired, at which time the pressure at cylinder port 53 would be removed and the spring would return actuator 44 to its position inward toward block 45.

A similar procedure applied to actuator 43 and its associated air cylinder would rotate indexing wheel 40 counterclockwise from its neutral position shown in FIG. 4, thus rotating ball 20 to move opening 21 into line with fluid port 12, thus connecting the flow of a second color of paint, for example, which can then flow through fluid adapter 25, through fluid port 12, opening 21, and out of opening 22 through passageway 56 in fluid nozzle 16. This positioning of actuator 43, indexing wheel 40, and ball 20 is shown in FIG. 1.

When one of the actuators 43 or 44 is extended, ball 20 is positioned so as to allow fluid, which is usually a paint of one color or the other, to flow through fluid adapter 25 or 26 respectively, through ball 20, and through fluid nozzle 16. With both actuators 43 and 44 in a position withdrawn into block 45, as shown in FIG. 4, a ball 20 is in a neutral position with opening 21 in line with cleaning port 15 so that either air or a solvent, or a mixture of both, which will pass through fluid adapter 27 into cleaning port 15, may be blown through ball 20 and passageway 56 in fluid nozzle 16 so as to clean the ball 20, nozzle 16 and nozzle assembly 17, and to prevent contamination of the separate fluids from fluid adapters 25 and 26 with each other.

A cover 56, as shown in FIG. 1, is cut out to fit over the actuating mechanism and fits over the top of block 45 to seal the mechanism therein and make the exterior easy to clean.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown in the drawings and described in the specification.

What is claimed is:

1. A spray gun assembly comprising indexing wheel means having slots therein displaced 90° from each other, actuating means engaging said slots in said indexing wheel means to rotate said indexing wheel means, a ball valve having a passage therethrough and connected to said indexing wheel means to be rotated therewith, a body means containing said ball valve and having at least three passageways intersecting in said body means,

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means to supply fluids to each of said passageways, connected to said body means at the outer end of each of said passageways, and a nozzle assembly attached to said body means and in communication with said ball valve whereby said ball valve connects said nozzle assembly to the centrally located one of the at least three intersecting passageways in said body means when said slots in said indexing wheel means are centered about a center line of said actuating means.

2. The spray gun assembly of claim 1, further characterized by an additional passageway in said body means connected to an air supply and to said nozzle assembly to produce an atomizing effect on fluids from said means to supply fluids.

3. The spray gun assembly of claim 1, further characterized by said at least three passageways intersecting in said body means including

two of said passageways each at a right angle to a third said passageway which is centrally located in relation to said first-mentioned two of said passageways.

4. The spray gun assembly of claim 3, further characterized by

said third passageway having said means to supply fluid attached thereto connected to a supply of cleaning fluid

whereby a cleaning action in said ball valve and said nozzle assembly takes place when said ball valve connects said nozzle assembly to said third passageway.

5. The spray gun assembly of claim 3, further characterized by

said passage through said ball valve having a portion adapted to be aligned with each of said intersecting passageways, one at a time, and a portion adapted to be aligned with said nozzle assembly.

6. The spray gun assembly of claim 3, further characterized by

said passage through said ball valve having a portion opening in alignment with each one of said intersecting passageways, one at a time,

and said passage having a portion opening in alignment with said nozzle assembly,

said nozzle assembly attached to the body means on the opposite side from said indexing wheel means.

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