

SPECIFICATION**Process for Electroforming from Natural Flowers**

This invention relates to electroforming from natural flowers, which term embraces any parts of flowers such as petals and leaves, and is particularly, but not exclusively concerned with the gold electroforming of orchids. Such electroformed flowers are used for decoration, for example jewellery.

The electroplating of leaves and flowers has been proposed, although the plating of natural orchids poses special problems because of their particular shape, texture, surface and pore juices, cell fluids, and the action of any insecticide or fungicide used on them during cultivation.

The present invention is a development of electroplating into electroforming, in which the constituents of the original natural flower are partially removed once the electroformed replica has been produced.

According to one aspect of the invention a process for electroforming from natural flowers, comprises the steps of cleaning a selected flower, attaching the selected flower to a support member, and coating the selected flower with a conductive medium, immersing the coated flower in an electroplating bath containing an electrolyte solution of the metal to be deposited, subjecting the coated flower to an electroplating process by making it an electrode and repeating the electroplating process until a desired depth of plating has been deposited, removing the plated flower from the electroplating medium and rinsing in a cleansing solution, during the cleaned flower and applying a high pressure liquid jet through the flower stem to eject the disintegrated constituents of the flower from within the plated surface to leave an electroformed replica of the original flower.

According to another aspect of the invention, there is provided an electroformed flower produced by a process according to the immediately preceding paragraph.

Any plating irregularities can be ground off the electroformed flower which can also be acid cleaned, rinsed with water and other cleansing chemicals both inside and out and briefly returned to the electroplating bath for a finished deposit of plating metal.

There now follows a description of a particular embodiment of the invention, by way of example only, with reference to the accompanying drawing which shows diagrammatically a simple electroplating bath for gold plating and electroforming of orchids.

A selected flower is subjected to preliminary preparatory treatment before processing with the apparatus illustrated. In this case an orchid is selected for desired characteristics, in particular prominent vein detail, slightly twisted profile and curly edges. Generally the flowers should be of good shape and freshly cut and free from any visual imperfections from the flower spike.

The selected flower is severed from its original stem, leaving about 1 cm length of stem on the flower. The anthers and sticky substance on the stigma are removed and any crevice in the orchid lip is filled with soft white paper tissue. This is then coated with a thin layer of special adhesive, which is also applied around the stalk base to the flower, on the stigma, between the petals and sepal attachment, in order to level out any furrows and depressions.

The cut flower is then attached to a support in the form of a length of copper wire, suitably, for example, .35 mm in diameter and of 16 cm in length. Both ends of this wire are threaded through the flower stem and then the wire is twisted a few turns around the stem in order to secure the wire firmly to it. Care is taken not to wind the wire too tightly around the stem, otherwise fragmentation of the stem may occur and the flower will become detached.

The flower is subjected to an initial sensitisation process prior to electroplating and electroforming and in this sensitisation process the flower is dipped into a conductive paint containing silver or other suitable conductive pigment. The flower is removed from the paint medium after coating and held to allow excess paint to flow into all recesses, for example the lip and stigmatic opening. Conveniently, the tip of the stem is gripped between the thumb and fore finger and excess paint on the flower may be removed by a gentle flicking action or with a soft painting brush. The back of the flower is placed on a flat horizontal plastic grid and the flower then shaped. After the paint has dried, the flower is removed from the grid and any areas devoid of paint are appropriately re-touched.

The flower is then secured by means of the thin copper wire to one end of a long stiff copper wire and the flower petals and sepals are arranged in a plane parallel to this wire so that no air can be trapped in any recessed corners and with the lip cup faced upwards.

If the flowers are small, two or more are attached to one supporting wire. Other mounting arrangements can be employed according to the particular production process in hand.

Any protruding wires are then severed and the painted flowers inspected and re-touched with sensitising paint as necessary. At this stage any flowers which are defective, for example of poor shape or badly wrinkled due to action of the paint solvent, are rejected.

A P.V.C. (polyvinylchloride) sleeve or sheath is fitted onto the supporting wire right up to the connecting wire attachment in order to prevent this wire from being gold plated. In practice, before use these sleeves must be leached in hot, dilute, medium-strength hydroxide solution (20% is sufficient), then immersed in water and acid washed, followed by thorough rinsing in water.

The flower is then subjected to a pre-plating step using an electroplating bath as illustrated. The particular plating details will depend upon the scale of production and in this case a simple

system is illustrated, consisting of a one litre solution of electroplating medium, in this case a gold electrolyte solution 16, contained in a 1.5 litre squat-form, heat-resistant, borosilicate glass beaker 15. Agitation of the electrolyte 16 is effected by a stirrer rod 21, driven from below the beaker 15 by a combined magnetic stirrer mechanism and hot plate 22.

A platinised titanium grid 17, measuring 16x25 cm is shaped to fit the curved beaker wall and a stabilised filtered rectifier with accurate current readout is used to control the electroplating current between the anode 17 and a cathode 18, which in this case comprises the copper wire 18 attached to the flower 12 and to the side of the glass beaker 15 by a clip 22. A P.V.C. sleeve 19 protects the end of the wire 18 immersed in electrolyte 16.

The sensitised flower 12 is slowly lowered into the gold electrolyte solution 16 in the glass beaker 15 and a current switched on. The supporting wire 18 is mounted on the rim of the beaker 15 using the clip 22 so that the flower 12 is spaced marginally from the sides of the beaker 15, and with its front facing the anode 17. Initially a very low current density is set in the bath to avoid burns on the wires. When the wires have been completely covered with bright gold deposit, the electroplating current is increased to plate at half the recommended current density for the bath. The electroplating solution 16 is agitated with the stirrer rod 21, which may comprise a 4 cm Teflon (Registered Trade Mark) coated stirring rod. The stirring speed is increased after the flower is stiff enough to withstand breakage from the increased agitation of the electrolyte 16. The flower is pre-plated with stiff bright gold coating for a minimum time.

The gold and other bath additives are replenished according to the operating requirements of the electroplating bath.

A general requirement of the electroplating bath is that it should have a very stable filtered rectifier source of current and a strong inert container vessel, in which the electroplating solution can be well agitated at a constant temperature of controllable value during electroplating.

Both the pre-plating and gold forming electroplating bath must be able to produce sound, strong, fairly hard, bright, uniform and relatively thick plating deposits and must give excellent throwing power and be fairly resistant to organic matter contamination.

After removal from the pre-plating bath, the flower is re-immersed in an electroplating bath, which may conveniently be the pre-plating bath itself, with the same or a different electroplating solution and this second bath effectively comprises a build-up bath, in which the plating deposit is increased in thickness. In this 'build-up' bath the flowers are plated under strong agitation until the flower is thick enough to be handled, whereupon it is removed from the bath washed, dried and weighed.

The stem is then trimmed to leave about 2 mm in length and weighing is repeated. The flower is re-wired with .35 mm diameter copper wire to the main copper wire support, with P.V.C. sleeves fitted to prevent gold plating of the copper wires themselves.

The flower is cleaned in an acid cleaner bath and rinsed with distilled water. Following this the flower is treated in a gold strike bath to provide good adhesion of gold deposits on the flower, followed by washing thoroughly in distilled water. Electroforming is continued until the flower shell is strong. During gold electroforming, the front and back parts of the flower are successively exposed to face the anode at regular intervals in order to enable a uniform build-up of gold plate on both sides. Again gold and other additives are added as required. The fully-formed flower is removed from the electroplating bath and dipped in a drag out solution. The flower is then washed and the support wires removed. After drying the flower is weighed and placed on a heat-resistant glass container. Deionised water is then added to immerse the flower completely, followed by autoclaving for 2 hours at 1.055 kgf/cm² (15 p.s.i.) followed by cooling.

In order to remove the flower matrix, a fine, high-pressure jet of water is directed through the cut stem end and this forces the disintegrated constituents of the flower matrix to be ejected through the gap between the stem opening and the jet. The flowers are washed with water and finally in distilled water and any water is flicked out from the interior of the flower shell.

Finally a jet of ethanol (at solution concentration of 95% by volume) is introduced through the stem aperture of the flower and both the interior and the exterior rinsed with the solvent. Ethanol is removed from the interior by flicking. The flowers are finally dried under a hot stream of moving air.

The resulting flower is an electroformed replica in a desired precious metal, in this case gold, of the original natural flower.

As a finishing step, any irregularities may be ground off and the flowers acid cleaned, followed by rinsing with water and suitable cleansing chemicals; the interior being rinsed out with a jet of solution as before. A further rinse is carried out with distilled water followed by a gold strike, a general rinse and thorough 'jet' rinsing out of any chemicals from the interior of the flower shell. The flowers can be brightened up in the gold bath for 10 to 30 minutes to provide a finishing coat, any such further plating being followed by cleansing out of all chemicals and washing with distilled water, treatment with ethanol and drying.

Claims

1. A process for electroforming from natural flowers, comprising the steps of cleaning a selected flower, attaching the selected flower to a support member, and coating the selected flower with a conductive medium, immersing the coated flower in an electroplating bath containing an

system is illustrated, consisting of a one litre solution of electroplating medium, in this case a gold electrolyte solution 16, contained in a 1.5 litre squat-form, heat-resistant, borosilicate glass beaker 15. Agitation of the electrolyte 16 is effected by a stirrer rod 21, driven from below the beaker 15 by a combined magnetic stirrer mechanism and hot plate 22.

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After removal from the pre-plating bath, the flower is re-immersed in an electroplating bath, which may conveniently be the pre-plating bath itself, with the same or a different electroplating solution and this second bath effectively comprises a build-up bath, in which the plating deposit is increased in thickness. In this 'build-up' bath the flowers are plated under strong agitation until the flower is thick enough to be handled, whereupon it is removed from the bath washed, dried and weighed.

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electrolyte solution of the metal to be deposited, subjecting the coated flower to an electroplating process by making it an electrode and repeating the electroplating process until a desired depth of plating has been deposited, removing the plated flower from the electroplating medium and rinsing in a cleansing solution, drying the cleaned flower and applying a high pressure liquid jet through the

10 flower stem to eject the disintegrated constituents of the flower from within the plated surface to leave an electroformed replica of the original flower.

2. An electroformed flower formed by electroplating a natural flower and removing most of the original flower from within the plated surface by a process as claimed in Claim 1.