United States Patent

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[73] Assignee **said Michaelson assignor to said Criswell**

[54] **SYNTHETIC NAIL STRUCTURE**
7 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **132/73**
[51] **Int. Cl.** **A45d 29/00**

[50] **Field of Search** 132/73, 73.5, 75.3, 88.7; 424/61; 106/311, 155, 156, 195, 193

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ABSTRACT: A solvent-permeable, supple and conformable synthetic nail structure which is differentially responsive to solvent and shaped for invisible securement to a human nail.

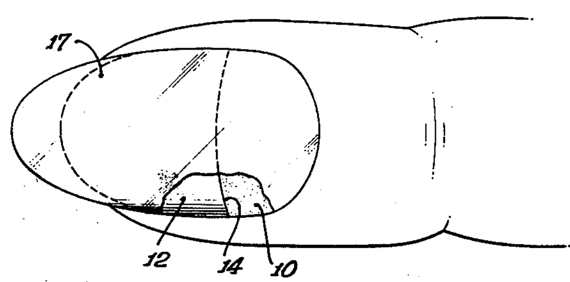

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FIG. 1.

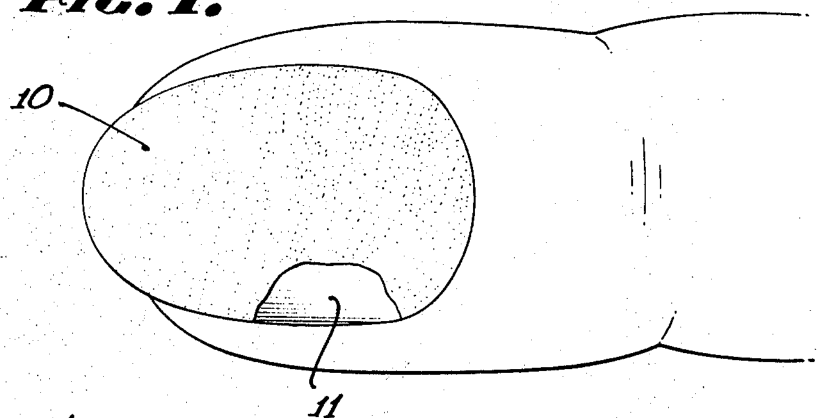


FIG. 2.

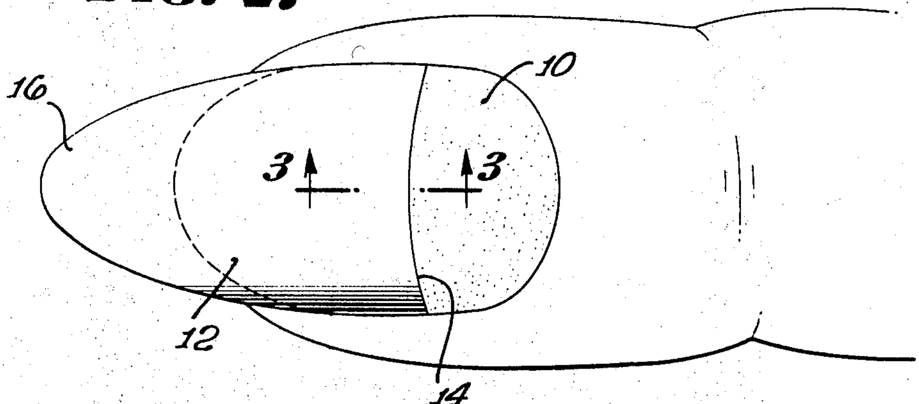


FIG. 4.

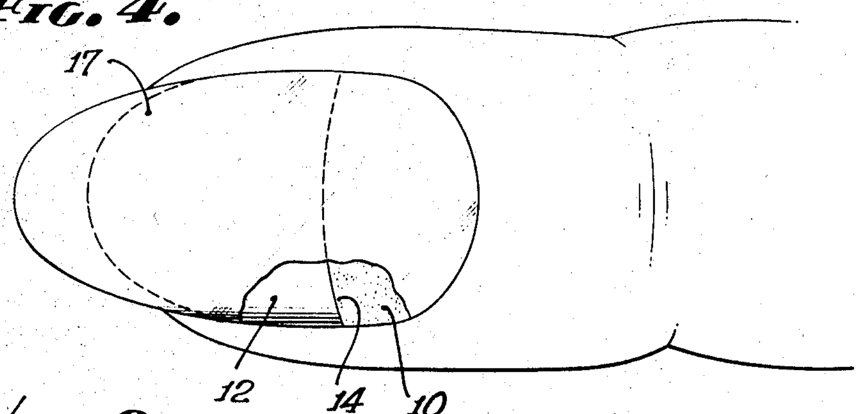
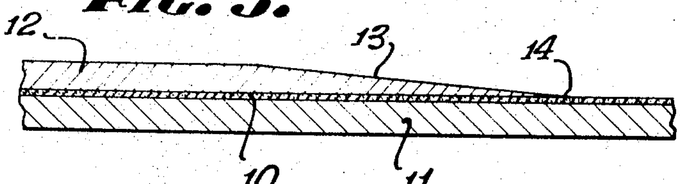


FIG. 3.



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SYNTHETIC NAIL STRUCTURE

REFERENCE TO RELATED APPLICATION

This application is divided out of our copending application Serial No. 294,706, filed Jul. 12, 1963, now Pat. No. 3,484,289.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention has to do with preformed nail overlay or so-called false nails, being structures which are adhesively or solvent-cement fastened to human nails for repair, concealment, embellishment or lengthening of the natural nail.

2. Prior Art

Application of synthetic nails is a common cosmetic expedient despite the difficulties present in currently procurable products. For the most part commercial synthetic nail structures are molded of resins found to be useful for nail coatings and polishes. The normal characteristics of nail lacquers namely a rigid stiffness and thick film buildup do not serve well where the nail structure is formed away from the nail and is later attempted to be applied. Small personal variations in natural nails preclude an exact design conformance with the natural nail and characteristic stiffness prevents real congruence between the synthetic and natural nail. As a result the synthetic nail is stressed and may pop up after application and is most difficult to apply accurately in the first instance.

Relying as they do on thickness and stiffness, present synthetic nail structures leave a distinct edge at their termination line. This may be temporarily satisfactory where a full nail is applied but with time the normal growth of the nail carries this unsightly edge outward across the natural nail surface.

SUMMARY OF THE INVENTION

It is a major objective of this invention to overcome the aforementioned problems of the prior synthetic nail structures. The invention is predicated on the major concept, among others, of building a controllable formability into a synthetic nail structure through the use of differentially soluble components, one component comprising particulate, relatively insoluble material and a second component comprising a relatively soluble, resinous film-forming material which acts as a matrix for the particulate component.

The inventive structures herein described are unique in providing in preferred embodiments the translucent, nearly nacreous appearance of the natural nail deriving from their protein content and the flexibility in bending accommodation of pressures that is normally associated with the natural nail deriving from the film-forming carrier component. These attributes moreover are provided in a nail structure which may be formed in a manner to preferentially dissolve edgewise from its inside edge during solvent application to a natural nail whereby the commencement of the synthetic nail on the natural nail is not apparent.

In particular, the present invention provides a synthetic human nail comprising a thin, elongated and transversely concave structure having supple conformity to a human nail and comprising a carrier component and a differently soluble particulate component distributed therethrough providing the structure with differential response to solvent whereby the structure is solvent-permeable and solvent application thereof to a human nail locally solubilizers and partially reforms the structure to close conformance with the human nail.

Ultimately such local solubilization may be carried to complete disintegration of the edge portions of the synthetic nail as in structures which are tapered in their normal inward edge portion to a degree permitting solubilization of the carrier resin throughout the edge portion.

The carrier or matrix component is resinous and organic-solvent soluble and is film-forming from solution. The particulate-distributed component may be proteinaceous and is insoluble in the carrier solvent used in practicing the invention. Proteinaceous materials may have an average particle size between about 20 and 400 U.S. mesh.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view illustrative of a single nail which has been given a coating of solvent prior to application of a synthetic nail structure;

FIG. 2 is a view showing the overlay or false nail applied and adhered to the solvent cement coating;

FIG. 3 is a fragmentary, enlarged section on line 3–3 of FIG. 2; and

FIG. 4 is a view similar to FIG. 2 showing second application of a surface coating to the adhered nail, with the latter terminally reshaped.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, solvent-cement coating **10**, which may be compounded in accordance with any of the hereinafter given exemplary solutions or otherwise, is applied to the surface of the natural nail **11** and allowed to set for a time that may be upward of one minute.

The false nail **12**, which may be preformed by molding, stamping or any other suitable manner, is then applied to the surface of the true nail as illustrated in FIG. 2. By reference to FIG. 3 it will be observed that the inner end extent of the false nail is longitudinally tapered at **13** to a fine or sharp edge at **14** so that the inner terminal of the overlay presents, in effect, a gradually enlarging continuance of the natural nail surface to a degree presenting no readily discernible inner termination of the overlay. For this reason it is unnecessary that the false nail be preformed to fit or extend to the cuticle **15**, and there are advantages in not doing so because of benefits in such exposure of the natural nail and the fact that the overlay **12** is intended primarily to be an extender initially-projecting at **16** and beyond the natural nail. The presence of the overlay remains essentially indistinguishable throughout growth of the natural nail until ultimately the overlay may no longer remain desirable or have become filed away.

After adherence to the natural nail, the overlay and natural nail may be surfaced using a second coating **17** which may or may not correspond with the base coating **11**, and which may or may not be tinted for polishing, or used as a base for a selected enamel or finish polish. All three coatings **10**, **12** and **17** preferably are of essentially the same basic composition in dried condition, although proportions, solvents and coloring, when included, may be varied. As a consequence, there is a basic sameness in the three layer compositions contributing to their integrability as well as their compatibility with the natural nails.

The invention structures use albuminoids in the class of animal proteins which are resistant to various solvents including salt solutions, dilute acids and alkalis and the like. Such albuminoids include keratin obtained from hair, horn, hoof and nails; elastin—from connective tissue and ligaments; collagen—from bones, cartilage, skin and tendons; spongin—from sponges; and fibroin and sericin—from silk. Of these, keratin is particularly desirable for various reasons, and will be referred to as the preferred albuminoid.

The protein component is formulated with what may be termed a carrier or matrix material or component. The general purpose is to impart to the coating, necessary strength, body, hardness, polishability, adhesiveness and in general the total of those physical properties required for success of the composition in any or all of its coating usages. Suitable carrier materials are found in the general class of water-insoluble cellulosic derivatives and water-insoluble natural and synthetic resins. The properties of cellulosic derivatives, such as low order of toxicity, ease of use and low cost, render them particularly desirable as bodying materials.

These cellulosic derivatives are prepared from the cellulose molecule by esterification, etherification, xanthation, addition substitution, and oxidation of the hydroxyl groups; or by degradation reaction including hydrolysis, oxidation, and decomposition. It is therefore possible to produce a wide variety of simple or complex compositions which by solution in suitable solvents become useful as protective coatings which harden in films primarily by solvent evaporation.

Examples of usable cellulose derivatives are as follows: cellulose nitrate (nitrocellulose—formed by direct nitration with nitric acid; cellulose acetate—formed by action of acetic anhydride on cellulose; methyl and ethyl cellulose—formed by action of methyl or ethyl chloride on soda cellulose; benzyl cellulose—formed by action of benzyl chloride on cellulose; cellulose acetopropionate—formed by action of acetic and propionic anhydrides on cellulose; and cellulose acetobutyrate—formed by action of acetic and butyric anhydrides on cellulose.

Resins, natural and synthetic, may also be used as bodying materials to increase adhesion, to build solid content, to bolster gloss, to increase durability, and to provide water resistance. Examples of water-insoluble natural resins are: dammar gum, mastic, sandarac, gum accroides, batu, elemi, resin gum, and ester gum (reaction product of glycerin and resin).

The following are examples of usable water-insoluble synthetic resins: alkyd, produced from esterification of polybasic acids, fatty acids, and polyhydric alcohols, e.g., glyptal; alkylated methylol amino formaldehyde resins, e.g., urea-formaldehyde resins, malamine, casein, and zein; phenolic (phenolformaldehyde), phenol-formaldehyde and phenol-furfural resins; vinyl-polyvinyl acetate, polyvinyl chloride, polyvinyl butyrate, vinylidene chloride and copolymers of vinyl and polyvinyl acetates and butyrates; acrylic-polymethyl methacrylate and polyethylacrylate; sulfonamide formaldehyde, a modifier for cellulose nitrate, made by reacting p-toluene sulfonamide with formaldehyde; maleic and maleic anhydride and linseed oil type resins. All of these resins can be used to modify cellulosics.

It is important to note that many of these resins require the usual catalysts in order to polymerize. In this respect the resins basically can be of two types: those producing a film through evaporative processes, and those producing a film via thermoplastic processes utilizing catalysts, and including thermosetting resins.

The keratin bodying agent composition is initially made by mixture of the components in a suitable solvent liquid of which ketones such as acetone and methyl ethyl ketone, esters such as one or more alkyl acetates, ethers such as glycol ether, alcohols, such as ethanol and isopropanol and hydrocarbons both aromatic (e.g. toluene, xylene) and aliphatic e.g., hexane) are illustrative.

Plasticizers may be used to impart desired flexibility to the present structures. Usable plasticizers include castor oil organic tartrates, organic phosphates, phthalates, camphor and benzoates.

The following are illustrative of solvent cement solutions usable for general purposes of adhering the preformed overlays or false nails disclosed herein.

I

Components:	Percent by weight
Acetone	50.0
Ethyl acetate	16.5
Cellulose nitrate	12.5
Butyl acetate	10.0
Keratin (powdered)	8.0
Dibutyl phthalate	3.0
	100.0

II

Components:	Percent by weight
Trifluorotrichloro ethane	27.0
Methylene chloride	23.0
Ethyl acetate	15.0
Acetone	14.0
Cellulose nitrate	10.5
Keratin (powdered)	7.5
Dibutyl phthalate	3.0
	100.0

III

Components:	Percent by weight
Acetone	50.0
Ethyl acetate	16.5
Cellulose nitrate	10.0
Butyl acetate	10.0
Resin (natural or synthetic)	5.5
Keratin	5.0
Dibutyl phthalate	3.0
	100.0

IV

Components:	Percent by weight
Trifluorotrichloro ethane	26.0
Methylene chloride	22.0
Acetone	15.0
Ethyl acetate	14.0
Cellulose nitrate	10.0
Resin (natural or synthetic)	5.0
Keratin	5.0
Dibutyl phthalate	3.0
	100.0

In all formulations the percentage of ingredients may be varied to produce special effects; e.g., increasing solvent proportions relative to other ingredients will produce products of low viscosity. Dyes or coloring agents may be added as desired, usually in the order of 0.1 percent or less.

EXAMPLE 1

The following is a representative starting material formulation from which nail overlays (false nails) can be made by molding over a suitable die.

Components:		Percent by weight
Carrier component: Cellulose Nitrate	12.5	
Solvent:		
Acetone		50.0
Ethyl acetate		15.0
Butyl acetate		10.0
Distributed component: Keratin (20–400 U.S. mesh)		9.5
Plasticizer: Dibutyl Phthalate		3.0
		100.0

The albuminoid, or keratin, being insoluble, is used in the finely particulate form and becomes uniformly distributed or dispersed in the solution and the solidified coating film formed by the evaporation of the Solvent from the Carrier.

Allowing for other minor quantity components, the particulate protein content of the dried coating will range generally between about 4 to 15 weight percent, although for special purposes somewhat higher or lower than this range, and the carrier material will range generally between about 80 to 95 percent.

In applying a false nail prepared from the above formulation and molded to approximate conformity with a human nail, the false nail structure is oriented to be congruent with the natural nail which has been previously coated with a solvent cement which may advantageously comprise the same or similar ingredients as the false nail or be merely a carrier solvent optionally containing protein and thickeners such as the resins enumerated above. The false nail is pressed into place against the cement. The solvent present in the cement solubilizes the resinous carrier at the false nail inner surface. The proteinaceous particles flow onto and closely conform about the surface irregularities of the nail. The tapered portion carrier to at least some inward extent dissolves wholly with the result of the particulate protein distributing itself onto the nail where it blends indistinguishably. As the solvent evaporates the false nail is anchored firmly to the true nail.

We claim:

1. Synthetic human nail comprising a thin, elongated and transversely concave preformed overlay structure having supple conformability to a human nail and comprising a solvent-soluble carrier component and a differently-soluble particulate proteinaceous component distributed therethrough providing the structure with differential response to solvent whereby the structure is solvent-permeable and solvent application thereof to a human nail locally solubilizes and partially reforms the preformed structure to close conformance with the human nail.

2. Synthetic human nail structure according to claim 1 in which said preformed overlay structure is tapered at its normal inward edge portion to a degree permitting during-application solubilization of the carrier throughout said portion.

3. Synthetic human nail structure according to claim 1 in which said carrier component is organic solvent soluble and at least one distributed component is insoluble in said carrier solvent.

4. Synthetic human nail structure according to claim 3 in which said first component is the major component by weight, is resinous and film forming from solution.

5. Synthetic human nail structure according to claim 4 in which said distributed component is an albuminoid.

6. Synthetic human nail structure according to claim 5 in which said albuminoid material has an average particle size between about 20 and 400 U.S. mesh.

7. Synthetic human nail structure according to claim 6 in which said preformed overlay structure is tapered at its normally inward edge portion to a degree permitting obtaining of solution of said first component throughout said portion on nail application whereby the terminus of said nail structure adheres indistinguishably to the human nail.