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C. E. POPE

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APPARATUS FOR PRODUCING MULTI-COMPONENT SURFACE COATINGS

Filed Sept. 13, 1960

2 Sheets-Sheet 1

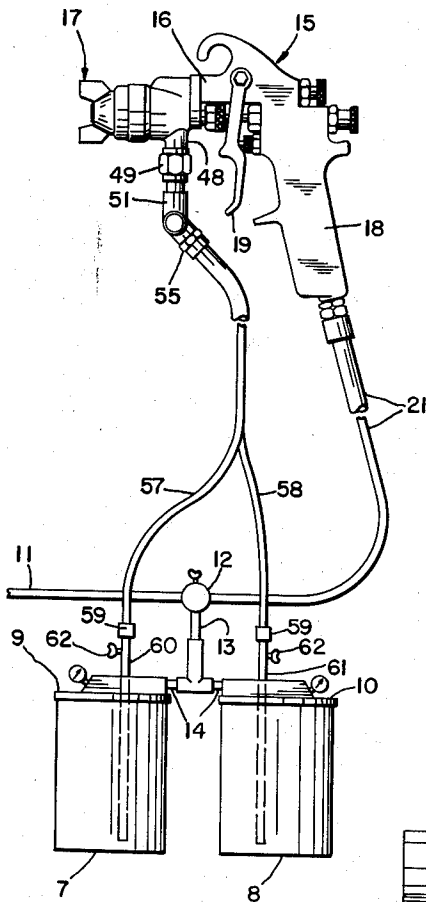


Fig. 1

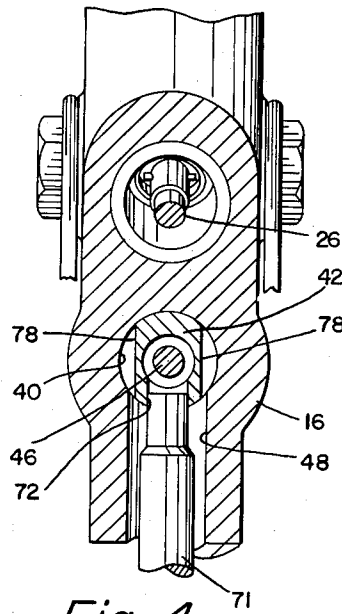


Fig. 4

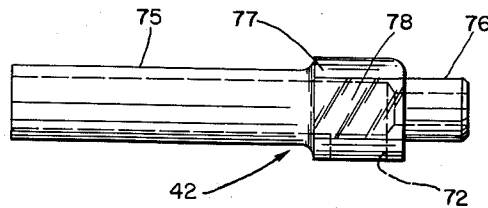


Fig. 5

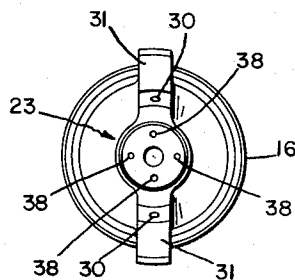


Fig. 6

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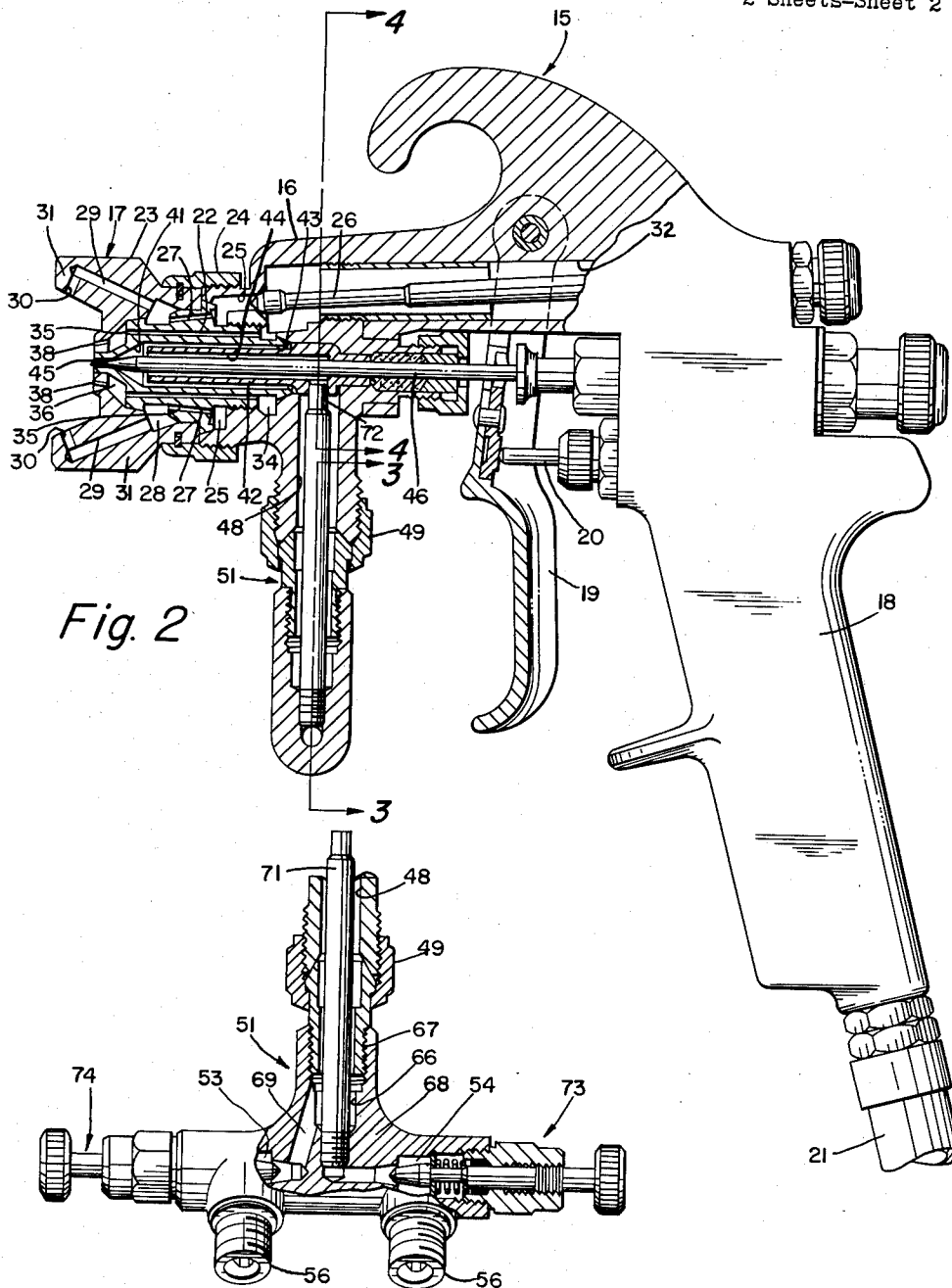


Fig. 2

Fig. 3

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APPARATUS FOR PRODUCING MULTI-COMPONENT SURFACE COATINGS

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This invention relates to apparatus for producing surface coatings from a plurality of visually different coating liquids applied simultaneously to a surface to produce what has been termed a "spatter finish" coating of uniform pattern, attractive appearance, and durable wearing qualities. In accordance with common practice, the plurality of coating liquids are propelled together through a common spray gun orifice as a composite stream that is atomized as it emerges from the orifice by air jets appropriately disposed to produce a spray of intermingled droplets of the two liquids to give the spray a desired shape, such as a cone or a fan.

Spatter finishes are employed on many commercial products, particularly products having minor surface irregularities or blemishes. The pattern effect of such finishes tends to break up the reflection of light from the coated surface so as to render the surface irregularities or blemishes less noticeable than if a single solid color were used.

Spatter finishes of the general character to which the present invention relates have heretofore been formed by a single spray coating application in accordance with methods and apparatus described and claimed, for example, in U.S. Patents 2,511,626 and 2,511,627, granted June 13, 1950 to Henry B. Einbecker, in U.S. Patent No. 2,504,116, granted April 18, 1950 to Austin H. Downs, and in U.S. Patent No. 2,513,081, granted June 27, 1950 to Edward M. Clark and Fernand E. Ledecq. In accordance with all of said prior patents, a plurality of different liquid coating compositions are introduced into the main chamber of a more or less conventional type of paint spray gun, preferably as a pair of substantially parallel flowing streams of the different liquids. By employing a plurality of coating composition liquids that are visually different when dry, either as a result of differences in color (hue, chroma, or intensity) or other differences in light reflecting properties, and by employing vehicles for the plurality of liquids that have some difference in their miscibility characteristics so as to hinder blending of the liquids upon contact with each other and discharge together from the spray gun, a substantial degree of heterogeneity of the liquids can be maintained until they are atomized to produce a spray in which each discrete droplet is substantially entirely composed of only one or another of the liquids. Generally, one of the liquids is fed to the spray gun at a greater rate than the other so that the liquid present in the greater quantity forms a substantially continuous background phase on the coated surface, the liquid or liquids present in lesser proportions being deposited as discrete droplets randomly distributed through the continuous background phase in a substantially uniform overall concentration.

While the methods and apparatus of the prior patents mentioned above were capable of producing and substantially reproducing spatter finish coatings of a fairly uniform character when the spray guns were carefully handled, some skill was required to achieve such uniformity. In some instances, the relative concentrations and/or

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sizes of the droplets of the different liquids in the spray would not remain constant with time, so that close uniformity of coatings over large areas or on separately coated surfaces or products was not achieved. Lack of uniformity of coatings seemed to occur most frequently when attempting to coat intersecting surfaces in the region of the surface intersections, possibly due to the fact that marginal portions of the spray would be concentrated on one of the surfaces while other portions were concentrated on the surface angularly related thereto.

As explained in the copending application Ser. No. 3,904 of Joseph Giordano, filed January 21, 1960, and assigned to a common assignee, the causes of the difficulties in obtaining a high degree of uniformity and reproducibility of spatter finish coatings are somewhat speculative and may be different under various coating conditions. However, the problem is largely one of maintaining a controlled degree of relative concentrations and heterogeneity of the different liquids until the composite stream emerges from the gun and the constituent liquids are atomized by impinging air jets. One of the probable causes of variations in the relative concentrations and degree of heterogeneity of the different liquids as they emerged from the orifices of conventional spray guns was that the liquids, while they were flowing together through the gun chamber toward the orifice, were irregularly intermingled in substantially laminar streams, possible with some twisting and distortion of the laminations, so that the relative quantities of the intermingled liquids passing through the restricted gun orifice from one instant to another were not constant. An unsymmetrical and varying distribution of the plurality of liquids in the composite stream emerging from the gun orifice probably resulted and contributed to the lack of uniformity of distribution of droplets of the different liquids over the spray pattern at any given instant.

The Giordano application is directed to methods and apparatus for producing spatter finish coatings with a greater degree of uniformity and reproducibility without the skill theretofore required. In general, this has been accomplished by propelling different liquids toward the spray gun orifice in parallel flowing concentric streams separated by a physical barrier until the streams are closely adjacent the orifice. This principle of preventing the liquids from mixing together until they are near the point of discharge from the gun has been found to produce a desirable, substantially symmetrical and highly uniform distribution of the different liquids in the composite stream emerging from the gun orifice so that when the composite stream is dispersed by impinging air jets, there results a simultaneous and uniform distribution of droplets of the different liquids throughout the resulting spray.

The apparatus disclosed in the above-identified Giordano application for dispelling the coating fluids in the foregoing manner was characterized by a reciprocable, axially extending, hollow needle disposed within the gun and provided with a discharge tip formed of soft deformable rubber. This needle was connected to a pressurized fluid supply receptacle, the fluid being fed through the hollow needle to the gun orifice. The other of the different fluids was conducted to the gun orifice in an annular stream around the needle.

While the general principle of propelling the fluids through the gun in separate streams of controlled cross-sectional configurations has proven highly successful, certain improvements in the apparatus embodying this principle have been found advantageous. For example,

in some applications, the relatively small passageway through the needle has had a tendency to clog, this being particularly true if the gun is not promptly and thoroughly cleaned after it has been used. In other applications the solvents used in some of the coating compositions have deleteriously affected the rubber discharge tip. Further, because of mechanical difficulties, it also has been found desirable not to connect a conduit to the reciprocating needle.

The principal object of the present invention is to provide an improved apparatus for producing spatter finish coatings embodying the general features disclosed in the aforementioned Giordano application, wherein the different liquids forming the coatings are conducted to the orifice of the spray gun in physically separated, parallel streams of controlled cross-sectional configuration.

Another more specific object of the invention is to provide a spray gun having the general features described above, and being further characterized by concentric fluid conduits extending axially of the barrel of the gun to a point adjacent the orifice, whereby the different fluids making up the coating composition may be kept separated until reaching the discharge orifice. According to the preferred embodiment, these conduits, which may be of any desired size, are fixedly mounted in the body of the gun as distinguished from the apparatus of the aforementioned Giordano application, wherein one of the conduits is a reciprocable needle of relatively small diameter.

An important advantage of the improved apparatus of the invention is that the increased size of the conduits substantially reduces the tendency of the liquids to clog in the gun, even after prolonged use without periodic cleaning. Another concomitant advantage is that the invention provides for greater flexibility in producing coatings of varying design and composition. For example, when a multi-color liquid was propelled through the hollow needle described in the Giordano application, the colors tended to segregate in slugs as the liquid passed through the relatively small passageway. This segregation adversely affected the spray coating by destroying the uniformity of distribution of the several differently colored paint components.

Still another important object is to provide a novel spray gun adapter element which can be inexpensively and easily incorporated into conventional, single component spray guns to provide a reliable modified structure for introducing a plurality of coating liquids into the gun and separately conducting the liquids to the spray orifice for combination into a symmetrical and highly uniform composite stream.

Other objects and attendant advantages of the invention will become apparent from the following detailed description and the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevation of apparatus constructed according to the principles of the invention, a portion of the apparatus being shown in reduced scale for simplicity of illustration;

FIGURE 2 is a similar view of the spray gun shown in FIG. 1, with the main parts of the gun shown in longitudinal, vertical section;

FIGURE 3 is a transverse vertical sectional view of the spray gun taken as indicated by the line 3—3 in FIG. 2;

FIGURE 4 is another transverse sectional view taken as indicated by the line 4—4 in FIG. 2;

FIGURE 5 is a side elevation of the adapter element which forms a part of the invention; and

FIGURE 6 is an end elevation of the spray gun shown in FIG. 2.

As shown in FIG. 1 of the drawings, pressure receptacles 7 and 8 are provided with hermetically sealed covers 9 and 10, respectively, for holding two supplies of different coating composition liquids under pressure for feeding them to a spray gun. Gas pressure is supplied

to the receptacles through a gas supply line 11, a pressure reducing valve 12, a conduit 13, and branching conduits 14. The line 11 may be connected to a compressor or other suitable source of air pressure or inert gas pressure (not shown). The supply of gas pressure to the receptacles 7 and 8 is preferably such that they are both under a common pressure, as shown.

The coating composition liquids in the receptacles 7 and 8 are applied to surface to be coated by means of a tool 15 resembling an ordinary spray gun in its outside appearance, but differing from an ordinary gun as regards the apparatus for supplying the coating liquids thereto and certain details of construction for controlling the flow of the coating liquids thereto and through the spray gun. Except for such differences, the structural details of the spray gun may be conventional, and the invention is illustrated herein as applied to a typical spray gun modified in the respects mentioned above. Accordingly, it will be unnecessary to describe with detailed particularity the well known features of the gun shown in the drawings for illustrative purposes.

Referring generally to FIGS. 1 and 2, the gun shown therein may comprise a main body portion 16 having a nozzle and air cap assembly, generally designated 17, mounted on the forward end thereof, and being appropriately formed to provide a handle portion 18 integral with the main body portion of the gun. The gun may also comprise a valve actuating lever or trigger 19 connected to the main body of the gun for actuating the liquid and air control valves hereinafter described.

The handle portion 18 of the main body of the gun has its interior formed to define a gas passage (not shown) which extends the length of the handle portion. This gas passage is connected at its lower end by a flexible conduit 21 to the gas supply line 11 through the pressure reducing valve 12. This valve is preferably so constructed that the pressure delivered to the conduit 21 is greater than that delivered to the conduit 13 supplying the receptacles 7 and 8. Alternatively, if preferred, two pressure reducing valves may be employed for maintaining this pressure differential. I have found that excellent results are obtainable with the present invention by employing air pressures of the same order of magnitude commonly employed heretofore in the prior art methods and apparatus referred to above, the specific pressures employed being varied in accordance with variations in the viscosity of the coating liquids employed and other considerations well understood by those skilled in the art.

A normally closed, main gas shut-off valve (not shown) of conventional construction is interposed in the gas passage of the handle portion 18, and this valve has one end 20 projecting laterally through the side of the handle into engagement with the trigger 19. Retraction of the trigger 19 is effective to open the normally closed valve against the opposing force of a spring (not shown). The foregoing structure is well known in the art and forms no part of the present invention.

The end of the gas passage in the handle 18 beyond the main shut-off valve communicates with a second gas passage 32 extending longitudinally through the upper portion of the main body 16. Gas under pressure is supplied through this passage 32 to the nozzle and air cap assembly 17, in a manner to be described in more detail, from which the gas is discharged through any desired array of openings. This nozzle and air cap assembly consists generally of a tubular nozzle 22 threaded into the open, forward end of the main body 16, an air cap 23 which is freely rotatable around the outer wall surface of the nozzle, and a coupling 24 having one portion threadedly engaged on the forward end of the gun body and another portion keyed to the air cap.

In the specific construction shown in FIG. 2, the forward end of the passage 32 communicates with the chamber 25 formed in the forward end of the main body 16, and the gas under pressure is supplied to the chamber, as

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regulated by a gas valve 26 which is operable to open and close the rear end of the chamber. From the chamber 25 the gas is conducted through passages 27 in the wall of the nozzle 22 to a second annular chamber 28 formed by corresponding grooves in the air cap and nozzle, and thence into passages 29 from which the gas is discharged through openings 30 directed diagonally forwardly toward the longitudinal axis of the nozzle, which, for convenience is termed the longitudinal axis of the gun.

The interior 41 of the nozzle 22 and an inwardly spaced, concentric adapter element 42 in the form of a tubular extension co-operate to form liquid passageways 43 and 44 in the main body of the gun, through which the different liquids making up the coating composition are conducted in physically separated, parallel streams of controlled cross-section. The forward end of the nozzle 22 converges forwardly toward the longitudinal axis of the gun so as to define a discharge orifice 45 positioned coaxially of the air cap 23 and having its axis coincident with the longitudinal axis of the gun. Advantageously, the forward end of the tubular extension 42 extends to the converging end portion of the nozzle so that the streams of the different liquids are prevented from intermingling until closely adjacent the orifice 45. This construction assures a substantially symmetrical and uniform distribution of the liquids in the composite stream which issues from the orifice.

The discharge orifice 45 is controlled by a stem or needle 46 that extends rearwardly and coaxially with the orifice 45 into operative engagement with the trigger 19 and rearwardly therebeyond in the form of an enlarged plunger (not shown). The rear end of the plunger engages a compression spring (not shown) that normally urges the head of the needle forwardly into closing engagement with the orifice 45 and also urges the trigger 19 toward its normal unretracted position. The unretracted position of the trigger is shown in FIGS. 1 and 2, with the orifice 45 closed by the needle 46 and with the main gas shut-off valve also in its closed condition.

The fluid passageways 43 and 44 are connected to receive liquids simultaneously from the receptacles 7 and 8 in separately defined streams. To this end, an inlet passage 48 in the main body of the gun communicating with the rear of the interior of the nozzle 22 is connected by means of a coupling 49 with the interior of a T-shaped valve fitting 51. This fitting 51 has laterally extending passages 53 and 54 in the legs of the body which, by means of the couplings 55 received on the lower sides of nipples 56 threaded into the legs, are connected to flexible hoses 57 and 58. As shown in FIG. 1, the hoses 57 and 58 are connected by couplings 59 to rigid tubes 60 and 61, respectively, which extend through the receptacle covers 9 and 10 in sealed relation therewith to near the bottoms of the receptacles 7 and 8. Each of the tubes 60 and 61 may suitably be provided with a manually operable shut-off valve 62.

The lateral passage 54 in the valve fitting assembly 51 communicates with the bottom portion of a bore 66 extending vertically through the stem 67 of the T-shaped body of the fitting assembly, while the passage 53 communicates with an upwardly and inwardly sloping passage 69 which opens in the side of the bore. Within the bore 66 is concentrically disposed a tube 71 whose lower end is threaded into the lower end of the bore below the opening of the passage 69, and whose upper end is received within a part 72 in the rear of the tubular extension 42. Liquid from the receptacle 8 entering the passage 54, under the control of a manually operable valve 73 extending into a portion of the passage of reduced diameter, is free to flow upwardly through the tube 71 into the liquid passageway 44, and thence to the orifice 45 of the gun in a central stream.

The liquid from the other receptacle 7 is received within the passage 53 under the control of another valve

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74 and flows through the passage 69 into the bore 66 around the tube 71, and thence into the inlet passage 48. The inlet passage communicates with the interior of the nozzle 22 so that the annular stream flowing upwardly through the bore 66 and passage 48 around the tube 71 may be fed into the liquid passageway bore 43 surrounding the tubular extension 42, and thence to the orifice of the gun.

Reference is made finally to FIGS. 4 and 5 which show the details of the adapter element 42 which permits the liquids to flow from the receptacles to the gun orifice in physically separated streams. As shown, the member 42 is generally tubular in shape, and includes a forward end portion 75, a rear portion 76 of reduced diameter, and an intermediate portion 77 having a relatively thick wall section. The intermediate portion 77 has a pair of opposed flat side surfaces 78 that are joined by cylindrically curved top and bottom surfaces. This intermediate portion is additionally provided with the port 72 which is cut in the bottom cylindrically curved surface thereof. Preferably, the port 72 is of such diameter that the top of the tube 71 may fit snugly therein with a free sliding fit.

In this form the member 42 may be fitted with the bore 40 of the main body of the gun in any suitable manner, as for example, by coating the intermediate and end portions with solder and sweating the member until it is joined to the walls of the bore. When thus fitted within the bore 40 of the main body 16, it will be seen from FIG. 4 that the distance between the flat side surfaces 78 is less than the diameters of the inlet passage 48 and of the bore 40. Thus the annular stream of liquid flowing from the bore 66 of the fitting 51 through the inlet passage 48 is free to enter the bore 40 of the gun. The inner surface of the bore 40 in the region of the port 72 is co-extensive with the inner surface of the nozzle 22 (FIG. 2) and, hence, the liquid flowing along the flat surfaces 78 of the member 42 is free to enter the open rear end of the nozzle 22 and to flow to the orifice 45 of the gun. Although there is by necessity some slight clearance, between the tube 71 and the walls of the port 72, there is normally no tendency for the liquid issuing from the mouth of the tube or the liquid within the bore 40 to seep in either direction through this clearance because the two liquids are normally under substantially equal pressures.

The apparatus of the invention may be operated in the following manner to produce the improved results therefore desired. Assuming that the containers 7 and 8 are filled with different liquid coating compositions to level well above the lower ends of the rigid tubes 55 and 67, air pressure of, for instance, about 30 p.s.i. is applied to the upper surfaces of the liquids in the containers by adjustment of the reducing valve 12, and a higher pressure is delivered to the spray gun through the flexible hose 21. The operator grips the gun by the handle portion 18, directs the forward end toward the surface to be coated, positions it the requisite distance from the surface, as determined by experience, and retracts the trigger 19, moving it to the right as viewed in FIGS. 1 and 2. This action of the trigger 19 opens the main gas shut-off valve, permitting a flow of air under pressure to the several air orifices 30 and 38 in the air cap 23. The needle 46 is then retracted to open the orifice 45.

The air pressure delivered to the receptacles 7 and 8 forces the two different coating liquids to the gun through the separate conduit assemblies described above, and these liquids are respectively admitted into the gun through the inlet passage 48 and the tube 71. The liquid entering at the passage 48 surrounds the tubular extension 42 as it flows toward the orifice 45. The liquid entering through the tube 71 flows forwardly through the tubular extension 42 and is discharged as a central stream, while the other liquid merges with it and flows through the orifice as a substantially concentric outer annular stream.

The resulting composite stream issuing from the orifice 45 obviously has little or no opportunity for distortion of the two stream components or for blending of one with the other before the composite stream is disrupted and atomized by collision with the air jets from the air orifices 30 and 38. As a result, substantially uniform conditions of the resulting spray are maintained throughout a spraying operation, producing the desired greater uniformity and reproducibility of a spatter finish coating applied to the surface or surfaces being coated.

The sizes of the droplets of the different coating liquids produced in the spray issuing from the gun, as will be well understood by those skilled in the art, are determined to some extent by the viscosities of the two liquids. The relative proportions or quantities of the two liquids in the spray are also affected by the liquid viscosities and by any restriction of the passages through which the liquids are conducted by the orifice 45. Various pattern effects may be obtained by adjusting the viscosities of the two liquids and changing the restrictions of the passages through which the liquids flow through the valve fitting 51 of the valves 73 and 74, and by varying the several other adjustments of the apparatus as a whole that are conventional in equipment of the general character shown and described, as well as by varying the visual differences between the coating liquids to produce differences in color, gloss, etc.; between the contrasting portions of the resulting coating. As will be appreciated from the foregoing description of the apparatus of the invention, the uniformity and reproducibility of the resulting coatings achieved by the invention are substantially unaffected by changing the several variables to produce a desired effect.

In addition to the improvements in the resulting coatings obtained as herein described, the invention provides simple, reliable, and inexpensive modifications of a conventional single component, spray gun for introducing a plurality of coating liquids into the gun and separately conducting the liquids to the gun orifice for combination as described. The flow of both liquids is initiated and terminated at the gun orifice itself, so that no blending of the liquids can occur within the gun during brief idle periods.

While the invention has been illustrated and described herein with reference to particular exemplary apparatus, it will be appreciated that the details of the apparatus, may be varied without departing from the principles of the invention or the proper scope of the appended claims.

What is claimed is:

1. Spray gun apparatus for producing multi-component surface coatings from at least two coating liquids that are visually different when dry comprising a gun body having a bore in one end, a tubular extension fixed in said bore and projecting therefrom, said tubular extension defining a central fluid passageway, a nozzle mounted on said one end of said body and spacedly surrounding said tubular extension to define an annular fluid passageway therebetween, said nozzle having a forward end portion converging axially forwardly of such tubular extension to form a discharge orifice having its axis coincident with the longitudinal axis of said bore and said tubular extension, said discharge orifice being closely adjacent the forward end of said tubular extension, means for simultaneously introducing in separate streams a first liquid into said annular fluid passageway and a second liquid into said central fluid passageway, whereby said liquids approach said orifice in streams of controlled cross-sectional configuration separated by said tubular extension until closely adjacent said orifice, and means on said gun body for atomizing said liquids as they are discharged from said orifice.

2. Spray gun apparatus as claimed in claim 1 wherein said means for introducing said liquids into said fluid passageways comprises a fluid inlet passage in said gun body, said inlet passage communicating with said annular fluid passageway, and a conduit extending through

said inlet passage into communication with said central fluid passageway.

3. Spray gun apparatus as claimed in claim 2 wherein said tubular extension has a hole through its wall, said conduit being received in said hole in a free sliding fit.

4. In a spray gun apparatus for producing multi-component surface coatings from at least two coating liquids that are visually different when dry including a gun body having a bore in one end, a nozzle mounted on said one end coaxially of said bore, said nozzle defining a nozzle chamber converging axially and forwardly to form a fluid discharge orifice, said orifice having an axis coincident with the axis of said bore, and means surrounding said orifice for atomizing a fluid stream discharged there-through, the improvement consisting of a tubular adapter element concentrically positioned within said nozzle chamber and being spaced from the walls thereof, said adapter element having a rear end fixed within said bore, an intermediate portion lying within said bore adjacent the rear end of said nozzle, and a forward end projecting into said nozzle chamber and terminating adjacent said orifice, said intermediate portion having a wall section inwardly spaced from the inner wall surface of said bore, a hole in the wall of said adapter element in said intermediate portion, a fluid inlet passage formed in said gun body in the region of said intermediate portion, said fluid inlet passage communicating with said bore and with said nozzle chamber, a conduit coaxially extending through said inlet passage, said conduit having one end positioned within said hole in a freely sliding fit, and means for simultaneously introducing a first liquid into said fluid inlet passage and a second liquid into said conduit, whereby said first liquid is conducted in an annular stream through said nozzle chamber to said orifice, and said second liquid is conducted through said tubular adapter element to said orifice in a central stream, said annular and central streams being physically separated by said adapter element until adjacent said orifice.

5. Spray gun apparatus for producing multi-component surface coatings from at least two coating liquids that are visually different when dry comprising a gun body having a bore in one end, terminating in a nozzle having an inner wall surface converging axially forwardly to form a discharge orifice, said discharge orifice having its axis coincident with the axis of said bore, a valve stem extending axially through said bore and having a forward end normally seated in closing engagement with said orifice, said stem being reciprocal for opening and closing said orifice, an air cap connected to said one end of said body and surrounding the converging portion of said nozzle, gas passages extending through said body, nozzle, and air cap, said gas passages terminating in openings in said air cap disposed to direct atomizing jets of gas forwardly and axially inwardly toward the discharge path of said orifice, means supplying gas in controlled amounts to gas passages and openings, a tubular adapter element mounted in said bore and surrounding said valve stem, said tubular adapter projecting forwardly within said nozzle to a point adjacent said orifice, the outer wall surface of said tubular adapter being spaced radially inwardly from the inner wall surface of said nozzle to form a first fluid passageway therebetween, and the interior of said tubular adapter forming a second fluid passageway, a fluid inlet passage in said gun body communicating with said first fluid passageway, a conduit extending through said fluid inlet passage and communicating with said second fluid passageway, and means for simultaneously introducing a first liquid into said inlet passage and a second liquid into said conduit, whereby said two liquids approach said orifice as an annular stream of said first liquid surrounding a central stream of said second liquid and separated therefrom by said tubular adapter until adjacent said orifice.

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References Cited in the file of this patent

UNITED STATES PATENTS

1,470,111	Biersdorf	Oct. 9, 1923
2,511,626	Einbecker	June 13, 1950
2,513,081	Clark et al.	June 27, 1950

2,786,716
2,953,305

508,288

10

Peeps ----- Mar. 26, 1957
Bondurant ----- Sept. 20, 1960

FOREIGN PATENTS

France ----- July 20, 1920