

[54] FINGERPRINT APPARATUS

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101/125, 323

[56]

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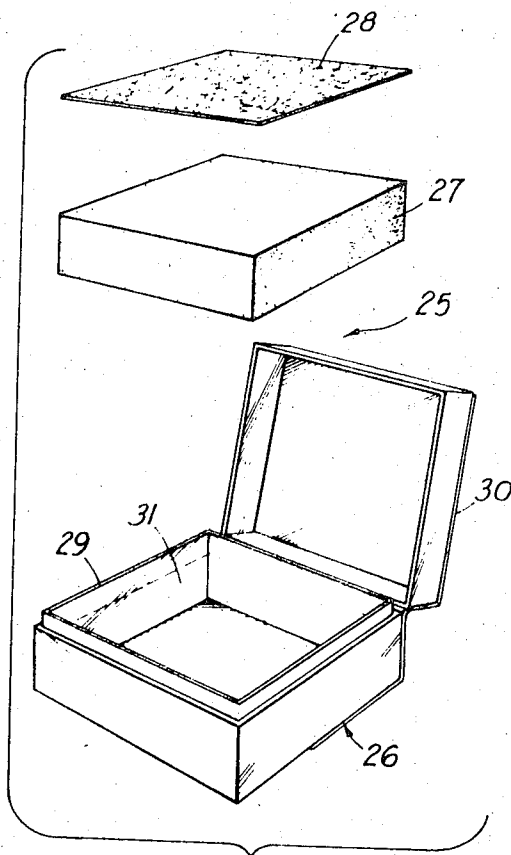
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[57]

ABSTRACT

Method and apparatus for inkless fingerprinting employing the steps of applying a reagent comprising an aromatic polyhydroxy compound having the structural formula $R-Ar(OH)_n$ wherein R is a radical selected from the group consisting of hydrogen, halogens, amides, carboxyl groups, and the n-propyl ester of a monocarboxylic acid; Ar is an aromatic selected from the group consisting of benzene and naphthalene; and n is a positive integer greater than 1, to the surface upon which the fingerprint is to be deposited, applying a ferric or vanadium salt developer to a fingertip and applying the developer-coated fingertip to the print surface. The reagent applicator includes an aerosol dispenser which is inserted into a positioning device for an application of a predetermined amount of reagent from a selected height to the print surface. Another embodiment of the reagent applicator includes a reservoir for the reagent and a porous nib in communication with the reservoir for delivering a controlled amount of reagent to the print surface. The developer applicator includes a rigid material having interconnecting voids which serves as a reservoir for the developer solution and an overlying, permeable membrane which is contacted by the fingertip.

6 Claims, 3 Drawing Figures



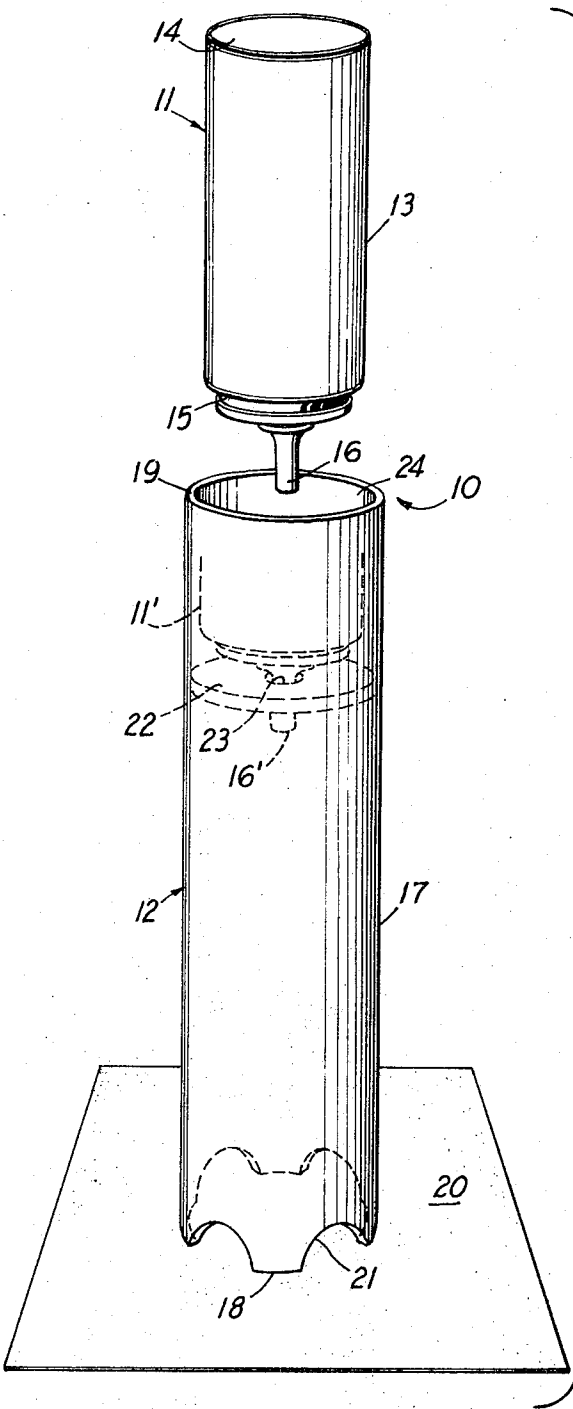


FIG 1

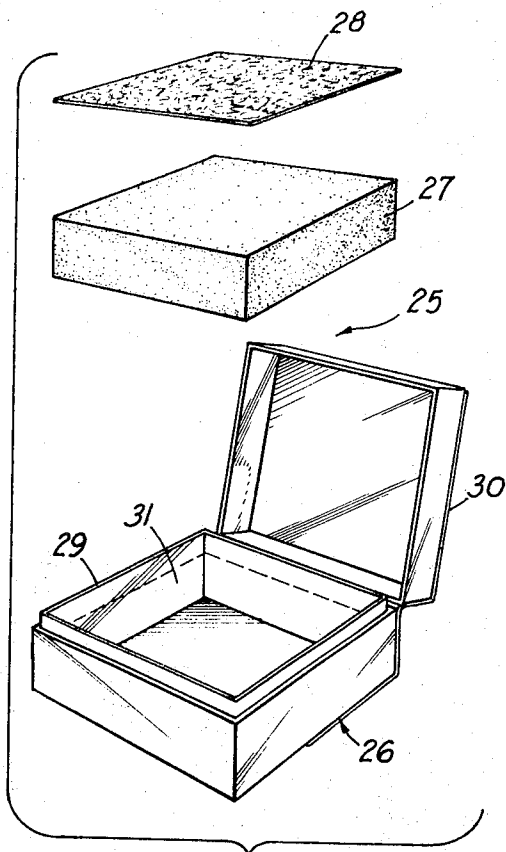


FIG 2



FIG 3

FINGERPRINT APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

There is a wide-spread need for a procedure which can be used to obtain a fingerprint of sufficiently high quality and which at the same time will be comparatively inoffensive to the person whose fingerprint is being obtained.

Fingerprints are obtained for two distinct, though interrelated purposes. One is for purposes of record; for example, as part of personnel records or as a portion of an application for a gun permit. The other is for purposes of identification. As such, it does not become a matter of permanent record, and an identification print will either be used within a given period of time or will be discarded. Admittedly, the distinction between prints for record purposes and prints for identification purposes at times becomes somewhat nebulous. Probably the greatest difference or significance is one of quality. A record print generally must be of the highest quality obtainable; although certain quality standards must be preserved, an identification print need not be of the same quality as a record print.

2. Prior Art

The patent to Heinecke, U.S. Pat. No. 2,082,735, issued June 1, 1937, discloses a method of obtaining a fingerprint wherein the finger is moistened with an oxidant solution and impressed on paper carrying gallic acid, thereby producing a colored print. Among the various oxidant solutions named as being suitable is ferric chloride in glycerine. A stamp pad is disclosed as a suitable surface for transferring the oxidant solution to the finger. The possibility of reversing the procedure, that is applying the oxidant solution to the paper and the gallic acid to the finger, is recognized. Application of gallic acid in an alcoholic solution to the paper surface by various methods such as spraying, brushing, roller coating, etc., is revealed. Among the objectives to be attained is the elimination of the messiness associated with normal fingerprinting procedures.

The patent to Freudenheim, U.S. Pat. No. 2,104,586, issued Jan. 4, 1938, discloses a method of obtaining a fingerprint wherein an iron compound, ferric oleate, is applied to the finger and then transferred to a paper surface to form an almost invisible print; the print so obtained is then developed through the application of an alcoholic solution of tannic acid.

Brutten, U.S. Pat. NO. 3,083,682, issued Apr. 2, 1963, discloses an apparatus for obtaining fingerprints in which ferric chloride is applied to the finger and then brought into contact with a surface containing tannic acid.

The patent to Evans, U.S. Pat. No. 878,366, issued Feb. 4, 1908, discloses the use of a fingerprint on a check as a means of providing identification.

Jones, U.S. Pat. No. 1,374,208, issued Apr. 12, 1921, discloses the use of a fingerprint on a check as a means of providing identification with the print being obtained by pressing the finger against a sensitized area and then subsequently developing the print.

The patent to Bean, U.S. Pat. No. 3,318,282, issued May 9, 1967, discloses the use of a fingerprint kit in supermarkets and the like as a means of providing identification for endorsers of checks.

The prior art does not teach a controlled rate at which the components are applied to the surface upon which it is desired to obtain the fingerprint, and this has been found to be a requisite for a quality print. Furthermore, it is very difficult, if not impossible, to obtain prints of the desired quality when the ferric chloride solution described in the patent literature is used.

SUMMARY OF THE INVENTION

Two components are utilized in obtaining the desired fingerprint of the present invention: (a) a reagent comprising an aromatic polyhydroxy compound having the structural formula $R-Ar(OH)_n$, wherein R is a radical selected from the group consisting of hydrogen, halogens, amides, carboxyl groups, and the n-propyl ester of a monocarboxylic acid; Ar is an aromatic selected from the group consisting of benzene and naphthalene; and n is a positive integer greater than 1; and (b) a developer selected from the group consisting of a ferric salt and a vanadium salt. Examples of reagents include propyl gallate, gallic acid, tannic acid, pyrogallol and phloroglucinol. An example of a developer is ferric chloride. It is preferred that the reagent be first applied to the paper or other surface upon which the print is to be obtained, after which the developer is applied to the fingertip and then to the previously treated surface.

One of the embodiments of the reagent applicator includes an aerosol dispenser containing the reagent solution and having a metering valve for controlling the amount of reagent discharged and a positioning device comprising a cylinder into which the dispenser is placed and which serves to place the discharge nozzle of the dispenser a predetermined distance from the print surface when the cylinder is placed in an upright position on the surface. The metering valve and the cylinder serve to control the dryness of the reagent spray at the point of impact on the print surface.

Another embodiment of the reagent applicator includes a type of marker pen having a reservoir for the reagent and a sintered polyolefin porous nib in communication with the reservoir for delivering a controlled quantity of the reagent to the print surface.

The developer applicator comprises a container with a tight fitting lid; a porous, rigid material which serves as a reservoir for the ferric or vanadium salt solution; and an overlying membrane which is permeable to the developer fluid but which is of sufficient thinness that it does not serve as a storage reservoir. The fluid is attracted into the interfacial void existing between the rigid material and the overlying membrane and is withdrawn through the membrane when the fingertip is pressed upon the membrane.

It is, therefore, a primary object of the present invention to provide an improved apparatus for obtaining inkless fingerprints.

Another object of the present invention is to provide an apparatus for imparting a permanent, identifiable fingerprint to a surface wherein a fingertip is moistened with a developer solution and is impressed on a print surface carrying a reagent solution.

A further object of the present invention is to provide an apparatus for inkless fingerprinting wherein the developer dispenser includes a porous, rigid material containing the developer fluid and an overlying, permeable membrane so that only a predetermined amount of developer is deposited on the fingertip regardless of how

much pressure is applied to the dispenser by the fingertip.

A still further object of the present invention is to provide a simple and reliable apparatus for obtaining a fingerprint upon a print surface without the means of ink.

An object of the present invention is to provide an apparatus for inkless fingerprinting wherein the ingredients employed are non-staining, non-toxic and non-caustic.

Still further objects and advantages of the present invention will become apparent after reading the accompanying description of the selected illustrative embodiments of the invention with reference to the attached drawings wherein like reference characters have been used to refer to the like parts throughout the figures of drawings, and wherein:

DESCRIPTION OF THE FIGURES OF DRAWING

FIG. 1 is an exploded, perspective view of the reagent applicator and positioning device of the present invention;

FIG. 2 is an exploded, perspective view of the developer applicator of the present invention; and

FIG. 3 is a schematic of the method of the present invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

Application of Reagent: The reagent may be applied to the paper surface long previous to the actual making of the fingerprint. For example, an application blank for a firearm, for a credit card, for a job, etc., might be printed on paper stock which is impregnated with the reagent. Methods of impregnation include normal coating techniques, dipping the stock into a solution containing the reagent dissolved therein, spraying the stock with a suitable solution, or applying the reagent to the stock at the time the fingerprint is obtained. Normally, such application will be made by means of a controlled addition of a solution containing the reagent, and the solvent must have been removed prior to the application of the developer-coated finger to the area so treated. As a general statement, previously coated stock will be used when it is desired to obtain prints of record quality; on-site application to the paper stock will be largely employed for the purpose of obtaining identification-type prints.

Application of Developer: The developer is applied to the finger in the form of a solution. After being applied to the finger, the developer is brought into contact with the reagent while the solvent component of the developer solution is still present; otherwise, the color-producing reaction will not occur. The quality of developer solution applied to the finger is critical. If an excessive amount is applied, the "valleys" on the surface of the skin will be filled and as a result the print obtained will be poorly defined. If an insufficient amount is applied, the "ridges" on the skin surface will be incompletely covered; this will result in the formation of an incomplete, fragmentary print.

Selection of Reagent Material: The reagent material must, of course, interact with the developer material to produce a colored product, preferably dark in shade. Conversely, the reagent material must be stable insofar as any reactions with paper components, air, moisture, etc. are concerned. The colored product or print so ob-

tained must be permanent to exposure to ordinary environment conditions. The minimum life of the colored product is the life of the substrata upon which the print is made. In other words, the print must be as durable as the paper upon which it is made.

In addition to its color-producing potential, the reagent material must be soluble in a range of solvents, non-toxic, non-irritating to the skin, and preferably tasteless and odorless. The conditions required for the color-producing reaction to occur must be such that they will not adversely affect the skin; for example, a color-producing reaction which could occur only in a highly alkaline environment.

The reagent component selected for the present invention is an aromatic polyhydroxy compound having the generic formula $R-Ar(OH)_n$, wherein R is a radical selected from the group consisting of hydrogen, halogens, amides, carboxyl groups and the n-propyl ester of a monocarboxylic acid; Ar is an aromatic selected from the group consisting of benzene and naphthalene; and n is a positive integer greater than 1. As a usual rule, n would probably never exceed 3.

The chemical literature indicates that the functional group which participates in the color-forming reaction is a polyphenol. To obtain a useable product, it is necessary to include "vehicles" such as a phenyl or naphthyl group for the functional groups and to further include "auxiliary" groups such as a carboxyl group. Probably the most commercially available aromatic polyhydroxy compound is either gallic acid or n-propyl gallate.

It has been found that a derivative of gallic acid, n-propyl gallate (n-propyl ester of the aromatic monocarboxylic acid) is a better reagent material than gallic acid which has been utilized in previous fingerprinting systems. This is true because it is more soluble than gallic acid in certain solvents, such as ethanol, and is therefore more adaptable to the aerosol reagent dispenser discussed herein.

Selection of Developer Material: Generally, the requirements for a developer material will be similar to those already listed for the reagent material. The preferred developer is a ferric salt, such as ferric chloride, or a vanadium salt.

In addition, the wetting characteristics of the developer solution are altered through the addition of a suitable surface active agent, whereby a relatively stable film is obtained on the ridge lines of the individual's finger and the pattern resulting therefrom is, therefore, characteristic of these lines. The addition of a wetting agent is a useful additive to the developer with an individual whose skin is unduly oily.

Controlled Rate of Application of Components: It is of the utmost importance to control the rate at which the components, particularly the reagent, is applied to the surface upon which it is desired to obtain the fingerprint as well as to control the gross quantities of components applied.

As a preliminary to any discussion of applicators, the necessity for controlling the quantity and rate of application must first be understood. Insofar as quantity is concerned, there must be sufficient reagent material present to completely cover the surface area in which the print is to be made. If the quantity is insufficient, the print in its developed state will be incomplete.

An excess of reagent will in some instances cause an off-setting of the print generated when the developer is

subsequently applied. Such off-setting results in part of the print remaining on the paper surface with the other portion being transferred to the finger. This, of course, soils the finger and serves to defeat one of the purposes for which the present fingerprinting procedure was designed. This effect is noticed most when the reagent is applied by dipping the paper to be impregnated into a solution of the reagent.

The reagent material is usually supplied in the form of a solution and an over-supply of the solvent component of the solution does create problems. These problems stem from the fact that it is frequently desirable to obtain the fingerprint on a document which has already been written or printed upon; for example, a check or a sales slip. The solvents most suitable for dissolving the reagent are also excellent solvents for many inks. Thus, if an excessive amount of reagent material should be applied, as for example to the reverse side of a check, penetration of the paper stock would occur and any writings or imprints in the area thus wetted would in all likelihood be damaged. As may be seen from the preceding, an excessive quantity of the reagent can easily prove to be the source of difficulties. However, rate of application is important because of localized over-supply, particularly of solvent, can be created through the use of an excessive rate of application even though the gross amount supplied may be within tolerable limits. This frequently happens when a relatively volatile material is employed as the solvent component. If applied at a reasonable rate to the desired surface area, evaporation of the solvent occurs and prevents the accumulation of an excessive amount. If applied at an excessive rate, flooding occurs. Now, to proceed with a description of the various methods of applying the components to the printing surface and the finger of the individual.

Preimpregnation of Surface Upon Which the Print is to be Obtained: There are two procedures which are employed. The first is to dip the paper into a reagent solution of the proper strength, withdraw the paper and allow the solvent portion of the solution to evaporate. It is necessary that the concentration of the reagent in the solution be varied should the type paper be changed. For example, a coated stock such as is used for printing catalogue sheets requires a comparatively dilute solution, namely 0.25 percent reagent by weight. On the other hand, a non-coated stock such as check paper requires a 5 percent solution by weight.

The preferred method for use in impregnating is to coat the paper surface with a mixture containing the reagent. Other ingredients of such mixtures are clays, binders, fixatives, preservatives, etc.

EXAMPLE OF IMPREGNATING PAPER WITH REAGENT

The following is an example of a formula which can be utilized in coating a paper surface with the reagent material. Please note the following:

- Figures in parentheses indicate weight fraction solids in the ingredients.
- HEXAPHOS is sodium hexametaphosphate (Hooker) - dispersant for pigments.
- PURECAL 0 is precipitated calcium carbonate pigment (BASF-Wyandotte).
- ULTRA WHITE 90 (Minerals & Chemicals) is a No. 1 high brightness kaolin clay.

- AZITE 900 (American Cyanamid) is dicyandiamide - viscosity reducer for casein solutions.
- DOW 636 — a typical 80/20 styrene/butadiene water dispersed latex.
- PERMACHEM PC (Flexabar Mfg.) — a biocidal preservative.
- KILFOAM (Rohm & Haas) — proprietary de-foaming agent.
- Na₂EDTA — disodium salt of ethylenediaminetetra-acetic acid - chelating agent for iron.

Ingredients	Formula (Grams)	Solids (Grams)
Deionized Water (0)	140.00	—
Hexaphos (1)	0.40	0.40
Purecal O (.995)	63.00	62.50
Ultra White 90 Clay (.995)	147.00	146.20

Disperse the ingredients by intensive mixing for 5 minutes and transfer to a 600 ml beaker with agitation.

Deionized Water	(9)	83.3	—
Azite 900	(1)	9.4	0.4
Sancor Casein	(.9)	14.3	13.0
Ammonia	(0)	2.0	—

Dissolve Azite 900 in water, slurry Casein, warm to 120° F., add ammonia, cook for 10 minutes and add it to above batch.

Deionized Water	(0)	97.0	—
Dow 636 S/B Latex	(.48)	52.0	25.0
Permachem PC	(1)	0.4	0.4
Kilfoam	(1)	0.3	0.3

Mix for 10 minutes.

Dissolve Na ₂ EDTA (1) in deionized water (0) at 140° F.	1.5 50.0	1.5 —
Dissolve n-propyl gallate (1) in propylene glycol (warm)	10.2 21.7	10.2 21.7

Mix for 10 minutes.

The Brookfield viscosity at 100° F. of the above formula on a No. 2 spindle at 60 r.p.m. is 57.5 c.p.s.

The resulting aqueous composition contains 41.2 percent solids by weight and is a suitable dispersion for application to paper substrates with conventional commercial paper-coating equipment. The foaming characteristics of this formula are desirably minimal and the composition has the proper wetting penetration and leveling characteristics on paper substrates for optimum coatability. Further, the interrelated viscosity/solids properties can be adjusted as desired, typically in the practical 35–45 percent solids range.

This example of a coating composition may be applied by coating one side, or if desired, two sides simultaneously of a paper web. Conventional air-knife, reverse-roll coaters, or the like, may be employed. For example, with an air-knife coater, the wet coating com-

position is typically metered to a paper web moving at speeds up to 400 fpm. The coated web is dried continuously with warm high velocity air by leading thru a drying tunnel, and then wound into a roll. The paper coated in this manner can be lightly calendered, and sheeted as desired.

Typical constructions would be sheets weighing 110 lb/ream (25 × 38 inches — 500) to which 10 lb/ream of dry coating is applied on one side, or a 10-point board stock weighing 150 lb/ream with the same coating weight. The sensitized coating applied as above is also suitable for overprinting with conventional offset or letterpress lithographic inks.

Marker Pen: The marker pen is particularly useful when the area in which the print is to be obtained is small and must be carefully delineated. In designing a marker pen for this application, care must be taken to insure that the proper transfer rate of reagent from the marker nib to the fingerprinting surface is achieved. This is accomplished by balancing the surface area of the nib-paper interface against the cross-sectional area of the nib through which the solution is delivered from the capillary reservoir and by balancing the capillary attraction exerted by the nib structure against the capillary retentive forces exerted by the reservoir.

One combination which has proved to be unusually satisfactory was achieved through the use of a sintered polyolefin nib (16F Nib, R4315-WP, manufactured by Porex Materials Corporation, Fairburn, Georgia) and a reservoir consisting of polyester fibers in a polyolefin sheath (Polysorb Filler, No. 424, manufactured by Action Plastics Company, Totowa, N.J.). With this combination, it has proved to be virtually impossible to produce a flooding condition on the reverse side of a check.

Aerosol Reagent Dispenser: It is almost mandatory that the reagent solution be applied to the print surface before the application of the developer coated fingertip thereto. In applications such as to the back of a check where the possibility exists of damaging existing writings or prints thereon, it is necessary to use both a metering valve and a positioning device to control the distance between the nozzle of the aerosol dispenser and the surface. The purpose of this is to control the dryness of the spray at the point of impact. If the nozzle is positioned an insufficient distance away, the solvent content of the impinging spray may be sufficiently great to damage any writing or printing either in adjacent areas or on the reverse side thereof. A reagent applicator has been developed which will accomplish these purposes.

As seen in FIG. 1, the reagent applicator 10 comprises an aerosol container 11 and a positioning device 12. The container 11 includes a cylindrical side wall 13 having an integrally formed closed bottom 14 and a top 15. Projecting outwardly from top 15 is a nozzle 16. Within container 11 is a metering valve (not shown). The valve discharges a predetermined amount of reagent from container 11 only when the container 11 is held in an inverted position with the long axis of the container 11 being perpendicular to the print surface 20.

The positioning device 12 comprises an elongated, cylindrical side wall 17 having an open bottom 18 and an open top 19. Bottom 18 is adapted to contact print surface 20. Adjacent bottom 18 are a plurality of spaced openings 21 circumferentially extending around

side wall 17. Radially extending within device 12 adjacent top 19 is a partition 22 having an opening 23 centrally disposed therethrough. The area within device 12 between the partition 22 and the top 19 is receiving chamber 24. Chamber 24 is of sufficient diameter to receive therein the forward portion of container 11 as shown in dotted lines as 11'. Opening 23 is of sufficient diameter to receive therethrough nozzle 16, as shown in dotted lines at 16'. Chamber 24 is of sufficient height to have the bottom 14 of container 11 protrude past top 19 when the container 11 is in its operative position 11' within chamber 24. When container 11 is in its operative position 11', the exposed bottom 14 is pressed downward, thereby actuating the metering valve and discharging a predetermined volume of spray upon the print surface 20. The area within device 12 between bottom 18 and partition 22 serves to both position the nozzle 16 and to confine the spray within the desired area of impingement. Openings 21 allow the reagent solvent to evaporate rapidly.

The preferred distance of partition 22 from surface 20 is 6 inches. Any closer than six inches causes the spray to become too wet so that it strikes surface 20 almost as a solid stream of liquid. Above 6 inches, the spray is diffused too much and is almost dry by the time it impinges surface 20. The height of the applicator 10 above surface 20 depends upon the ratio of the solvent to the propellant and the evaporation rate of the solvent itself. The less volatile the solvent is, the further away from surface 20 it is necessary that the reagent applicator 10 be positioned.

Spray and atomizer reagent applicators have been tried, but they have not been found to be as effective as an aerosol applicator. This is true because it is very difficult to eliminate the big drops in the middle of the spray pattern which, if they impinge on say the endorsement of a check, can cause the ink to bleed or spread. Therefore, the fineness of the spray is best controlled by an aerosol applicator.

Roller: When it is desired to impregnate comparatively large areas of paper stock or other materials with the reagent solution, smooth rubber rollers have been found to be useful.

Applicator for Developer: It has been found that control of the amount of developer material applied to the finger is even more critical than controlling the reagent material. If too much is applied, the valleys become coated and the resulting print will have little or no definition. If too little is applied, the resulting print will be too light and too indistinct to be of value. Initially, an ordinary stamp pad consisting of absorbent, non-woven fibers covered with a piece of woven fabric was utilized. In order to obtain the desired coating, it was necessary that the pressure applied when the finger was pressed against the surface of the pad be adjusted to compensate for the quantity of developer within the pad. If the pad was on the dry side, considerable pressure had to be applied in order to obtain adequate coating. On the other hand, if the pad was on the moist side, an adequate coating could be obtained only by barely touching the pad. Thus, it proved to be necessary to continually adjust the developer content of the stamp pad in an effort to maintain an optimum concentration of developer.

An applicator has been developed which is virtually fool-proof. It is charged with a predetermined quantity of developer at the time of manufacture and the devel-

oper content is never adjusted thereafter. Further, it is not necessary to confine the pressure of application within narrow limits, and is almost impossible to obtain a coating which is too heavy. As seen in FIG. 2, the developer applicator 25 comprises a container 26, a piece of rigid material 27 containing interconnecting voids and an overlying membrane 28.

Container 26 is a box-like element comprising a bottom portion 29 having a top portion 30 pivoted thereto to seat on bottom portion 29 to provide a reasonably air-tight enclosure when the applicator 25 is not in use. Bottom portion 29 defines therein cavity 31 which receives material 27 and membrane 28.

The porous, rigid material 27 serves as a reservoir or storage chamber for the developer fluid. The surface of the rigid material 27 must be sufficiently smooth to insure a close fit between this structure and the overlying membrane 28. The member 28 must be permeable to the developer fluid but must be of sufficient thinness that it cannot serve as a storage reservoir.

The functioning of this applicator 25 is as follows: The developer fluid is attracted into the interfacial void which exists between the porous material 27 and the overlying membrane 28. Thus, the membrane 28 rests on a film of fluid which is easily replaceable should a portion thereof be withdrawn. The fluid permeates the membrane 28 and when the finger is pressed against the membrane 28, fluid is transferred to the surface of the finger. When the finger is withdrawn, the membrane 28 replenishes its fluid content by transfer from the film and the film replaces its losses from the porous reservoir 27.

In order for this structure to function satisfactorily, it must be immune to variations of pressure. Hence, it is necessary that the reservoir 27 be rigid. Otherwise, fluid could be squeezed therefrom should excessive pressure be exerted thereon. Similarly, the membrane 28 must be sufficiently thin that it holds a negligible amount of fluid thereby serving only to transfer fluid from the underlying film to the fingertip. The practical thickness of the membrane 28 can range from approximately 0.002 to 0.010 inches with the preferred thickness being 0.003 inch. If the thickness of membrane 28 is greater than 0.010 inch, it begins to act both as a transmitter and as a storage reservoir. A membrane 28 with a thickness of 0.003 inch has practically no storage capacity.

Several different materials have been found to be suitable for use as the component parts of this applicator 25. However, the preferred materials are:

Reservoir: Porous, plastic material (high-density polyethylene) manufactured by the Porex Materials Corporation, 7380A Bohannon Road, Fairburn, Georgia, under the number SLC06-70 micron, hydrophilic grade.

Membrane: "Nomex" Nylon Paper, 3-mil, E54A, manufactured by Textile Fibers Department, E.I. duPont de Nemours and Company, Inc., Wilmington, Delaware.

Composition of Reagent and Developer: A derivative of gallic acid, namely n-propyl gallate, is now considered to be the preferred reagent material because of its solubility in a wide range of solvents. The concentration of the reagent material will vary with the type of applicator employed. In applying the reagent material by dipping, the solutions used vary from 0.25 percent

reagent to 5 percent with the solvent being n-propyl alcohol.

In applying the reagent by coating, the reagent consists of approximately 3.5 percent of the coating.

When used in an aerosol dispenser, the concentration of the reagent will be approximately 1 percent of the contents of the dispenser. The remaining ingredients in the dispenser are ethanol as a solvent and one or more propellants such as "Freon 11" and "Freon 12."

When used in a marker pen applicator, the concentration of the reagent material is 5 percent in n-propyl alcohol. Other solvents could be used since the reagent materials are readily soluble in such common liquids, such as many of the glycols. Other materials which could be used as a reagent would include tannic acid as well as numerous other polyhydroxy benzene and naphthalene derivatives. Specific examples of these derivatives would be pyrogallol or phloroglucinol.

A colorant can be added to the reagent solution. The use of a colorant in the reagent material as an indicator of whether or not any given area has been sensitized would be advantageous in certain instances. The incorporation of a suitable colorant in the reagent material would present no problems. Selection of the colorant would be primarily governed by its solubility in the medium selected to serve as the vehicle for reagent. For example, one or more alcohols have been referred to above as solvents for the reagent. Dyes for use in such solvents could be selected from a group such as the "Luxol" line of dyes made by E.I. duPont de Nemours and Company, Inc., Wilmington, Del.

Ferric chloride was selected as being a satisfactory developer material because of its ready availability as a commercial product. Any ferric salt would constitute a suitable alternate and would be limited only by whatever solubility characteristics it might possess. Ferric chloride is also advantageous to use in that it is readily soluble in such solvents as mixtures of water with such glycols as propylene or dipropylene. Vanadium salts could be substituted for ferric salts if so desired.

When the wetting characteristics of the ferric chloride solution can be altered through the addition of a suitable surface active agent, a relatively stable film can be obtained on the ridge lines of the print and the pattern resulting therefrom is therefore characteristic of the lines. In other words, the quality of the print is greatly improved as a result of changing the wetting characteristics of the ferric chloride solution.

A typical example of an improved ferric chloride solution is:

Ingredients	Parts by Weight
Ferric Chloride, Hexahydrate	15.0
Demineralized Water	20.0
Propylene Glycol	30.0
Dipropylene Glycol	10.0
n-Propyl Alcohol	10.0

In all of the preceding discussion, the area to be printed has been referred to as the finger. It should of course be understood that the term finger is used as being a synonym of thumb. Further, we have found that considerable potential usage exists obtaining prints of other areas of the body. For example, footprints are now being used in certain instances where for one reason or another, it has been found to be either impracticable or undesirable to use fingerprints. Exam-

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ples of such useage are footprints for newly-born infants or for purpose of control in some of the recently instituted drug addiction curative programs.

It is obvious that one skilled in the art may make modifications in the details of construction of the apparatus and the application of the method without departing from the spirit of the invention which is set out in varying scope in the appended claims.

What is claimed is:

1. An apparatus for coating a predetermined amount of developer upon a surface portion of the human body upon contact therewith, for producing an inkless print when said coated body portion is applied to a reagent coated surface, comprising a developer storing means which includes an element formed of a rigid material and having a substantially smooth face, and a membrane permeable to said developer, mounted adjacent to and overlying said face, said membrane and face being spaced a short distance apart to provide a uniform interfacial void which is sufficiently restricted to cause the developer to be attracted into said void, said

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developer being withdrawn through said membrane when said body portion is pressed upon said membrane, and transferred to the surface of said body portion, said withdrawn developer being replaced by developer attracted into said void from said storage means; and said membrane being of sufficient thinness to prevent it from acting as a storage reservoir.

2. An apparatus as in claim 1 wherein said storage means comprises a box like container and a rigid, porous member snugly received in said container.

3. An apparatus as claimed in claim 1 wherein said membrane thickness ranges from 0.002 to 0.010 inches.

4. An apparatus as claimed in claim 3 wherein the preferred thickness of said membrane is 0.003 inch.

5. An apparatus as claimed in claim 1 wherein said developer is selected from the group consisting of ferric and vanadium salts.

6. An apparatus as claimed in claim 1 wherein said developer comprises ferric choloride.

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