US 20020005208A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2002/0005208 A1**

Laughlin (43) **Pub. Date: Jan. 17, 2002**

(54) **METHOD OF AND APPARATUS FOR AUTOMATICALLY COATING THE HUMAN BODY**

(76) Inventor: **Thomas J. Laughlin**, Grapevine, TX (US)

Correspondence Address:
Michael A. O'Neil
Michael A. O'Neil, P.C.
5949 Sherry Lane, Suite 1030
Dallas, TX 75225 (US)

(21) Appl. No.: **09/907,838**

(22) Filed: **Jul. 17, 2001**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/751,752, filed on Dec. 29, 2000.

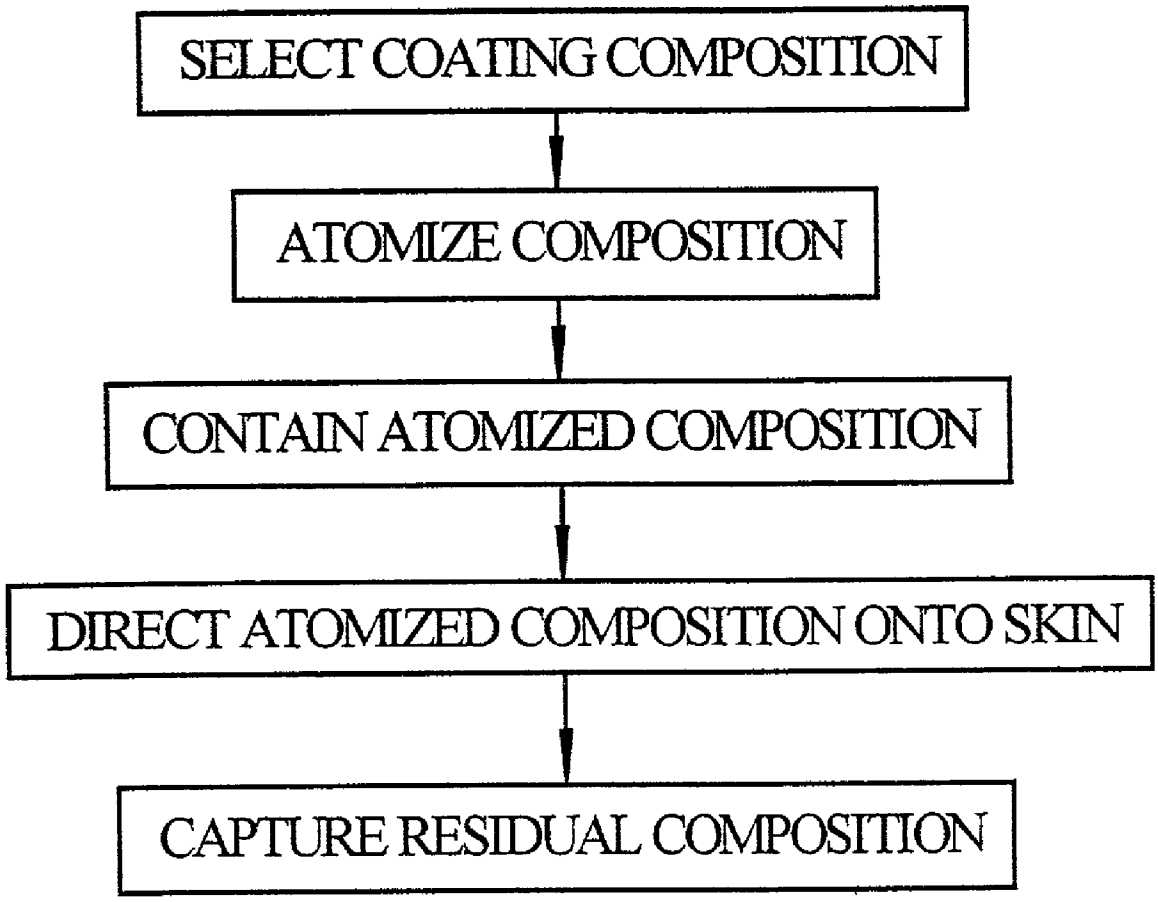
Publication Classification

(51) **Int. Cl.**[7] **A45D 24/00**; B05C 19/00

(52) **U.S. Cl.** **132/200**; 118/309

(57) **ABSTRACT**

In a system for coating human skin, a chemical composition, such as a cosmetic or medical formulation, is uniformly coated over the entire body or selected parts of the body of the person being coated. The system includes atomization of the coating composition, containment of the atomized spray, and residual recovery which together yield a novel method for applying chemical compositions.



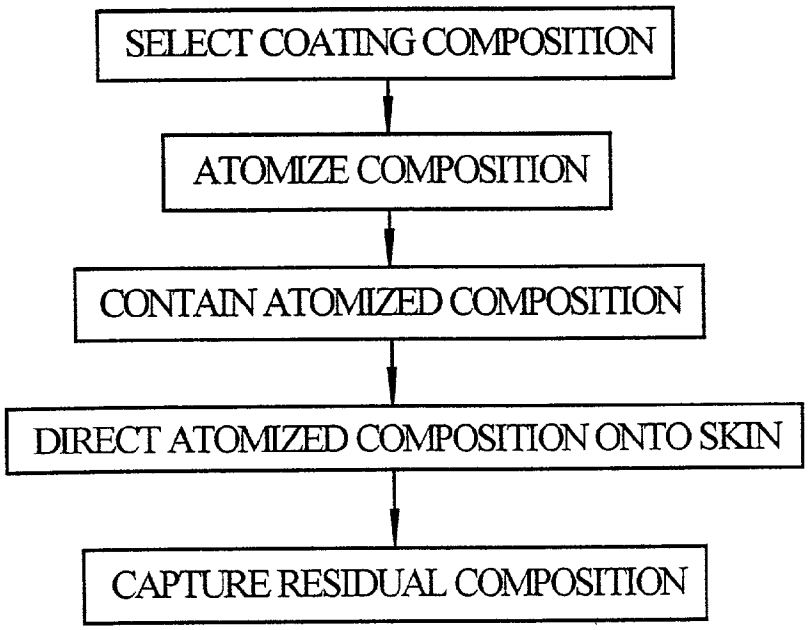

SELECT COATING COMPOSITION
ATOMIZE COMPOSITION
CONTAIN ATOMIZED COMPOSITION
DIRECT ATOMIZED COMPOSITION ONTO SKIN
CAPTURE RESIDUAL COMPOSITION

Fig. 1

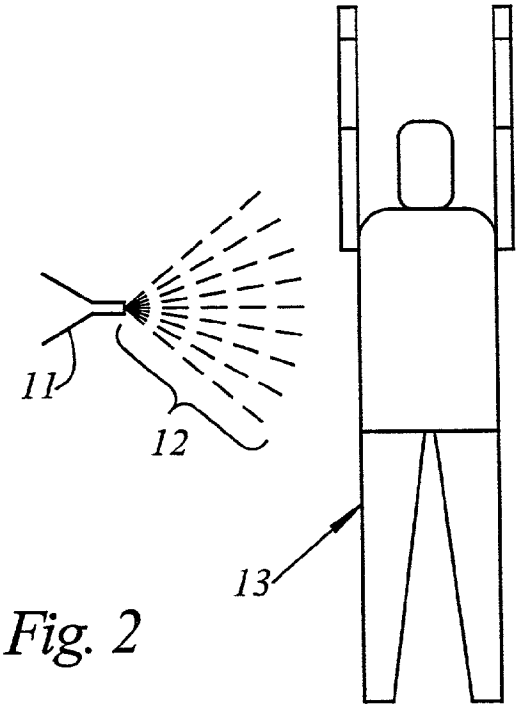

11
12
13

Fig. 2

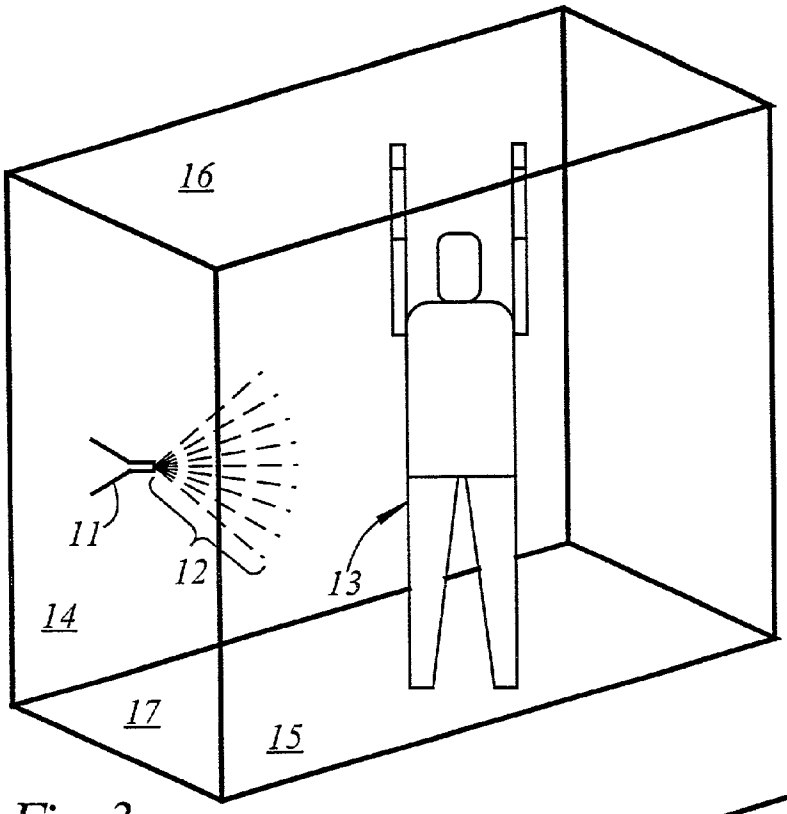


Fig. 3

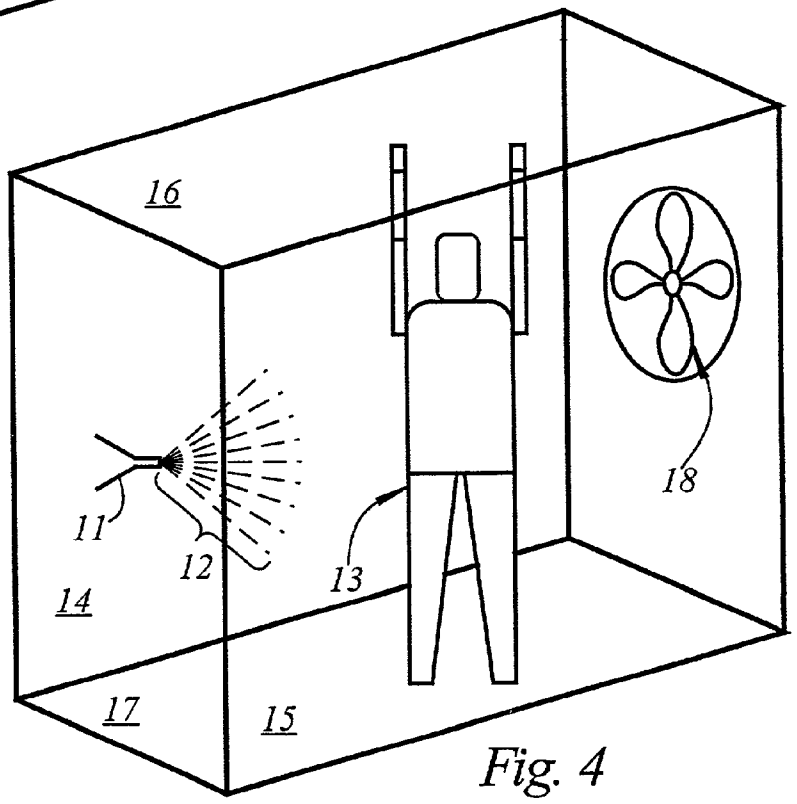


Fig. 4

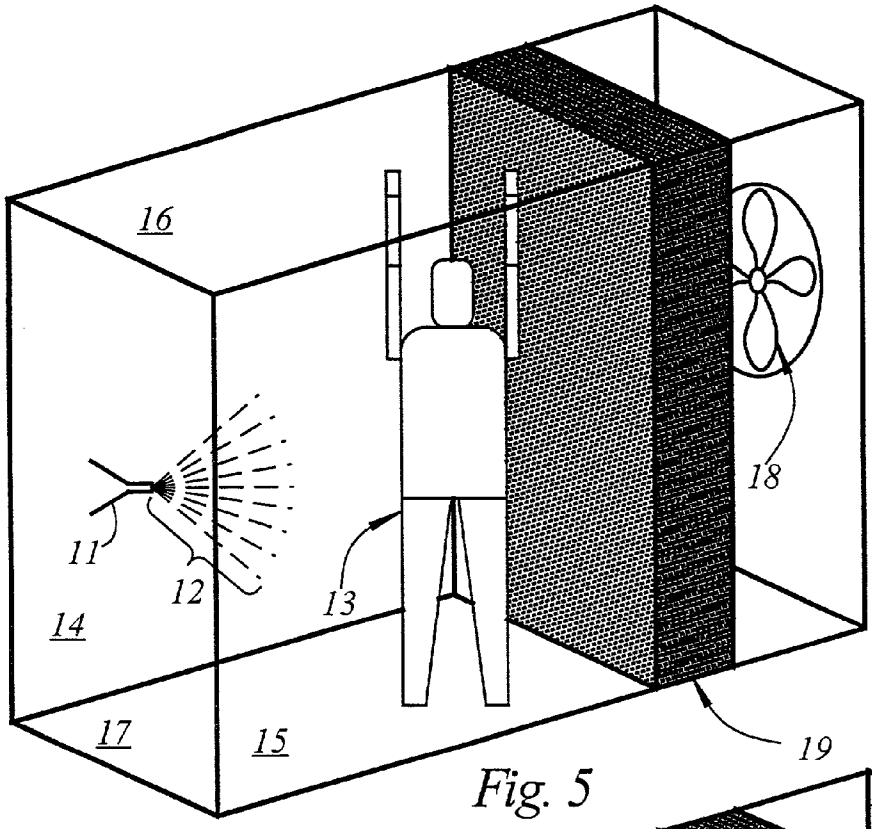


Fig. 5

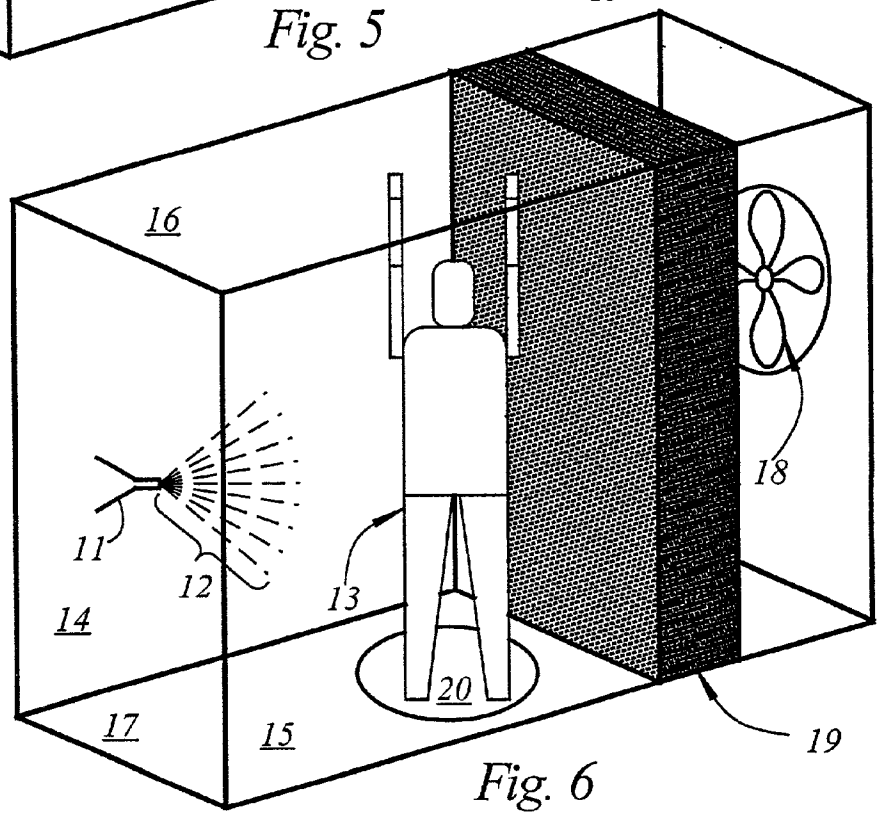


Fig. 6

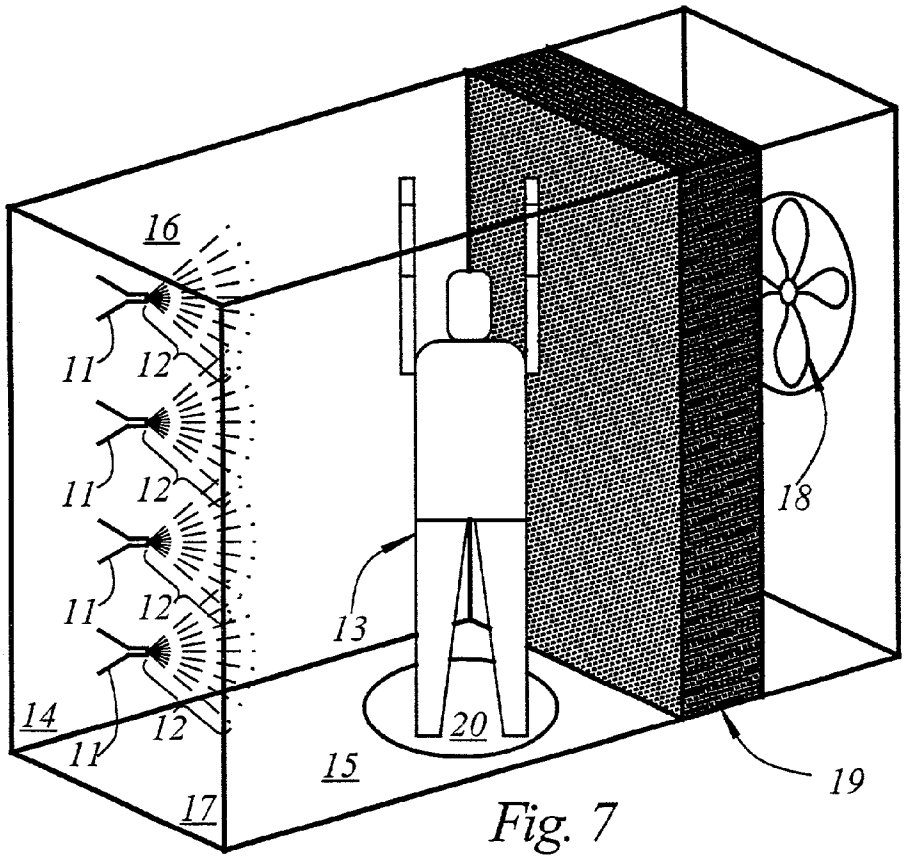

16
11
12
11
12
11
12
11
12
14
12
11
13
20
15
17
18
19

Fig. 7

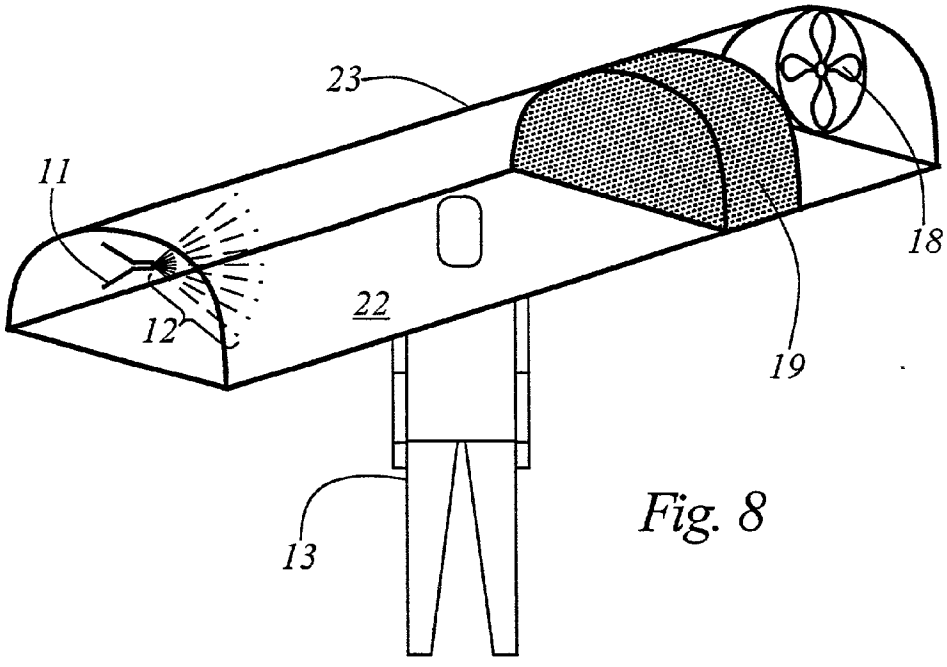

23
11
12
22
18
19
13

Fig. 8

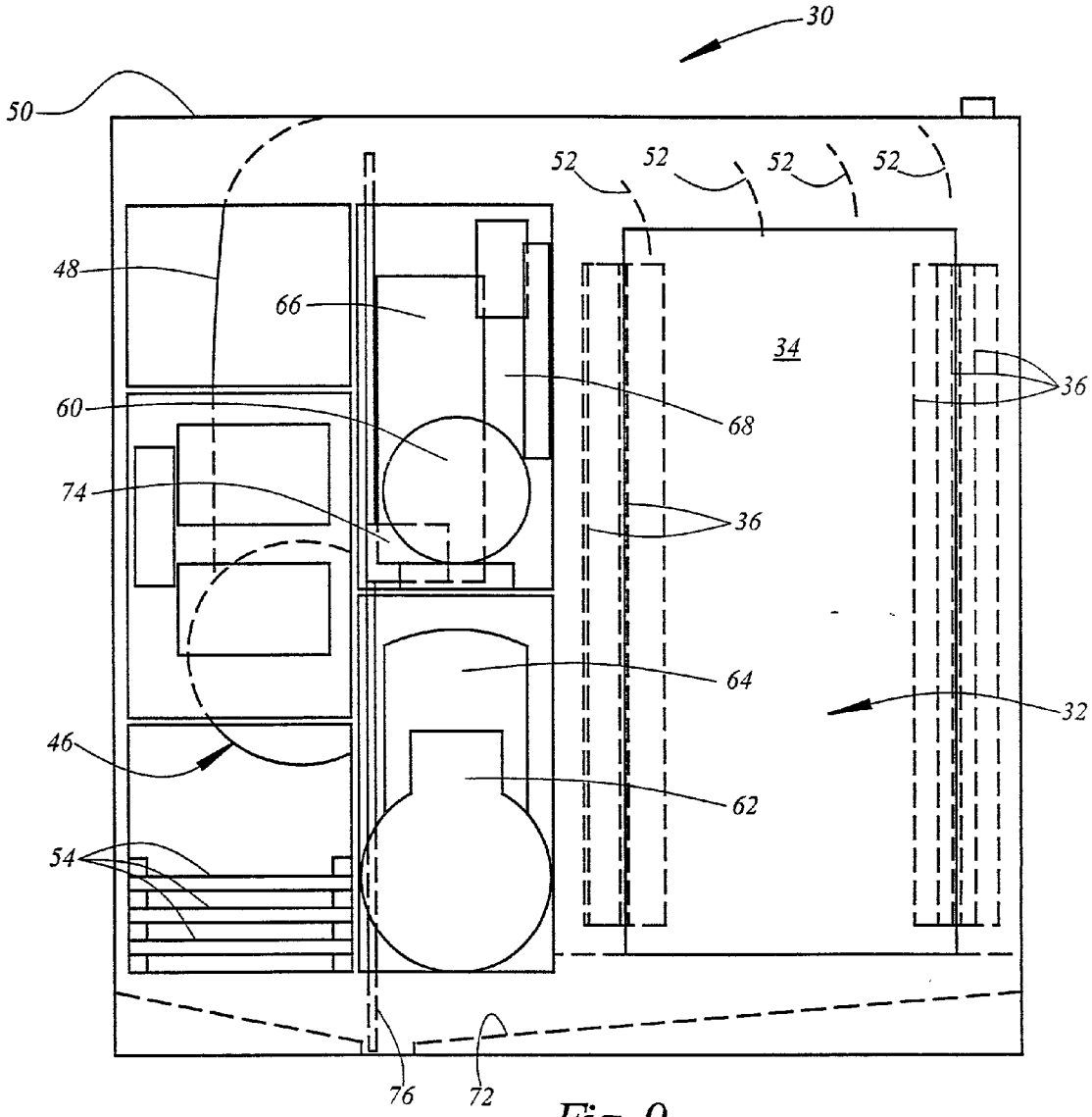


Fig. 9

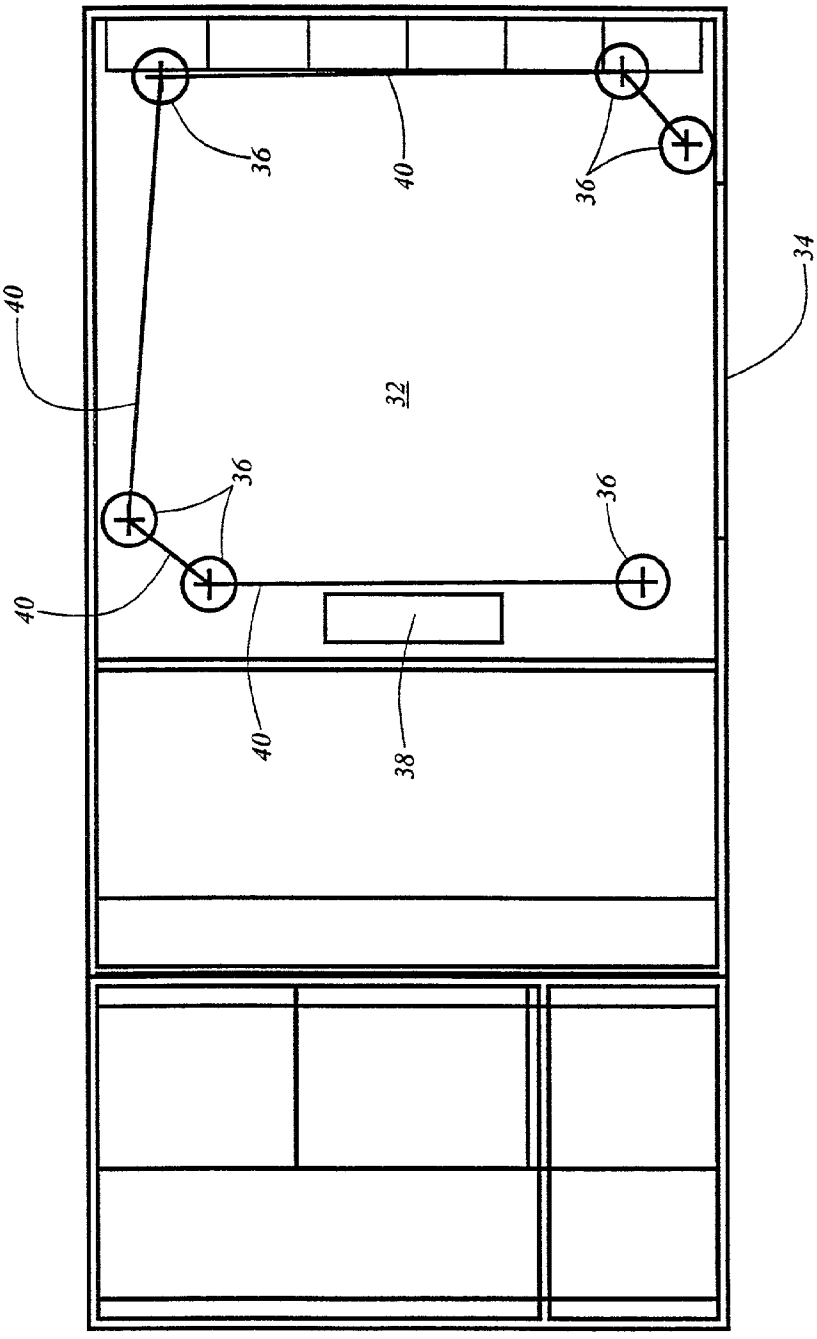


Fig. 10

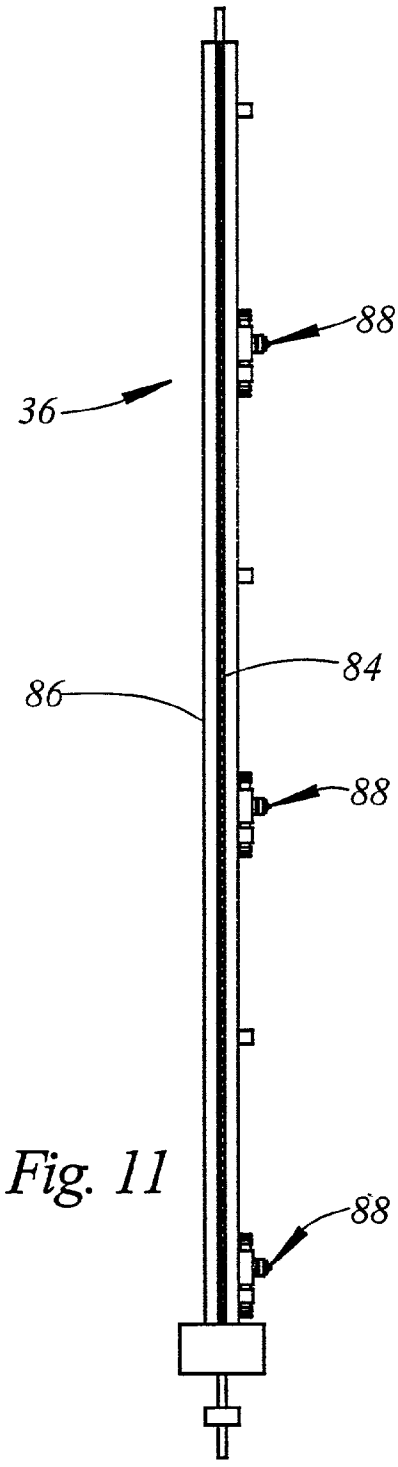


Fig. 11

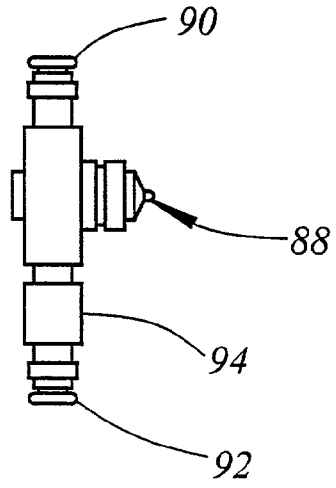


Fig. 12

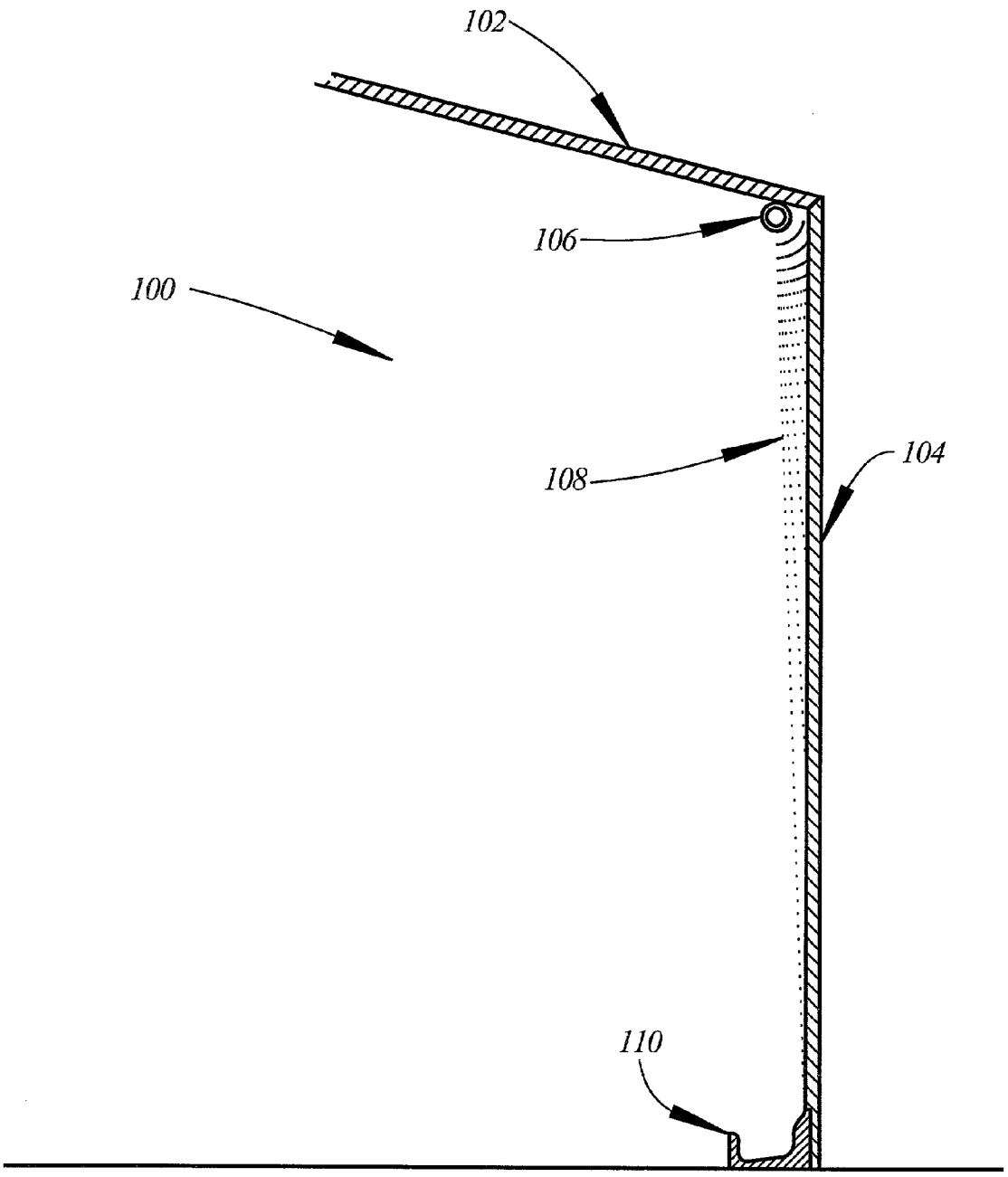


Fig. 13

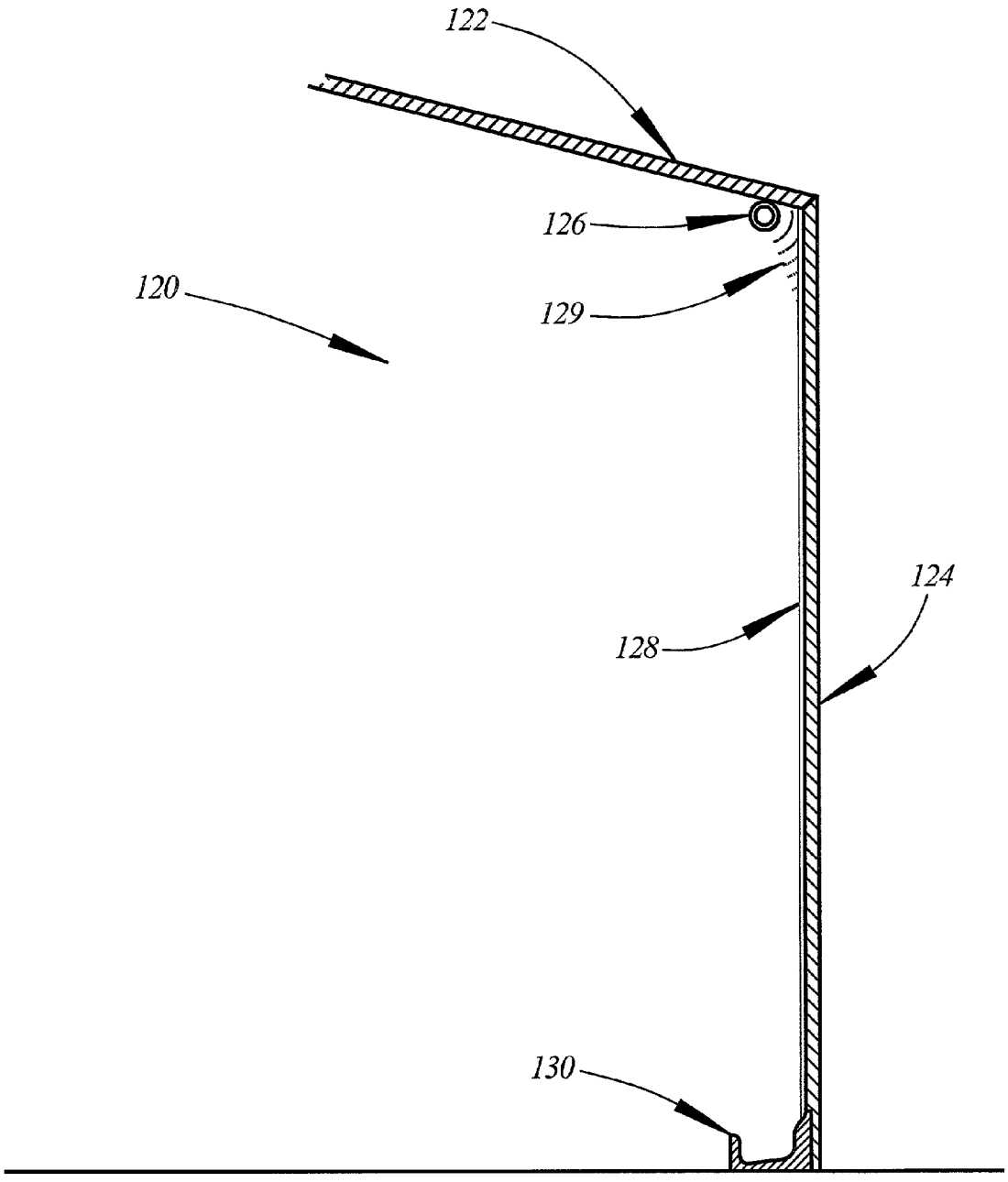


Fig. 14

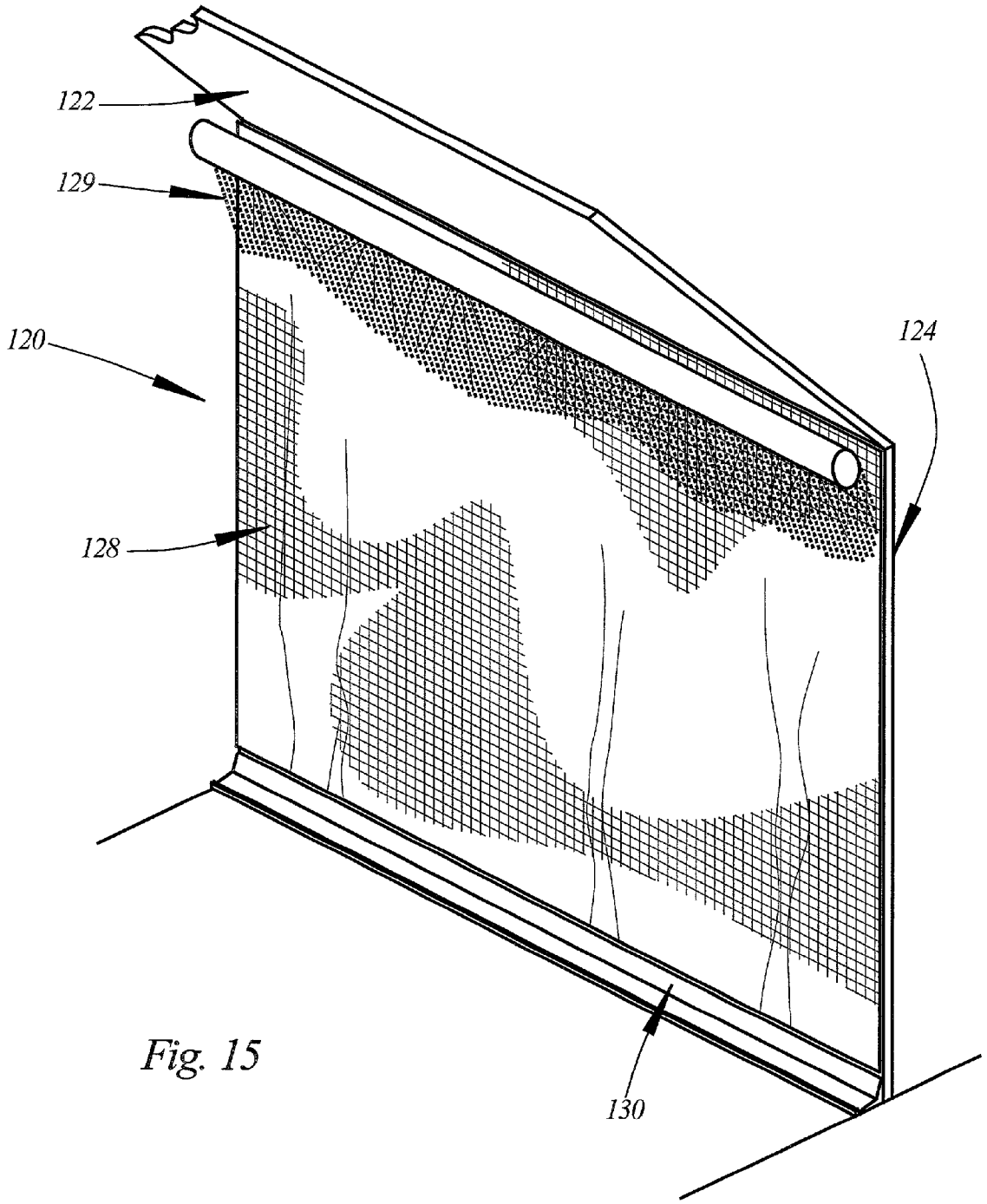


Fig. 15

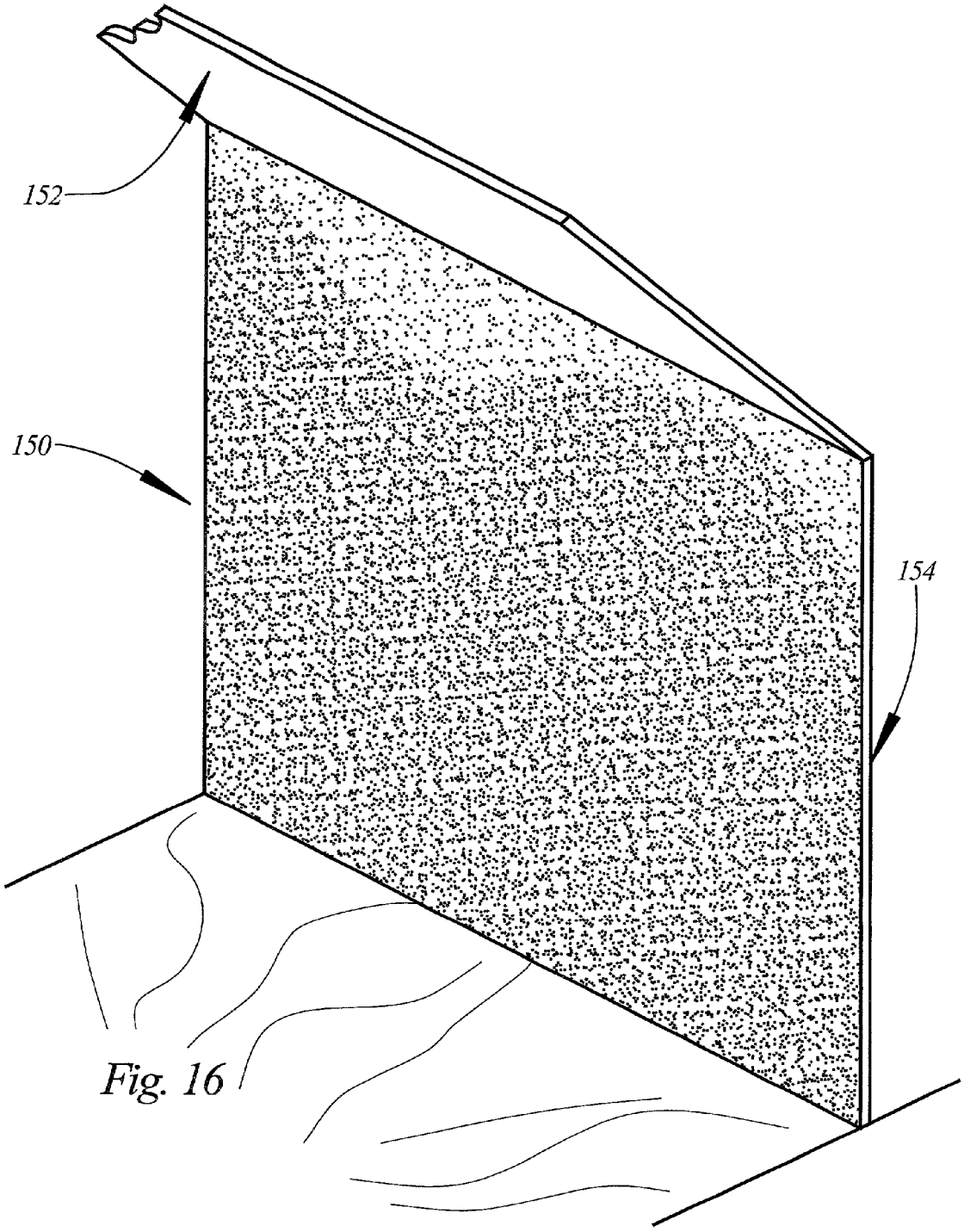


Fig. 16

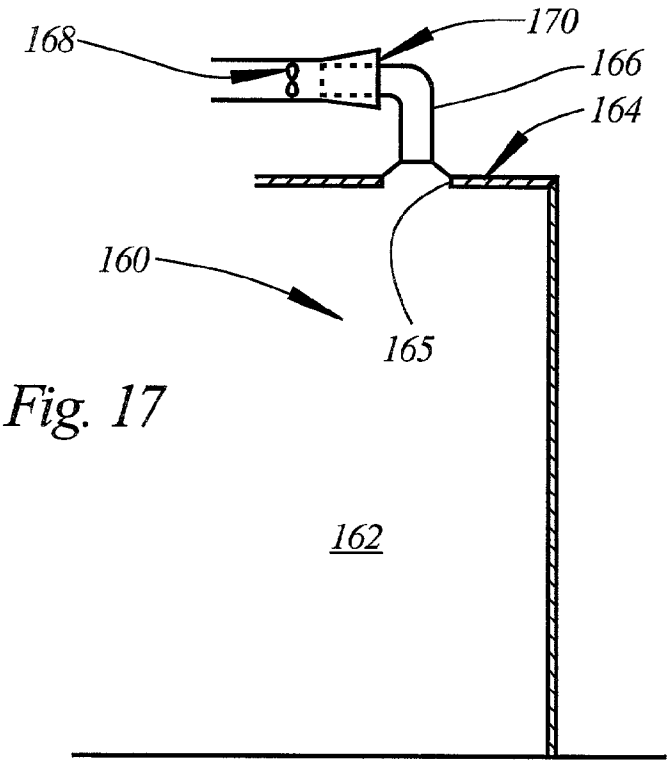


Fig. 17

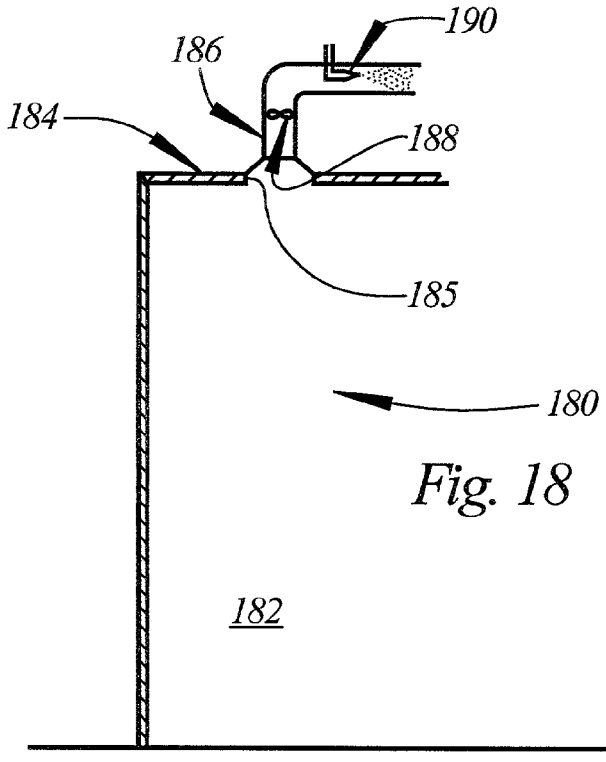


Fig. 18

METHOD OF AND APPARATUS FOR AUTOMATICALLY COATING THE HUMAN BODY

BACKGROUND OF THE INVENTION

[0001] The application of various fluids to all or selected parts of the human body has been known literally for centuries. However, despite the long standing and wide spread practice of coating the human body with various fluids, there has never been a successful way of automatically coating the human body. Therefore, prior to the present invention, it has been necessary to apply fluids to the body manually.

[0002] Manual application of fluids to the human body results in numerous disadvantages. First, it is almost impossible to uniformly coat the human body with fluids using manual application techniques. This is true even in the case of fluids that are provided in aerosol or spray form because such fluids must be rubbed in after application. Second, the application of fluids to certain parts of the human body, for example, the back, require the availability of an assistant in order that proper manual application can be attempted.

[0003] The foregoing difficulties are particularly apparent in the case of artificial tanning processes. Artificial tanning has been known for more than 40 years, with artificial tanning products appearing on the U.S. market as early as 1959. The two key types of tanning processes are by colorants and bronzers.

[0004] Tanning by colorants is based on the color reaction which occurs between components of the skin and the colorant. The most commonly used chemical for artificial tanning is dihydroxyacetone (DHA). It is widely used in commercial artificial tanning products, and is recognized as safe and effective by the U.S. Food and Drug Administration (FDA). DHA reacts solely with the stratum corneum. It interacts with amines, peptides and free amino acids to generate a Maillard reaction. The resulting products are cyclic and linear polymers that have a yellow or brown color.

[0005] Two common bronzers are juglone and lawsone. Both are naphthoquinones. When applied to skin, lawsone produces an orange hue and juglone produces a greenish-brown tan. They are sometimes used in combination with DHA to modify the color or hue of the tan or to intensify the color.

[0006] Numerous forms of artificial tanning products are now on the market. They include:

[0007] lotions,

[0008] creams,

[0009] gels,

[0010] oils,

[0011] sprays.

[0012] These products are mixtures of a chemically-active skin colorant or a bronzer with combinations of the following:

[0013] moisturizers,

[0014] preservatives,

[0015] antimicrobials,

[0016] thickeners,

[0017] solvents,

[0018] emulsifiers,

[0019] fragrances,

[0020] surfactants,

[0021] stabilizers,

[0022] sun-screens,

[0023] pH adjusters

[0024] anti-caking agents,

[0025] ingredients to alter the color reaction.

[0026] Users of these products often experience significant problems associated with the current methods for applying artificial tanning formations to skin. These problems include the following.

[0027] If not properly dried, the formulation will streak or form blotches with time. The net result is a very non-uniform tan, with light or dark streaks or blotches.

[0028] Certain parts of the body will stain more intensely when the formulation is spread manually. This differential staining is due to enhance absorption of certain skin tissue and the tendency of certain tissue to retain more formulation. The result is that as the formulation is being spread manually, certain tissue absorb or trap more formulation (e.g., the wrinkles in the elbows and knees and the dense tissue in the palms).

[0029] Most products designed for manual application require components such as thickeners and polymers, which often inhibit the efficacy of DHA.

[0030] Current formulations typically take about 20 minutes to dry to the touch, and about 1 hour before not transferring from skin to textiles.

[0031] Application of artificial tanning products is additionally complicated by the tendency of these formulations to stain materials containing amine molecules, including certain fabrics, certain types of carpet, and certain wall coverings and paint.

[0032] In spite of all of these problems, artificial tanning is becoming increasingly popular. It is apparent that a need exists for a superior application system which solves the foregoing problems.

[0033] There is also a need for a superior applications system for many other applications, including but not limited to:

[0034] self-tanning formulations,

[0035] sunscreens,

[0036] suntan lotions,

[0037] tanning accelerators,

[0038] sunburn treatments,

[0039] insect repellants,

[0040] skin toners,

[0041] skin bleaches,

[0042] skin lighteners,

[0043] anti-microbial compositions,

[0044] moisturizers,

[0045] exfoliants,

[0046] nutriments or vitamins,

[0047] massage aides,

[0048] muscle relaxants,

[0049] skin treatment agents,

[0050] burn treatment agents,

[0051] decontamination agents,

[0052] cosmetics,

[0053] wrinkle treatments or removers.

[0054] There are specific and significant problems with the manual coating of each of these products. The artificial tanning application provides a good illustration of the types of problems normally encountered when manually coating these products. Artificial tanning is also one of the most demanding applications in that uniformity of the coating is critical to assure uniform tanning.

SUMMARY OF THE INVENTION

[0055] The present invention comprises a system for automatically coating the human body, including a method of and apparatus for uniformly and rapidly coating all or selected parts of the human body. The system includes apparatus which atomizes (also referred to as aerosolization, nebulization, mist generation, fog generation or spray generation) a chemical composition and deposits it uniformly over all or selected parts of the human body. It is not necessary for the individual receiving the treatment nor anyone else to manually apply any of the formulation. Also, a containment system is provided which restrains and collects residue from the application process. The system can optionally recycle the materials used.

[0056] There are several major advantages resulting from the use of the invention:

[0057] Uniform application minimizes or eliminates streaking,

[0058] No assistant is required for applying the composition,

[0059] The entire skin surface receives the same exposure to the composition, the uniformly of the coating is greatly enhanced over manual application,

[0060] The optimal formulation for atomization is very simple, and does not require the addition of components which may inhibit the efficacy of the applied material,

[0061] The application time can be as quick as a few seconds, and complete drying can occur in just a few minutes,

[0062] The containment system drastically reduces the unwanted environmental impact,

[0063] Multiple applications can be used to better control the amount of material applied per unit area, and additional substances can be applied in separate applications.

[0064] The invention may be practiced utilizing a unitary construction including both a coating chamber and apparatus for coating a person situated within the coating chamber. A door provides ingress to and egress from the coating chamber which is provided with vertically disposed arrays of spray discharging nozzles situated at spaced apart points around the periphery of the chamber. A blower circulates air through the coating chamber to effect drying following the coating procedure and to aid in containment of excess spray. An air compressor supplies liquid for coating and compressed air for spraying the coating liquid to the nozzles situated within the coating chamber.

REFERENCES

[0065]

U.S. Pat. documents

3,932,151	1/1976	Lau	55/229
4,231,289	11/1980	Domicent	98/115
5,268,166	12/1993	Barnett	424/047

Foreign patent documents

WO 94/12146 6/1994	PCT Int'l Appl.

[0066] Other publications

[0067] Akins, F. J. and Marlowe, E., "Non-Carcinogenicity of Dihydroxyacetone by Skin Painting," Journal of Environmental Pathology and Toxicology, 5: No. 5, pp. 349-351 (1984).

[0068] Federal Register, "Color Additive Dihydroxyacetone" 38: No. 148, p. 21615, Aug. 2, 1973.

[0069] Futterer, E., "Theory and Practice of Artificial Tanning: Literature and Patent Survey," Cosmetics and Perfumes, 88: No. 8, pp. 31-33 (1973).

[0070] Johnson, J. A. and Fusaro, R. M., "Persistence of Skin Color and Fluorescence after Treatment with Dihydroxyacetone," Dermatology 188: pp. 247 (1994).

[0071] Kurz, T., "Formulating Effective Self-Tanners with DHA," Cosmetics and Toiletries, 109: No. 11, starting p. 55 (1994).

[0072] Levy, S. B., "Dihydroxyacetone-Containing Sunless or Self-tanning Lotions," Journal of the American Academy of Dermatology, 27: No. 6, pp. 989-993 (1992).

[0073] "Spray Application Processes," BINKS training brochure TD49-2R-4, August, 1995, BINKS Manufacturing Company, Franklin, Ill.

BRIEF DESCRIPTION OF THE DRAWINGS

[0074] A more complete understanding of the invention may be had by reference to the following Detailed Description when taken in conjunction with accompanied Drawings, wherein:

[0075] **FIG. 1** is a flow chart illustrating the invention;

[0076] **FIG. 2** is a diagrammatic illustration of the system for automatically coating the human body of the present invention comprising the minimum requirements thereof;

[0077] **FIG. 3** is an illustration similar to **FIG. 2** wherein the system of the present invention is further provided with containment apparatus;

[0078] **FIG. 4** is an illustration similar to **FIG. 3** wherein the system of the present invention is further provided with an air ventilation apparatus;

[0079] **FIG. 5** is an illustration similar to **FIG. 4** wherein the system of the present invention is further provided with collection apparatus for residual spray;

[0080] **FIG. 6** is an illustration similar to **FIG. 5** wherein the system of the present invention is further provided with apparatus to effect rotation of the human body being coated;

[0081] **FIG. 7** is an illustration similar to **FIG. 6** wherein the system of the present invention is further provided with multiple discharge nozzles;

[0082] **FIG. 8** is an illustration similar to **FIG. 5** wherein the system of the present invention is adapted to the coating of a selected part of the human body;

[0083] **FIG. 9** is a front view of an apparatus useful in the practice of the invention;

[0084] **FIG. 10** is a top view of the apparatus of **FIG. 9**;

[0085] **FIG. 11** is an illustration of one of the spray columns of the apparatus of **FIG. 9**;

[0086] **FIG. 12** is an enlarged view illustrating the nozzle assemblies utilized in the spray columns of the apparatus of **FIG. 9**;

[0087] **FIG. 13** is a sectional view illustrating a first excess spray containment system useful in the practice of the invention;

[0088] **FIG. 14** is a sectional view illustrating a second excess spray containment system useful in the practice of the invention;

[0089] **FIG. 15** is a perspective view further illustrating the excess spray containment system of **FIG. 14**;

[0090] **FIG. 16** is a perspective view illustrating a third excess spray containment system useful in the practice of the invention;

[0091] **FIG. 17** is a sectional view illustrating a fourth excess spray containment system useful in the practice of the invention; and

[0092] **FIG. 18** is a sectional view illustrating a fifth excess spray containment system useful in the practice of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0093] Referring now to the Drawings, and particularly to **FIG. 1**, the system for automatically coating the human body of the present invention may comprise an automated coating system for numerous types of formulations, including but not limited to the application of:

[0094] self-tanning formulations,

[0095] sunscreens,

[0096] suntan lotions,

[0097] tanning accelerators,

[0098] sun-burn treatments,

[0099] insect repellants,

[0100] skin toners,

[0101] skin bleaches,

[0102] skin lighteners,

[0103] anti-microbial compositions,

[0104] moisturizers,

[0105] exfoliants,

[0106] nutriments or vitamins,

[0107] massage aides,

[0108] muscle relaxants,

[0109] skin treatment agents,

[0110] burn treatment agents,

[0111] decontamination agents,

[0112] cosmetics,

[0113] wrinkle treatments or removers.

[0114] The first component of such a system is the chemical composition. The suitability of a composition for coating is strongly influenced by its viscosity, with the preferred viscosity being close to that of water (1 centipoise). Compositions with viscosities in the 1 to 10 centipoise range generally atomize well, and viscosities in the 10 to 100 range can be atomized, but the resulting spray is not as fine. Higher viscosities can be atomized, and will work, but the spray is not as fine. Most currently marketed compositions of the aforementioned applications can be made suitable for atomization either as is or with appropriate dilution.

[0115] By way of example, a more detailed description of functional compositions for use in practice of the invention will be based on artificial tanning compositions. Six such compositions are given in Compositions 1, 2, 3, 4, 5, and 6. Individuals skilled in this art can create other compositions.

COMPOSITION 1

Ingredient	%
Dihydroxyacetone	3
Water	97

[0116]

COMPOSITION 2

Ingredient	%
Dihydroxyacetone	3.0
Denatured Ethanol	20.0
Water	77.0

[0117]

COMPOSITION 3

Ingredient	%
Dihydroxyacetone	12.0
Denature Ethanol	20.0
Water	68.0

[0118]

COMPOSITION 4

Ingredient	%
Dihydroxyacetone	10.0
Commercial Sunless-Tanning Lotion	15.0
Water	75.0

[0119]

COMPOSITION 5

Ingredient	%
Dihydroxyacetone	9.0
Commercial moisturizer	20.0
Citric acid	0.3
Commercial bath product	0.6
Bronzer	6.0
Water	64.1

[0120] By way of example, a suitable commercial moisturizer would include Vaseline Brand Intensive Care Aloe and Naturals lotion (Chesebrough-Ponds, Greenwich, Conn.), and a suitable commercial bath product would include Vaseline Brand Intensive Care Foaming Creme Bath (Chesebrough-Ponds, Greenwich, Conn.). The bronzer is a combination of FD&C dyes that yield a golden brown color.

COMPOSITION 6

Ingredient	%
Bronzer	8.0
Commercial moisturizer	20.0

-continued

COMPOSITION 6

Ingredient	%
Commercial bath product	0.6
Ethoxydiglycol	2.0
Water	69.4

[0121] By way of example, a suitable commercial moisturizer would include Vaseline Brand Intensive Care aloe and Naturals lotion (Chesebrough-Ponds, Greenwich, Conn.), and a suitable commercial bath product would include Vaseline Brand Intensive Care Foaming Creme Bath (Chesebrough-Ponds, Greenwich, Conn.). The bronzer is a combination of FD&C dyes that yield a golden brown color.

[0122] By way of example, suitable commercial preparations include Coppertone® Oil-Free Sunless Tanner (Schering-Plough, Memphis, Tenn.), Neutrogena® Glow Sunless Tanning Lotion for Face and Body (Neutrogena, Los Angeles, Calif.), and Kroger® Sunless Tanning Cream (Kroger, Cincinnati, Ohio).

[0123] Compositions 1, 2 and 3 are greatly simplified versions of the formulations now on the market or reported in the past. This simplification is possible due to the use of the present invention for applying compositions to skin. These simplified compositions have several advantages over more complex formulations, including:

[0124] faster drying,

[0125] less potential inhibition of DHA efficacy,

[0126] less potential for irritation from chemical components (because there are fewer components),

[0127] less residue on the skin,

[0128] less expensive,

[0129] more environmentally friendly.

[0130] Compositions 4 and 5 illustrate how a commercial formulation not particularly well suited for atomization can be diluted, effectively atomized and uniformly coated on human skin. Similar dilutions of products representing the other aforementioned applications can be effectively atomized and coated on human skin.

[0131] There is no pH adjustment required for these compositions, although the pH can be adjusted to alter the hue of the resulting tan and to alter the dihydroxyacetone stability. The optimal tanning occurs with DHA at a pH of below 6.0, preferably with the solution at pH 3.0 to 4.0. Unbuffered DHA has a pH of about 5.5. The pH on the surface of human skin is also about 5.5. Nonetheless, these formulations can be used over a wide pH range, and buffers or pH adjusters can be added.

[0132] A preferred colorant is DHA. DHA is available from Rona (Hawthorne, N.Y.). It is effective, safe, and approved by the FDA for this application. The preferred DHA concentration is 0.5% to 20%,with a more preferred range of 3.0% to 15.0%, and a most preferred range of 5% to 12%. Numerous other colorants can also be used. Those agents include, but are not limited to:

[0133] crotonaldehyde

[0134] pyruvaldehyde

[0135] glycolaldehyde

[0136] glutaraldehyde

[0137] otho-phthaldehyde

[0138] sorbose

[0139] fructose

[0140] erythrulose

[0141] methylvinylketone

[0142] food coloring

[0143] Various dyes and UV blocking agents can be covalently linked to the colorant or can be mixed into the composition with the colorant.

[0144] Bronzers can also be used in combination with or as an alternative to DHA. Bronzers which can be used include, but are not limited to, lawsone and juglone. Combinations of DHA and bronzers can also be used, and can be used to modify the resulting color (hue) and intensity of the tan. The preferred range for lawsone, juglone, and FD&C dyes is 0.5% to 10.0% with the more preferred range of 1.0% to 5.0%.

[0145] Composition 6 is an example of a formulation containing only bronzers (no DHA). The preferred range of FD&C dyes in commercially formulated liquid form (e.g., food coloring by Adams Extract Co., Austin, Tex.) is 1 to 50%, with a more preferred range of 4 to 12%. Ethoxydiglycol is added to enhance the penetration of the dyes into the skin, to reduce transfer to clothing, and to assist in the stabilization of the formulation. The preferred ethoxydiglycol range is 1 to 20%, with a more preferred range of 2 to 10%.

[0146] Alcohol can be added to the composition to accelerate the rate of drying. Denatured ethanol (USP grade, commodity chemical) works well in this capacity. The preferred range for alcohol concentration is from 1.0% to 50.0%, with a more preferred range from 10.0% to 30.0%, and a most preferred concentration of 20.0%.

[0147] Other potential additives include:

[0148] moisturizers,

[0149] preservatives,

[0150] antimicrobials,

[0151] thickeners,

[0152] solvents,

[0153] emulsifiers,

[0154] fragrances,

[0155] stabilizers,

[0156] sun-screens,

[0157] surfactants,

[0158] pH adjusters,

[0159] anti-caking agents,

[0160] ingredients to alter the color reaction.

[0161] It typically requires about 100 ml of a 5.0% DHA composition to obtain a medium to dark tan over an entire adult body (about 2 square meters of skin). A single application of about 250 ml of a 9% dihydroxyacetone composition over an entire adult human body will result in a very dark tan. The exact amount of dihydroxyacetone required depends on the skin type and intensity of tan desired. The tan can last for about 2 to 7 days, but usually lasts for 3 to 4 days. Multiple applications will darken the tan.

[0162] The second component of the invention is the atomization of the composition. The required atomization can be obtained by a host of ways, most of which involve passing the composition through an orifice under pressure. Methods now used to atomize solutions include the use of the following systems:

[0163] air atomization

[0164] siphon feed

[0165] gravity feed

[0166] pressure feed

[0167] internal atomization

[0168] external atomization

[0169] low pressure low volume

[0170] high volume low pressure

[0171] airless atomization

[0172] pressurized through small orifices

[0173] air-assisted

[0174] air-assisted heated

[0175] electrostatic

[0176] using charged particles

[0177] heated charged particles

[0178] high speed rotational atomizers

[0179] ultrasonic

[0180] These forms of atomization are the basis for most methods of producing atomized sprays, including misting and nebulization.

[0181] Using a single airless sprayer with a tip orifice of 0.6 mm, with a circular spray pattern of 12 inches at 12 inches from the tip, and with a flow rate of approximately 400 ml/min. the entire body (excluding the bottom of the feet) of an average-sized person can be coated with solution in 5 to 15 seconds. In practice, the underside of the feet usually get slightly tanned also from exposure to small quantities of residual artificial tanning composition on the floor of application area. The use of a single airless sprayer to apply a composition to human skin is illustrated in **FIG. 2**. In this figure and subsequent figures, **11** designates the orifice for atomization of the composition, **12** designates the atomized spray, and **13** designates the subject being sprayed. In this configuration, an operator must direct the flow of the spray. The configuration illustrated in **FIG. 2** would also work for any of the other atomization methods aforementioned, and for any of the applications aforementioned. The

preferred atomization method is the pressure-fee air-atomization system, with an internal or external atomization configuration.

[0182] For a person to be coated as illustrated in **FIG. 2** with an artificial tanning composition (or any composition of the applications aforementioned), several precautions should be taken. First, the person should hold their breath during the application and during the time required for the spray to clear. If this process is done in an open area, the coating should take about 5 to 15 seconds and the clearing of residues should take 1 to 10 seconds. Thus, the person would need to hold their breath for 6 to 25 seconds. Alternatively, they could wear a filter over their mouth, have a filter inside of their mouth, or use a breathing tube. They can also wear nose plugs or filters. Second, the eyes should be protected even though most of these formulations are not likely to injure the eye. The simplest and most effective protection is to keep the eyes closed. Goggles or patches also work well, although they leave uncoated areas that must be subsequently coated manually. Next, precautions need to be taken if one wants to avoid the exposure of scalp hair. Scalp hair can be protected with a shower cap or any other similar protective covering impervious to the coating compositions. Also, hair can be coated with a water insoluble material such as petroleumjelly. Similar protection can be used to protect hair on any other parts of the body. Next, if atomization is from a single source, it is recommended that the person being coated turn while being coated, or that the coating apparatus be moved around the person being coated, or there be a combination of these movements. Finally, care must be taken that the nozzle remain at least several inches from the person being coated to prevent any possible injection of composition into the person. Generally, spray injection occurs at pressures greater than 500 psi with the person actually contacting the atomization orifice. The pressures here are less than 80 psi, and more typically 10 to 40 psi, and the person being coated should be a foot or more from the orifice.

[0183] The issue of what to wear during coating is usually of great concern to the person being coated. In the case of coating with artificial tanning solution, the selection of what to wear is a matter of preference for the person being coated. The subject can be coated nude, with underwear, with a bikini or a bathing suit, or with some form of pasties covering their private parts.

[0184] The third component of the invention is containment of the spray. Containment is illustrated in **FIG. 3**. In this figure and subsequent figures, **14** and **15** designate side panels and **16** and **17** designate the top and bottom panels, respectively. This type of containment is similar to the containment of spray paint using paint booths in automobile refinishing. Alternatively, spray containment can be obtained using electrostatic forces, where the atomized spray is charged and the residual charged spray is removed by activating charged collection plates. Of course, precautions must be taken so that the person being sprayed and the operator are isolated from the charged plates.

[0185] Containment of the spray is very important for several reasons. These reasons include but are not limited to:

[0186] reducing waste,

[0187] avoiding spray getting onto and staining items in the immediate surroundings,

[0188] facilitating capture and recovery processes,

[0189] better control of air flow,

[0190] better control of temperature and humidity.

[0191] This type containment facilitates the use of this invention in enclosed areas such as stores or medical facilities.

[0192] Control of air and spray flow is very important to the quality of the skin coating. It is highly preferable to have an exhaust fan drawing the spray towards the person being coated, and the residual composition out of the booth. In **FIG. 4** is shown the addition of an exhaust fan **18**. The fan offers several significant advantages to the invention. These advantages include but are not limited to:

[0193] better control of air flow

[0194] shorter exposure to residue spray, requiring less time to hold breath or breathe through filter or air line

[0195] faster drying of the coated composition on skin

[0196] better quality coating

[0197] The fan 18 should have a flow of 10 to 5000 cubic feet per minute per square foot of opening, preferably 50 to 1000 cubic feet per minute per square foot, and most preferably 100 to 400 cubic feet per minute per square foot. At flow rates of below 100 cubic feet per minute per square foot, the air movement is sufficient to guide the atomized spray through the containment area. At flow rates of 100 to 400 cubic feet per minute per square foot, the atomized spray is being actively drawn through the containment area and the application and drying process is enhanced. At rates above 400 cubic feet per minute per square foot, the atomized spray is being accelerated and the exhaust flow plays a much more prominent role in the application process. The flow rate of the air through the containment area is therefore a major parameter which can be varied to modify the characteristics of the coating of the artificial tanning composition to the skin. The drying time for the composition deposited on skin is also effected by flow rate, with drying time decreasing as flow rates increase. At rates above 100 cubic feet per minute per square foot, the drying time (to the point of no transfer to other surfaces upon contact) is less than 5 minutes.

[0198] At any flow rate above 10 cubic feet per minute per square foot, the residual atomized spray is completely removed from the containment area within one second. This rapid removal is important to minimize the time the person being tanned is exposed to spray and has the potential to inhale this spray. In the absence of this air flow, the residual spray lingers in the area for several minutes, and traces can be detected hours later. This vigorous flow also protects any individuals or operators near the atomizing orifices from back spray.

[0199] The final element of this invention is recovery, or filtering, of residual composition. This feature greatly enhances the utility of the invention because it allows the system to be self-contained in an indoor environment and promotes a more environmentally friendly process. Without a recovery system, there is a potential for the exhausted residue to stain anything it contacts. Also, there could be an

accumulation of residue with time. One configuration of the recovery system is shown in **FIG. 5**. In this figure and subsequent figures, the recovery system or filter is denoted as **19**. Recovery of both particulates and solvents is possible. Potential filters include a high-efficiency filter such as Binks' (Franklin Park, Ill._ Paint Pockets or Columbus Industries' (Ashville, Ohio) High-Capacity Supra Mini-Mesh, a form of a carbon filter, a water-wash filter, or an exchange-type resin. The efficiency of particulate and solvent removal should be greater than 99%. As an alternative to high-efficiency filtering, the spray residuals could be vented to the outside environment.

[**0200**] Additional features adding to the utility of the invention are shown in **FIG. 6** and **FIG. 7**. In **FIG. 6** there is shown the addition of a motorized turntable **20**. This turntable **20** will rotate the person being coated, eliminating rotation by the individual as a possible source of error or problems. It also is a major convenience for the person being coated. The preferred rate of rotation is in the range of 1 to 60 rpm, with a more preferred range of 5 to 20 rpm, with a most preferred rate of rotation of 12 rpm.

[**0201**] In **FIG. 7** there is shown the use of multiple atomizing orifices. The use of multiple orifices facilitates the automation of this process, and reduces operator effort and potential error. It also reduces the time required to fully coat an individual. The typical round spray pattern is about 12 inches wide at 8 to 12 inches from the orifices, so a preferred spacing of multiple orifices will be 8 to 12 inches apart, but could be positioned from 1 to 48 inches apart. Fan patterns from wide-angle nozzles at 18 inches are typically 24 inches long and 9 inches wide. Using the preferred configuration, an individual can be coated in 5 seconds or less. In **FIG. 7**, the orifices are aligned in a vertical pattern. The coverage of more area at one time could also be obtained by rapidly moving one or more orifices along a track or by rapidly altering the angle of the orifice. Other patterns are possible, including combinations of vertical and horizontally aligned orifices. Orifices could also be aligned radially, with the subject being sprayed with orifices aligned from 0 to 360°. Another alignment is a horizontal ring containing orifices that surround the body. By vertically raising and lowering the horizontal ring, the entire body or selected parts of the body could be coated.

[**0202**] In an open environment, such as a beach or a park, a modified version of configuration illustrated in **FIG. 7** could be used to rapidly coat an individual. It would even be possible to have a walk-through coating system. An atomized spray could be produced from multiple nozzles arranged in a single line (as shown in **FIG. 7**), in two single lines facing one another and about 36 to about 48 inches apart, or multiple lines of nozzles. The preferred configuration is multiple lines, with 4 lines being adequate. The atomized spray results in an area of intense atomized solution, which would coat an individual standing in that area. The residual spray would then be dissipated into the surrounding environment. A fan could be used to accelerate the removal of the residuals from the coating area.

[**0203**] **FIG. 8** illustrates how the system of the present invention can be used to tan a selected part of the body. In this case, just the face is being tanned. In this figure the bottom panel of the apparatus **22** contains an opening through which one can insert his or her head. The top panel **23** is arched. The high-efficiency filter is **19**. The fan and back panel is **15**. Alternately, the setup as shown in FIGS. **2-7** could be used to tan only a select part of the body by protecting the area not desired to be tanned with appropriate barrier apparel or by screens between the atomized spray and the regions of the skin not to be coated. The barrier apparel could be any material impervious to the atomized coating composition. For example, materials appropriate for use with the aforementioned coating compositions include vinyl, polyurethane, and latex rubber. The screens can be sheets composed of any material impervious to the atomized artificial tanning compositions, including most metals orplastics. A preferred screening material is foam with an impervious aluminum foil backing. The foam is aligned with the backing away from the atomizing orifice. The foam is preferred because it absorbs much of the atomized spray, reducing back deflection.

[**0204**] **FIGS. 9, 10, 11**, and **12** illustrate an apparatus which may be utilized in the practice of the invention. The apparatus **30** comprises a unitary construction which includes both a coating chamber **32** adapted to receive a person to be coated with a predetermined substance and various components utilized to effect spraying of the predetermined substance onto the person situated within the coating chamber **32**.

[**0205**] The coating chamber **32** includes a door **34** which affords ingress to and egress from the coating chamber. The coating chamber **32** is further provided with a plurality of spray columns **32**. As is best shown in **FIG. 10**, the spray columns **36** are located at spaced apart points around the periphery of the chamber **32**. Those skilled in the art will appreciate the fact that neither the number nor the precise location of the spray columns **36** is critical to the practice of the invention, and that other spray column arrangements may be utilized in the practice of the invention, if desired.

[**0206**] The spray columns **36** are preferably supported for pivotal movement through predetermined arcs under the action of a pneumatic cylinder **38**. In this manner the predetermined material is discharged from the spray columns **36** in such a way as to assure uniform coating of the predetermined material on a person situated within the spray chamber **32**. The pneumatic cylinder **38** is connected to the pivoting mechanism of each of the spray columns **36** through a plurality of links **40**.

[**0207**] Referring again to **FIG. 9**, further includes a blower **46** which directs a flow of air upwardly along an air guide **48** and then laterally along a top panel **50** into engagement with a plurality of baffles **52**. The baffles **52** direct the air from the blower **46** downwardly through the coating chamber **32**, whereby the flowing air effects drying of the sprayed material and aids in recovery of the sprayed material for reuse. From the coating chamber **32** the air is directed through a plurality of filters **54** and is returned to the blower **46**.

[**0208**] The predetermined material which is to be coated onto a person situated within the coating chamber **32** is preferably provided in the form of a liquid which is received in a reservoir **60**. The interior of the reservoir **60** is pressurized by compressed air which is received from an air compressor **62** through an air tank **64**. Compressed air from the air compressor **62** in the tank **64** is also directed to an air tank **66** and to a manifold **68**. The air tank **66** provides

compressed air for operating the pneumatic cylinder (**FIG. 10**). The manifold **68** directs compressed air the spray columns **36**.

[**0209**] Ideally, all of the liquid from the reservoir **60** which is discharged from the spray columns **36** would be received on the body of the person within the coating chamber **32**. In actual practice, it is not possible to obtain 100% efficiency in the coating procedure. Excess liquid which is discharged from the spray columns moves downwardly under the action of gravity onto a drain ramp **72**. A drain pump **74** receives the excess liquid through a suction pipe **76** and delivers it to an appropriate drain.

[**0210**] Referring to **FIGS. 11 and 12**, each spray column **36** includes an inner tubular passageway **84** which receives liquid from the reservoir **60** under the action of compressed air supplied by the air compressor **62** through the tank **64** and an outer tubular passageway **86** which receives compressed air from the manifold **68**. Each spray column **36** is provided with a plurality of nozzles **88**. Each nozzle **88** receives compressed air from the outer tubular passageway **86** through a quick disconnect **90** and receives liquid from the inner tubular passageway **84** through a quick disconnect **92**. A check valve **94** prevents reverse flow of liquid back through the quick disconnect **92**.

[**0211**] Referring now to **FIG. 13**, there is shown an excess spray recovery system **100** which may utilized in conjunction with the method of and apparatus for automatically coating the human body of the present invention in lieu of, for example, the filters **19** illustrated in **FIGS. 5, 6, 7**, and **8** and described hereinabove in conjunction therewith or the filters **54** illustrated in **FIG. 9** and described hereinabove in conjunction therewith. An apparatus for automatically coating the human body comprising the present invention includes a coating chamber **102** for receiving a person to be coated. The coating chamber **102** includes a plurality of walls **104** only one of which is shown in **FIG. 13**. A liquid discharge apparatus **106** is positioned at the upper end of the wall **104**. The liquid discharge apparatus **106** may comprise a pipe or tube having a plurality of discharge outlets or discharge nozzles each for discharging liquid from the pipe or tube onto the wall **104**. Other types and kinds of liquid discharge apparatus may also be utilized in the practice of the invention.

[**0212**] As illustrated at **108** the liquid discharge apparatus **106** discharges liquid onto the interior surface of the wall **104**, it being understood that the liquid discharge apparatus **106** would normally discharge liquid onto all of the walls **104** comprising the coating chamber **102**. In the usual circumstance the liquid discharged by the liquid discharge apparatus **106** would comprise ordinary tap water. However, other liquids may also be utilized in the practice of the invention depending upon the requirements of particular applications thereof.

[**0213**] Liquid discharged from the liquid discharge apparatus **106** onto the interior surface of the wall **104** travels downwardly thereon under the action of gravity. Excess spray generated by operation of the apparatus for automatically coating the human body engages the falling liquid and is dissolved therein. The liquid having the excess spray dissolved therein falls into a suitable receptacle **110** such as a gutter. The receptacle **110** transports the liquid having the excess spray dissolve therein into a suitable drain.

[**0214**] **FIGS. 14 and 15** illustrate an excess spray recovery system **120** which may utilized in conjunction with the method of and apparatus for automatically coating the human body of the present invention in lieu of, for example, the filters **19** illustrated in **FIGS. 5, 6, 7**, and **8** and described hereinabove in conjunction therewith or the filters **54** illustrated in **FIG. 9** and described hereinabove in conjunction therewith. An apparatus for automatically coating the human body comprising the present invention includes a coating chamber **122** for receiving a person to be coated. The coating chamber **122** includes a plurality of walls **124** only one of which is shown in **FIGS. 14 and 15**. A liquid discharge apparatus **126** is positioned at the upper end of the wall **124**. The liquid discharge apparatus **126** may comprise a pipe or tube having a plurality of discharge outlets or discharge nozzles each for discharging liquid from the pipe or tube **124**. Other types and kinds of liquid discharge apparatus may also be utilized in the practice of the invention.

[**0215**] An open mesh screen **128** is positioned adjacent to and extends substantially parallel to the wall **124**, it being understood that a similar screen is employed in conjunction with each of the walls comprising the coating chamber **122**. As illustrated at **129** the liquid discharge apparatus **126** discharges liquid onto the upper end of the screen **128**, it being understood that the liquid discharge apparatus **126** would normally discharge liquid onto screens located adjacent to each of the walls **124** comprising the coating chamber **122**. In the usual circumstance the liquid discharged by the liquid discharge apparatus **126** would comprise ordinary tap water. However, other liquids may also be utilized in the practice of the invention depending upon the requirements of particular applications thereof.

[**0216**] Liquid discharged from the liquid discharge apparatus **126** onto the screen **128** travels downwardly thereon under the action of gravity. Excess spray generated by operation of the apparatus for automatically coating the human body engages the falling liquid and is dissolved therein. The liquid having the excess spray dissolved therein falls into a suitable receptacle **130** such as a gutter. The receptacle **130** transports the liquid having the excess spray dissolve therein into a suitable drain. The open mesh construction of the screen **128** allows excess spray to flow therethrough thereby improving contact between the excess spray and the falling liquid.

[**0217**] Referring now to **FIG. 16**, there is shown an excess spray recovery system **150** which may utilized in conjunction with the method of and apparatus for automatically coating the human body of the present invention in lieu of, for example, the filters **19** illustrated in FIGS. **5,6,7**, and **8** and described hereinabove in conjunction therewith or the filters **54** illustrated in **FIG. 9** and described hereinabove in conjunction therewith. An apparatus for automatically coating the human body comprising the present invention includes a coating chamber **152** for receiving a person to be coated. The coating chamber **152** includes a plurality of walls **154** only one of which is shown in **FIG. 16**.

[**0218**] As illustrated at **156**, during operation of the apparatus for automatically coating the human body, excess spray, that is, spray which is not received on the bodies of the person being coated, is deposited on the walls **154** of the coating chamber **152**. Periodically the deposited excess spray is removed preferably by scraping. The removed

excess spray is accumulated and appropriately disposed of. Alternatively, the accumulated excess spray can be removed by washing the walls **154** with water or other liquid.

[**0219**] **FIG. 16** illustrates an excess spray recovery system **160** which may utilized in conjunction with the method of and apparatus for automatically coating the human body in the present invention in lieu of, for example, the fillers **19** illustrated in **FIGS. 5, 6, 7**, and **8** and described hereinabove in conjunction therewith or the filler **54** illustrated in **FIG. 9** and described hereinabove in conjunction therewith. An apparatus for automatically coating the human body comprising the present invention includes a coating chamber **162** for receiving a person to be coated. The coating chamber **162** includes a top wall **164** having an exhaust port **165** formed therein. The exhaust port **164** extends to an exhaust duct **166**. A fan **168** functions to withdraw air from the interior of the coating chamber **162** through the exhaust duct **166**.

[**0220**] During operation of the apparatus for automatically coating the human body, excess spray, that is, spray which is not received on the body of the person being coating is withdrawn from the coating chamber **162** by operation of the fan **168**. Operation of the fan **168** also causes intake of fresh air through an inlet **170**. The inlet **170** and the exhaust duct **166** form a venturi. Due to the venturi effect, the fresh air received through the inlet **170** is thoroughly mixed with the air received through the exhaust duct **166** and having excess spray entrained therein. In this manner the excess spray is thoroughly diluted to the point that the mixture of the air having the excess spray entrained therein received through the exhaust duct **166** and the fresh air received through the inlet **170** can be discharged directly to the atmosphere without violating environmental regulations.

[**0221**] Referring to **FIG. 18**, there is shown an excess spray recovery system **180** which may be utilized in conjunction with the method of and apparatus for automatically the human body in present invention in lieu of, for example, the floaters **19** illustrated in **FIGS. 5, 6, 7**, and **8** and described hereinabove in conjunction therewith or the filters **54** illustrated in **FIG. 9** and described hereinabove in conjunction therewith. An apparatus for automatically coating the human body comprising the present invention includes a coating chamber **182** for receiving a person to be coated. The coating chamber **182** includes a top wall **184**. The top wall **184** has an exhaust port **185** formed therein which extends to an exhaust duct **186**. A fan **188** functions to withdraw air from the interior of the of the coating chamber **182** through the exhaust duct **186**.

[**0222**] During operation fo the apparatus for automatically coating the human body, excess spray, that is, spray which is not received on the body of the person being coated is entrained in the air which is withdrawn from the coating chamber **182** through the exhaust duct **186** under the action of the fan **188**. A discharge nozzle **190** injects water into the air flowing through the exhaust duct **186** under the action of the fan **188**. The water discharged by the discharge nozzle **180** dilutes the excess spray entrained in the air flowing through the exhaust duct **186**. The dilution achieved by the injection of water from the discharge nozzle **190** into the entrained excess spray is sufficient that the air, excess spray, and diluting water can be discharged from the exhaust duct **186** directly into the atmosphere without violating environmental regulations.

Features Contributing Significantly to the Successful Operation of an Automated Coating System for the Human Body Incorporating the Invention

[**0223**] Preferred Formula:

The preferred formula is a combination of water, dihydroxyacetone, bronzer, moisturizer, surfactant, and penetration enhancer. The formula is:

water	base	62.6%	36%–85.9%
dihydroxyacetone	self-tanning	9.0%	3%–15%
bronzer*	cosmetic colorant	5.0%	0%–10%
ethoxy diglycol	penetration enhancer	4.0%	0%–10%
commercial moisturizer lotion**	film former, viscosity	18.0%	10%–25%
commercial bath product***	surfactant	1.2%	0%–2%
citric acid	pH adjustment	0.2%	0.1% to 1.0%

*By way of example, a suitable bronzer would be a combination of the following food dyes provided by Adams Extract Company, Austin Texas: 4 parts red, 2 parts yellow, 1 part green, and 3 parts purple.
**By way of example, a suitable commercial moisturizer lotion includes Vaseline Intensive Care Lotion (Aloe Vera Triple Action Formula, Chesebrough-Ponds, Greenwich, CT).
***By way of example, a suitable commercial bath product includes Vaseline Intensive Care Foaming Creme Bath (Chesebrough-Ponds, Greenwich, CT).

[**0224**] Foot Shields:

[**0225**] The feet are one of the most difficult parts of the body to coat uniformly. This difficulty is due in large part to the irregular structure of feet. Also, the downward motion of the atomized mist, both by gravity and from air currents, tends to cause the mist to settle on the tops of the feet. Therefore, the feet are provided with shields to assure a more uniform coating of the feet. The shields may take the form of a large, bottomless shoe. The shields produce a silhouette effect from the top of the feet to the toes. Holes and openings are provided in the shields which are located 0.25 to 2 inches from the feet, allowing the mist to result in a silhouette effect rather that defined lines

[**0226**] Air Shield to Deflect Air Away From the Feet:

[**0227**] To reduce the amount of mist settling on the feet, a plastic shield shaped like a **FIG. 8** is placed between the fleximat flooring the user stands on and the metal grating supporting the fleximat. Dimensions of the figure eight are two 18 inch diameter overlapping circles with a total width of 26 inches. The total width can vary from 18 inches to 36 inches, and the circle diameters can vary from 12 inches to 20 inches

[**0228**] Toweling Buffing After Coating:

[**0229**] After coating it is advantageous to use a towel rub to buff over the entire body to yield a more uniform coating and to remove any areas of excess. The toweling yields a more cosmetically pleasing result and reduces transfer to clothing. It is preferred to towel using long, light strokes. A cotton bath towel 16 inches by 32 inches may be used. The towel could vary from a hand cloth (8"×8") to a large beach towel (18"×48"). Care must be taken not to rub so hard or too much as to rub off the coating (or tan). Basically, the weight of the preferred towel is adequate, without additional pressure.

[0230] Stance During Coating:

[0231] The stance using during the coating is important. After trial and evaluation of numerous methods, it has been discovered that the "ballerina stance" seems to work best. Key elements of the stance are:

[0232] hands over the head

[0233] preferred 2 inches

[0234] lower limit—hands touching head

[0235] upper limit—arms extended fully up

[0236] hands parallel to the floor

[0237] hands could be, but not recommended to be, perpendicular to floor in a praying stance, or facing downwardly

[0238] feet separated about 12 inches

[0239] to allow mist to coat inside of legs

[0240] feet are flat on flooring

[0241] use of feet shields as described above

[0242] Hair Net:

[0243] Although the above-described self-tanning solution does not turn hair orange, it may accumulate on hair. To avoid this accumulation, the user can wear a hair net or bouffant. Preferred compositions for the hair net include a cloth or plastic mesh or a continues plastic sheet.

[0244] Barrier Cream:

[0245] It has been discovered that the commercial barrier cream produced by GoJo blocks the tanning solution from the skin. During the coating process, this lotion can be used to prevent tanning of specific areas, such as the palms of the hands.

[0246] High Efficiency Filter:

[0247] The use of high efficiency filters to remove excess mist is important. Preferably, a Binks high-efficiency paint-pockets filter is used.

[0248] Recharging of Filter:

[0249] It has been discovered that the tanning solution trapped in the filter can be removed with a water rinse. The solution, which is water soluble, is flushed out using water that is back-washed (water applied to the top surface opposite of the surface facing the solution) or water, preferably under moderate (greater than 60 psi) pressure, that is hosed on the filtered surface.

[0250] Uniform Air Flow:

[0251] Uniformity of air flow is very important to assure that the mist continues to be applied uniformly over the body even after the pressurized spray stops. Air flow parameters are, in the downward motion:

most preferred	100 cfm
next preferred	50 cfm to 200 cfm
next preferred	25 cfm to 300 cfm

[0252] Warming of Air:

[0253] Atomization of liquids as done here by the nozzles results in a significant reduction in liquid temperature (as much as 20° F.). To keep the temperature to a warm, pleasant experience, four halogen lamps (250 watts each) can be added to the system to provide both illumination and heat. A coating chamber temperature of 80° F. to 110° F. is preferred, with 90° F. to 100° F. being more preferred. Other heating devices include infrared lamps and electrical heating elements.

EXAMPLES

Example 1

[0254] A twenty year old female of type III skin tanned by this process. She first applied a heart shaped sticker on her right arm. She covered her hair with a nylon mesh hair net and applied barrier cream over the palms of her hands. She tanned in the coating chamber. The formula above was coated for 7 seconds. About 300 grams of solution was applied during such time. There was a subsequent 7 second period in which the mist was circulated in the booth. The residual mist was removed from the booth and the subject dried for about 45 seconds. The subject then removed any excess lotion with a towel. The final result was that the subject was 1 to 2 shades darker after tanning. This difference was especially apparent when comparing the area under the sticker with the area with no sticker. The initial color was mainly from the bronzer, and is a deep brown color. Color was much more intense the next day, when the color was at least two shades darker than before tanning. After the subject showered, the intensity was dropped to about 1 shade darker than prior to tanning. This color, which was mainly from the dihydroxyacetone, was golden-brown. The color persisted about 1 shade darker for 3-4 days, and noticeable color was present for 7 days.

Example 2

[0255] A forty seven year old male with type II skin tanned by this process. He first applied a heart shaped sticker on his right arm. He covered his hair with a nylon mesh hair net and applied barrier cream over the palms of his hands and the bottoms of his feet. He tanned in the coating chamber. The formula above was coated for 7 seconds. About 300 grams of solution was applied during time. There was a subsequent 7 second period in which the mist was circulated in the booth. The residual mist was removed from the booth and the subject dried for about 45 seconds. The subject then removed any excess lotion with a towel. The final result was that the subject was about 1 shade darker after tanning. This difference was especially apparent when comparing the area under the sticker with the area with no sticker. The initial color was mainly from the bronzer, and is a deep brown color. Color was much more intense the next day, when the color was one to two shades darker than before tanning. After the subject showered, the intensity was dropped to about 1 shade darker than prior to tanning. This color, which was mainly from the dihydroxyacetone, was golden-brown. The subject repeated the tanning process again later the second day. This time, the initial tan from the combination of previous tan and new bronzer was about 2 shades darker than before. Even after showering the next day, the tan was about two shades darker than prior to initially tanning. The color persisted about 2 shade darker for 3-4 days, and noticeable color was present for 10 days.

Example 3

[0256] A 24 year old female with type II skin tanned as described in examples 1 and 2 for five consecutive days. The results were a highly uniform, very dark tan. Her skin color was about 3 shades darker by the end of the week. The color was golden brown. The color remained 2 to 3 shades darker for about 4 days, and some color (about 1 shade) was observed after 7 days.

Discoveries

[0257] Hair is not Turned Orange:

[0258] Self-tanning lotions have been reported to turn body hair orange. The formulation and application of the present invention do not cause the hair to turn orange. First, the formulation does not penetrate the hair, but rather beads up on it. Next, it is applied in a very thin coat. The net result is that the hair does not turn orange.

[0259] Produces a Very Uniform Tan:

[0260] The present invention facilitates the application of a thin, uniform film over the entire body. Consequently, the resulting coating and tan is far superior to manual application methods.

[0261] Bronzer Tends to Last Longer Than Expected:

[0262] The bronzer provides immediate color and a method for observing the uniformity of the tan. The uniformity of the bronzer application is greatly enhance because it is applied in a uniform thin film and its substantivity is enhanced because of deeper penetration into skin with the presence of a penetration enhancer.

[0263] Use of Ethoxy Diglycol as a Penetration Enhancer Makes the Tan Last Longer and More Uniform:

[0264] With the use of ethoxy diglycol, the duration of uniform intense tan has increase from an average of about 2 days to an average of about 4 days, and some color persists for up to 14 days.

[0265] Although preferred embodiments of the invention are illustrated in the Drawings and described in the Detailed Description, it will be understood that the invention is not limited to the embodiments disclosed, but is capable of numerous modifications and rearrangements of parts and elements without departing from the spirit of the invention.

What is claimed is:

1. In an apparatus for coating substantially the entire human body with a predetermined human skin coating material of the type including:

structure defining a coating chamber for receiving the entire body of a person to be coated;

the coating chamber comprising at least one wall;

a reservoir for receiving the predetermined human coating material in liquid form;

at least one nozzle positioned within the coating chamber for receiving the predetermined human skin coating liquid from the reservoir and for spraying the predetermined human skin coating liquid onto the skin comprising substantially the entire body of the person in the coating chamber;

apparatus for continuously moving the nozzle relative to the body of the person to be coated thereby assuring a uniform coating of the predetermined human skin coating material over substantially the entire body of the person;

the structure defining the coating chamber further comprising apparatus for containing at least part of the spray from the nozzle which is not received on the skin of the person;

apparatus for circulating air independently of the liquid discharged from the nozzle and around the body of the person to be coated and thereby containing the remainder of the spray from the nozzle which is not received on the skin of the person;

the improvement comprising:

apparatus for causing liquid to flow downwardly relative to the inside surface of at least one wall of the coating chamber for dissolving spray from the nozzle which is not received on the skin of th person; and

a container for receiving the liquid having the spray from the nozzle dissolved therein.

2. In an apparatus for coating substantially the entire body of a person with a predetermined human skin coating material in liquid form of the type including:

an enclosure defining a coating chamber for receiving the entire body of the person to be coated;

the enclosure comprising at least one wall;

a reservoir for receiving the predetermined human skin coating liquid;

at least one nozzle positioned within the coating chamber for receiving the predetermined human skin coating liquid from the reservoir and for discharging the liquid onto the skin of the person within the coating chamber;

apparatus for causing the predetermined human skin coating liquid to flow from the reservoir through the nozzle for discharge in the form of a spray;

apparatus for continuously moving the nozzle relative to the body of the person to be coated thereby assuring a uniform coating of the predetermined human skin coating material over substantially the entire body of the person;

the enclosure defining the coating chamber further comprising apparatus for containing excess spray from the nozzle which is not received on the skin of the person; and

apparatus for circulating air through the coating chamber independently of the discharge of liquid from the nozzle and around the body of the person therein during the discharge of the predetermined human skin coating liquid from the nozzle; the improvement comprising:

apparatus for causing liquid to flow downwardly along the inside surface of at least one wall comprising the enclosure for dissolving therein excess spray from the nozzle; and

apparatus for receiving the liquid having the excess spray dissolved therein.

3. In an apparatus for coating substantially the entire body of a person with a predetermined human skin coating material in liquid form of the type including:

an enclosure defining a coating chamber for receiving the entire body of the person to be coated;

the enclosure comprising at least one wall;

a reservoir for receiving the predetermined human skin coating liquid;

at least one nozzle positioned within the coating chamber for receiving the predetermined human skin coating liquid from the reservoir and for discharging the liquid onto the skin of the person within the coating chamber;

apparatus for causing the predetermined human skin coating liquid to flow from the reservoir through the nozzle for discharge in the form of a spray;

apparatus for continuously moving the nozzle relative to the body of the person to be coated thereby assuring a uniform coating of the predetermined human skin coating material over substantially the entire body of the person;

the enclosure defining the coating chamber further comprising apparatus for containing excess spray from the nozzle which is not received on the skin of the person; and

apparatus for circulating air through the coating chamber independently of the discharge of liquid from the nozzle and around the body of the person therein during the discharge of the predetermined human skin coating liquid from the nozzle; the improvement comprising:

a screen positioned within the chamber in an offset and substantially parallel relationship to one wall thereof;

apparatus for causing liquid to flow downwardly along the screen for dissolving therein excess spray from the nozzle; and

apparatus for receiving the liquid having the excess spray dissolved therein.

4. In an apparatus for coating substantially the entire body of a person with a predetermined human skin coating material in liquid form of the type including:

an enclosure defining a coating chamber for receiving the entire body of the person to be coated;

a reservoir for receiving the predetermined human skin coating liquid;

at least one nozzle positioned within the coating chamber for receiving the predetermined human skin coating liquid from the reservoir and for discharging the liquid onto the skin of the person within the coating chamber;

apparatus for causing the predetermined human skin coating liquid to flow from the reservoir through the nozzle for discharge in the form of a spray;

apparatus for continuously moving the nozzle relative to the body of the person to be coated thereby assuring a uniform coating of the predetermined human skin coating material over substantially the entire body of the person;

the enclosure defining the coating chamber further comprising apparatus for containing excess spray from the nozzle which is not received on the skin of the person;

apparatus for circulating air through the coating chamber independently of the discharge of liquid from the nozzle and around the body of the person therein during the discharge of the predetermined human skin coating liquid from the nozzle; the improvement comprising:

an outlet formed in the enclosure;

apparatus for withdrawing air having excess spray from the nozzle entrained therein from the enclosure through the outlet; and

apparatus for adding additional air to the withdrawn air and thereby reducing the concentration of the excess spray entrained therein.

5. An apparatus for coating substantially the entire body of a person with a predetermined human skin coating material in liquid form of the type including:

an enclosure defining a coating chamber for receiving the entire body of the person to be coated;

a reservoir for receiving the predetermined human skin coating liquid;

at least one nozzle positioned within the coating chamber for receiving the predetermined human skin coating liquid from the reservoir and for discharging the liquid onto the skin of the person within the coating chamber;

apparatus for causing the predetermined human skin coating liquid to flow from the reservoir through the nozzle for discharge in the form of a spray;

apparatus for continuously moving the nozzle relative to the body of the person to be coated thereby assuring a uniform coating of the predetermined human skin coating material over substantially the entire body of the person;

the enclosure defining the coating chamber further comprising apparatus for containing excess spray from the nozzle which is not received on the skin of the person;

apparatus for disposing of the contained excess spray;

apparatus for circulating air through the coating chamber independently of the discharge of liquid from the nozzle and around the body of the person therein during the discharge of the predetermined human skin coating liquid from the nozzle; the improvement comprising:

an outlet formed in the enclosure;

apparatus for withdrawing air having excess spray from the nozzle entrained therein from the enclosure through the outlet; and

apparatus for injecting liquid into the withdrawn air and thereby dissolving the excess spray entrained therein.

6. In a method for coating substantially the entire human body with a predetermined human skin self tanning material of the type including the steps of:

providing a coating chamber for receiving the entire body of a person to be coated and having at least one wall;

providing a reservoir for receiving the predetermined human skin self tanning material in liquid form;

providing at least one nozzle positioned within the coating chamber;

discharging the predetermined human skin self tanning liquid from the reservoir through the nozzle and thereby spraying the predetermined human skin self tanning liquid onto the skin comprising substantially the entire body of the person in the coating chamber;

continuously moving the nozzle relative to the body of the person to be coated during the discharging step thereby assuring a uniform coating of the predetermined human skin self tanning material over substantially the entire body of the person;

containing at least part of the spray from the nozzle which is not received on the skin of the person;

circulating air independently of the liquid discharged from the nozzle and around the body of the person to be coated and thereby containing the remainder of the spray from the nozzle which is not received on the skin of the person; the improvement comprising:

receiving spray from the nozzle which is not received on the skin of the person on at least one wall fo the coating chamber; and

periodically removing the received spray from the wall.

* * * * *