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(54) METHOD OF DYEING AN SLA PART

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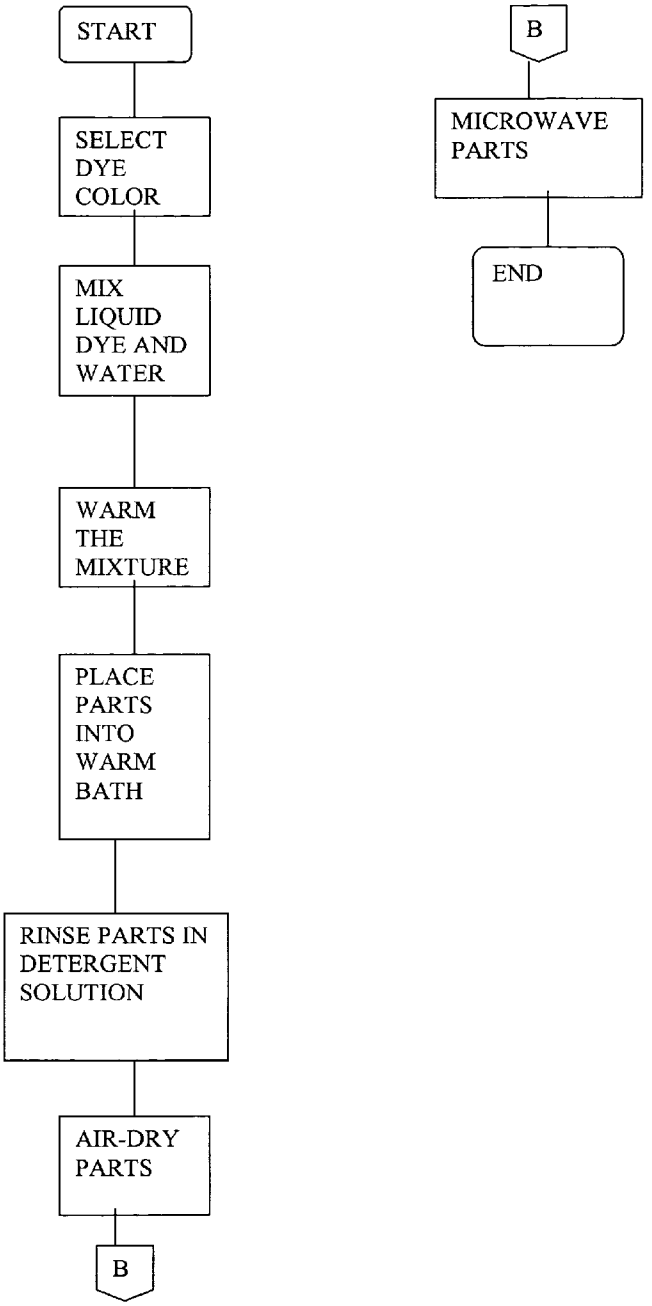
(57) **ABSTRACT**

A method for post-dyeing photopolymer parts. It may be used for custom ear shells for hearing aid applications or for adding color to any stereo-lithography part that is made from a suitable clear-based photopolymer resin.



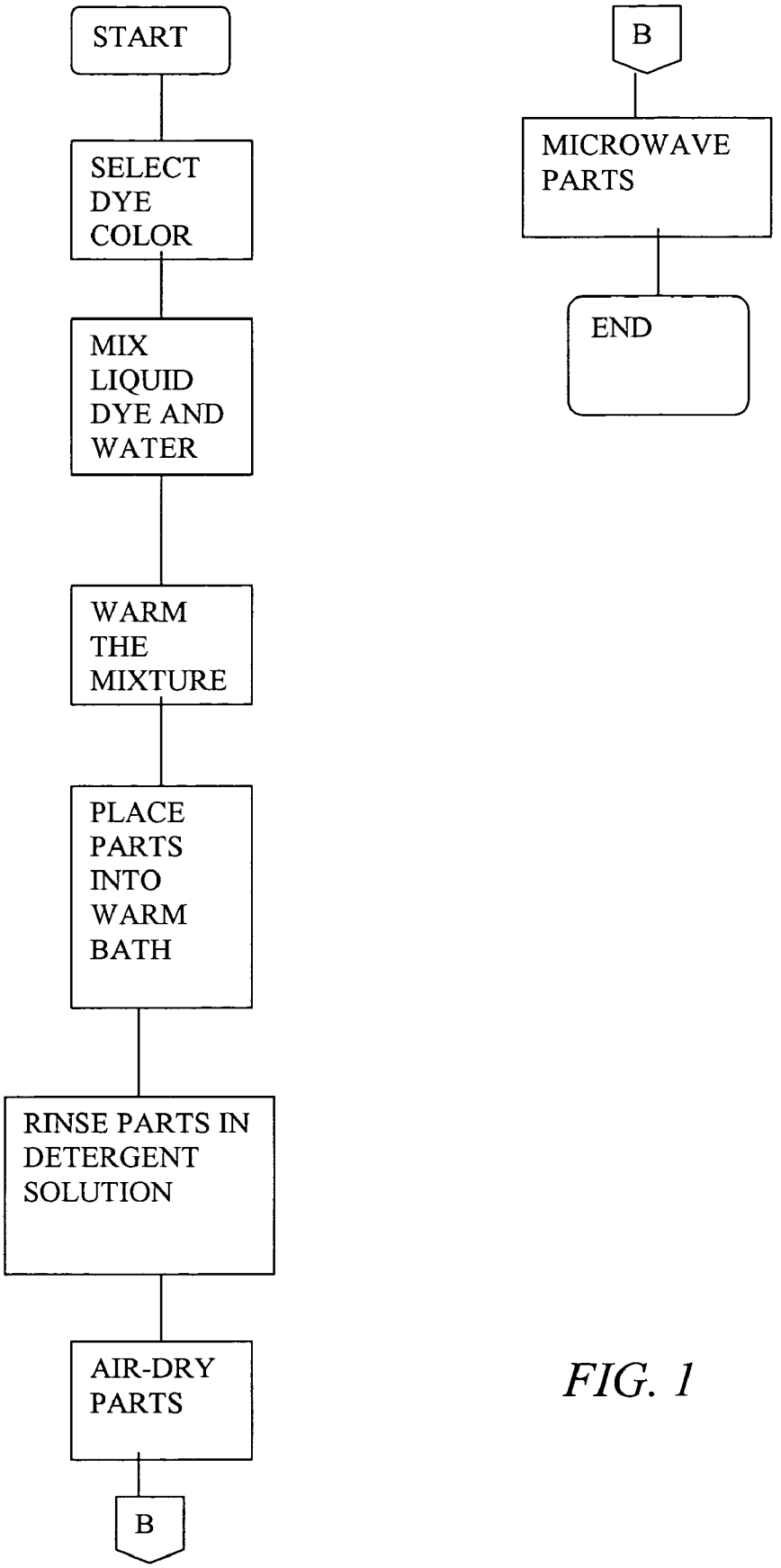

START
SELECT DYE COLOR
MIX LIQUID DYE AND WATER
WARM THE MIXTURE
PLACE PARTS INTO WARM BATH
RINSE PARTS IN DETERGENT SOLUTION
AIR-DRY PARTS
B
B
MICROWAVE PARTS
END

FIG. 1

METHOD OF DYEING AN SLA PART

BACKGROUND OF THE INVENTION

[0001] This process defines a method for post dyeing stereo-lithography parts or other photopolymers in the form of custom ear shells for hearing aid applications. It can also be used as a secondary operation for adding color to any SL parts or other photopolymers which are made from suitable resins. The result of this process produces ear shells that demonstrate little to no noticeable bleeding of colorant when the shells are wiped with a cloth containing 100% isopropyl alcohol solvent.

[0002] The present invention relates to the creation of custom coloration of ear molds or ear shells manufactured using stereo-lithography (SLA) or other technologies such as Polyjet™ and a clear photopolymer resin. Polyjet™ is described at httpi//www.2objet.com/Tech/Index.html. Presently, creating flesh tones or customer-specific ear shell or ear mold colors is accomplished using photopolymer resins within the SLA process that are pre-tinted or pigmented to the desired color. This results in ineffective use of the SLA machine in that all components produced within the machine at any given time can only be of one color, that of the resin which is loaded within it. Furthermore, producing the variety of flesh tone colors within the world market means inventorying several different shades to meet customers' needs. This carries large inventor dollars, given that these resins are very expensive, involving high costs (for example, $3000 to $5000) to load one SLA machine with one color, in addition to the time involved changing from one color to the next.

[0003] The present invention addresses this problem by a method to dye ear shells, ear molds, or any photopolymer part manufactured with a clear photopolymer resin using a secondary dyeing process that can accurately produce the desired color while meeting bio-compatibility requirements.

SUMMARY OF THE INVENTION

[0004] A method of dyeing a photopolymer part, comprising the steps of:

[0005] (a) selecting the dye color to be processed based on customer interest;

[0006] (b) mixing liquid dye and water to form a dye bath,

[0007] (c) warming the mixture;

[0008] (d) placing the photopolymer parts to be processed into the dye bath;

[0009] (e) removing the photopolymer parts from the dye bath;

[0010] (f) placing the photopolymer parts into a rinsing solution of detergent and tap water;

[0011] (g) removing the photopolymer parts from the rinsing solution; and

[0012] (h) Allowing the photopolymer parts to air dry.

[0013] A principal object and advantage of the present invention is that it permits the use of a clear photopolymer resin to produce any color desired by the customer.

[0014] Another principal object and advantage of the present invention is that is saves the expense of using colored photopolymer resins.

BRIEF DESCRIPTION OF DRAWINGS

[0015] **FIG. 1** is a flowchart of the method.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Preferred Materials

[0016] Laundry detergent/Tap Water solution

[0017] Dye colorant, liquid or powder form

[0018] Temperature controlled bath

[0019] Thermometer

[0020] Measuring Spoons

[0021] Timer

[0022] Tap water

[0023] Microwave oven; 1200 watt

Preferred Procedure

Dyeing

[0024] Select the dye color to be processed based on customer interest.

[0025] Mix liquid dye and water to form a dye bath. Warm it up to the preferred temperature @ 140±7 degrees in the temperature controlled bath.

[0026] Set a timer to approx. 10 minutes then place parts to be processed into the dye bath.

[0027] Remove parts from the dye bath into the rinsing solution of detergent and tap water.

[0028] Rinse parts approx. 2-3 minutes and allow to air dry.

Post Curing

[0029] Place parts within a microwave oven

[0030] Set timer for 2 minutes and start process.

[0031] Remove parts and inspect.

[0032] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar to or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety to the extent allowed by applicable law and regulations. In case of conflict, the present specification, including definitions, will control.

[0033] The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and

not restrictive, reference being made to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What is claimed:

1. A method of dyeing a photopolymer part, comprising the steps of:

a) selecting the dye color to be processed based on customer interest;

b) mixing liquid dye and water to form a dye bath,

c) warming the mixture;

d) placing the photopolymer parts to be processed into the dye bath;

e) removing the photopolymer parts from the dye bath;

f) placing the photopolymer parts into a rinsing solution of detergent and tap water;

g) removing the photopolymer parts from the rinsing solution; and

h) Allowing the photopolymer parts to air dry.

2. The method of claim 1, wherein step (c) is carried out at 140±7 degrees Fahrenheit.

3. The method of claim 1, further comprising the step of placing the photopolymer parts within a microwave oven for approximately 2 minutes.

4. The method of claim 1, wherein in step (d) the photopolymer parts remain in the dye bath about 10 minutes.

5. The method of claim 1, wherein in step (f) the photopolymer parts remain in the rinsing solution about 2 to 3 minutes.

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