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FINGER PRINTING METHOD

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This invention relates to finger printing, and it comprises a method of obtaining a finger print wherein the finger is moistened with an oxidant solution and impressed on paper carrying trihydroxybenzoic acid (gallic acid) or another polyphenolic body, thereby producing a colored print, and it further comprises an assemblage of a pad carrying an alkaline solution of a vanadate, or another like oxidant and a stock of paper sheets carrying trihydroxybenzoic acid, or another polyphenol, all as more fully hereinafter set forth and as claimed.

Finger prints are usually made with ink or carbon black preparations, the carbon being often in a greasy or oily vehicle, something like printing ink. All these methods are open to the objection of soiling the fingers, of being more or less uncleanly and of demanding too much skill. With a smeary ink it is not easy to obtain with certainty unblurred sharp prints. Much depends on the finger pressure, or, rather, the correlation between the pressure and the character of the ink. Further, it is important that the prints be fairly uniform in appearance as this facilitates comparison. Sharpness of outline is, however, the fundamental requisite; the characteristic ridges of the finger surface must stand out clearly against the background. And, as stated, skill is required to attain this.

I have discovered a way in which I can produce finger prints of greater uniformity of appearance, more certainty of outline and capable of easier study without the disadvantage of personal inconvenience or the necessity of any great skill on the part of the operator. In this method I produce a print by simple contact of a moistened finger with a sensitized surface and the degree of pressure is no longer an important factor. I use a two-liquid process wherein the finger is moistened with an oxidant solution, usually a solution of sodium vanadate in glycerin or glycerin, diethylene glycol and triethanolamine, contained in a stamp pad and is then impressed on paper carrying trihydroxybenzoic acid ("gallic acid"). A colored print is formed at the expense of the vanadate and the trihydroxybenzoic acid. This color development is due to contact and no exact pressure is required. This gives greater uniformity of appearance as between successive imprints and renders their comparison easier. Trihydroxybenzoic acid, being somewhat unstable when exposed to the atmosphere in the absence of added free acid, I ordinarily acidulate it with a small amount of tartaric acid or another di-

basic acid. The sodium vanadate is alkaline and this acid also serves to neutralize its alkalinity.

It will be noted that instead of smearing the finger with ink and then transferring the ink to paper by pressure, I produce color from colorless materials at the time of impression. So to speak, I produce the ink in place; I produce it in making the print. As a matter of fact the two reagents mentioned, vanadate and gallic acid, when admixed in solution produce an ink.

The paper may be coated with a sort of lacquer containing the trihydroxybenzoic acid, the acid being dissolved in a lacquer-like coating composition. A solution of collodion cotton in ethyl acetate or another volatile solvent of the alcoholic class, serves. After application to paper the solvent evaporates leaving a coating of pyroxylin containing the trihydroxybenzoic acid. A good coating composition is a 4 per cent solution of trihydroxybenzoic acid in ethyl acetate with an addition of 4 per cent collodion cotton. About 2 per cent tartaric acid may be added as a stabilizer. This composition may be applied to paper by ordinary methods, spraying, brushing, roller coating, etc. Or instead of using a lacquer the paper may be surfaced with an ordinary aqueous glue-pigment composition containing trihydroxybenzoic acid. As casein coating compositions are alkaline, they are not suitable. A composition of 2 parts glue, 8 parts clay, 17 parts water, 1 part trihydroxybenzoic acid and 0.1 part tartaric acid is suitable. This composition may be applied to paper by ordinary roller coating means and the paper afterwards dried.

While I have specifically stated trihydroxybenzoic acid or gallic acid as used in the present invention and while it possesses distinct advantages over other materials, many of the polyhydroxy benzene or naphthalene derivatives, that is, polyphenols strike a color with sodium vanadate solution and similar oxidants and may be used in this invention. Among these applicable polyphenols, I may mention:

1-2-4-oxyhydroquinone monoethylether
3-4-5-trihydroxy benzoic acid
3-4-5-trihydroxy benzoic ethyl ester
3-4-dihydroxybenzoic acid (protocatechuic acid)
1-2-dihydroxy benzene (pyrocatechol)
1-methyl-3-5-dihydroxy benzene (orcinol)
1-2-3-trihydroxy benzene (pyrogallol or pyrogalllic acid)
1-3-5-trihydroxy benzene (phloroglucinol)
1-3-4-trihydroxy benzene (hydroxy hydroquinol)

Tannic acids and gallo-tannic acids, that is, tannins which are usually considered to be anhydrides of hydroxybenzoic acids can be used.

In lieu of the tartaric acid for stabilizing the polyphenols, I may use other organic acids. For instance, I may use the following acids: oxalic, malonic, succinic, monomethyl succinic (pyrotartaric acid), dimethyl succinic, glutaric, adipic, suberic, maleic and fumaric. I find that the dibasic acids which contain hydroxyl groups have certain advantages. Tartaric acid is typical of this class. Also maleic acid (monohydroxy succinic acid) and mesoxalic acid (dihydroxy succinic acid) may be used. I may also use aromatic carboxylic acids such as phthalic acids.

I find that, on the whole, vanadates give me better colorations with the polyphenols than do other oxidants. Sodium orthovanadate is the most convenient salt. Ammonium vanadate is not very soluble and calcium, etc., vanadates are not commercially easily obtainable. Sodium orthovanadate dissolved in ordinary commercial glycerin or/and diethylene glycol solution is capable of direct application to a stamp pad, and such a stamp pad is used for moistening the finger. A solution of 10 parts commercial sodium vanadate in 90 parts of commercial glycerin is suitable. More suitable still, is an addition of diethylene-glycol and triethanolamine to this solution. The purpose of diethylene-glycol as a solvent of nitrocellulose is to cut through the pyroxylin coating, and accelerate the desired reaction.

While the printing method may be used in reverse manner with the oxidant in or on the paper and the trihydroxybenzoic acid in the pad, it is not so convenient.

As stated, other oxidants may be employed. Among these are the chromates. Sodium chromates used in the same way as sodium vanadate also gives color and a good print. The polyphenols also strike a color with ferric chlorid and ferric chlorid may be used. In solution in glycerin on a stamp pad, however, ferric chlorid is not indefinitely permanent. However, it may be used and in this event, such natural polyphenols as tannic acid may be employed. Paper may be surfaced or impregnated with a composition containing extract of gall nuts and a stamp pad used containing ferric chlorid. In this event, the imprint finally developed is an iron ink of great permanence.

It will be noted that in the described method two colorless solutions are used. The moistened finger is not colored nor does it become colored in making the finger print. Coloration is confined to the paper. The finger does not become smeared, colored or stained.

While I have described the use of paper for the surface to receive the finger print record, other materials may be used. Anodically oxidized thin sheet aluminum or foil is covered with a porous, hard surface which takes up trihydroxybenzoic acid, etc., and is suitable for taking a finger print. The coating has considerable stiffness and extremely thin cards may be made using thin foil aluminum. The coating being somewhat acid in its nature, is well adapted to receive trihydroxybenzoic acid, no added acid stabilizer being then necessary.

While I have mentioned "finger" prints, I wish it to be understood, that by this term I include similar record prints of other portions of the body: thumb prints, palm prints, foot prints, heel prints, etc.

In the operation described specifically I use two colorless substances developing a colored material on contact, this colored material being formed at the expense of the trihydroxybenzoic acid (gallic acid). Other pairs of substances developing colored material of high tinctorial power may however be used. In all cases, one substance is used on the paper and another on the finger, the two on contact developing a colored material of high tinctorial power, the color depending on the particular pair of substances. As such pairs of materials I may use:

Aescioxalic acid $C_7H_6O_4$ derived from aesiellitin		
$C_9H_6O_4$ -----	Fe salts	Vanadates
Chlorsaligenin $OH.CH_2.C_6H$		
$Cl.OH$ -----	do	Do.
Sappanin $C_{12}H_6(OH)_2.2H_2O$, derived from caesalpinia sappan-----	do	Do.
1-2-dihydroxynaphthalene $C_{10}H_6(OH)_2$ -----	do	Do.
2-3-dihydroxynaphthalene $C_{10}H_6(OH)_2$ -----	do	Do.
Oxytetrahydroquinolin $OH.C_9H_{10}N$ -----	do	Do.

In the present state of my knowledge, however, I regard the pair particularly described, gallic acid and sodium vanadate, as the most generally useful. They produce a finger print of about the right darkness and of permanent character, neither darkening or lightening in the files. Sometimes, however, the other substances mentioned may be advantageously employed for special reasons.

The present application is a continuation in part of my prior application Serial No. 625,198 filed July 27, 1932.

What I claim is:

1. The method of producing finger or like prints, comprising contacting the finger, or the like, with a surface of an absorbent material impregnated with a solution of sodium vanadate dissolved in glycerine-diethylene glycol solution, and then contacting the finger, or the like, with a surface carrying a coating containing trihydroxybenzoic acid, tartaric acid and a thickening agent, the resulting print being a black print.

2. The method as specified in claim 1, in which said first mentioned surface is a stamp pad and said second surface a sheet of paper.

3. The method of producing finger or like prints, comprising contacting the finger, or the like, with a surface of an absorbent material, impregnated with a solution of sodium orthovanadate dissolved in glycerine-diethylene glycol solution, and then contacting the finger, or the like, with a surface carrying a coating containing trihydroxy benzoic acid, a stabilizing agent, and a thickening agent, the resulting print being a black-print.

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