Description

Title of Invention

ELECTROFORMED COMPONENT ~~AND~~PRODUCTION METHOD ~~FOR MANUFACTURING SAME~~

Technical Field

[0001]

The present invention relates to an electroformed component and a method of producing the electroformed component.

Background Art

[0002]

Fig. 1 is a perspective view illustrating a method of producing a conventional electroformed component, that is, a contact. First, as a pretreatment, a surface of an electrically conductive base material 11 is subjected to electrolytic degreasing as illustrated in (A) of Fig. 1. Then, as illustrated in (B) of Fig. 1, a photoresist 12 is applied to the surface of the electrically conductive base material 11. Then, as illustrated in (C) of Fig. 1, a laser beam 13 is scanned, with the use of a direct writing exposure device, along a region of the surface of the photoresist 12, except for a region having a contact shape. In a case where the photoresist 12 is a negative resist, a light-exposed part of the photoresist 12

Claims

Claim 1

A method of producing an electroformed component, comprising:

an electrodepositing step of fabricating an electroformed product by electrodepositing a metal on an exposed surface which is at least part of an electrically conductive base material and which is exposed within an opening of an insulating mold form;

a mold form removing step of removing the insulating mold form from a surface of the electrically conductive base material;

an insulating film forming step of covering a surface of the electroformed product with an insulating film; and

an insulating film removing step of removing part of the insulating film while causing a remaining part of the insulating film to remain on at least part of the surface of the electroformed product.

Claim 2

The method as set forth in claim 1, further comprising:

a mold form fabricating step of fabricating the insulating mold form by making the opening through part of an insulating mold form material which is provided on the surface of the electrically conductive base material; and

after the insulating film removing step, a peeling step of peeling, from the electrically conductive base material, the electroformed product having the surface on which the remaining part of the insulating film is provided.

Claim 3

The method as set forth in claim 1, wherein

in the insulating film forming step, the insulating film covering the surface of the electroformed product is a dry film resist.

Claim 4

The method as set forth in claim 1, wherein

in the insulating film forming step, the insulating film covering the surface of the electroformed product is a liquid resist which has been applied to the surface of the electroformed product.

Claim 5

The method as set forth in claim 1, wherein:

the insulating film is a photosensitive film; and

the insulating film removing step includes

an exposing step of irradiating, after the insulating film forming step, the insulating film with light while the electroformed product serves as a positional reference, so that

a partial region, which corresponds to the at least part of the surface of the electroformed product, is made insoluble in a developing solution and

a developing step of subjecting the insulating film to a development process, so as to remove a region of the insulating film, the region not having been made insoluble in the developing solution.

Claim 6

The method as set forth in claim 1 wherein:

the insulating film is a photosensitive film; and

the insulating film removing step includes

an exposing step of irradiating, after the insulating film forming step, the insulating film with light while the electroformed product serves as a positional reference, so that a region of the insulating film, which region is other than a partial region corresponding to the at least part of the surface of the electroformed product, is made soluble and

a developing step of subjecting the insulating film to a development process, so as to remove the region of the insulating film.

Claim 7

The method as set forth in claim 5 or 6, further comprising:

a mold form fabricating step of (i) fabricating the insulating mold form by making the opening through an insulating mold form material which is provided on the surface of the electrically conductive base material and (ii) forming, with use of the insulating mold form material, a recess part or a protrusion part any of which is intended for fabricating a position determining mark,

in the electrodepositing step, (i) the electroformed product being fabricated in the opening and (ii) the recess part or the protrusion part fabricating the position determining mark having a protruding form or a recessed form, respectively, and

in the exposing step, light irradiation being carried out while the position determining mark serves as a positional reference.

Claim 8

The method as set forth in claim 5 or 6, further comprising:

a mold form material providing step of providing an insulating mold form material on a surface of the electrically conductive base material, which surface has a position

determining mark; and

a mold form fabricating step of fabricating the insulating mold form by making the opening through part of the insulating mold form material while the position determining mark serves as a positional reference,

in the exposing step, light irradiation being carried out while the position determining mark serves as a positional reference.

Claim 9

The method as set forth in claim 1, wherein

the electroformed product is a contact.

Claim 10

A contact comprising:

an electroformed product including (i) a spring part which is elastically deformable in a direction perpendicular to a voltage application direction in which a voltage is applied during formation of the contact by electroforming and (ii) a terminal part provided so as to be able to be pressed, by the spring part, against an external conductor; and

an insulating film provided on at least part of a main surface of the electroformed product, which main surface is perpendicular to the voltage application direction.

Claim 11

The contact as set forth in claim 10, wherein

the insulating film is provided on at least part of a main surface on one side of the electroformed product.

Claim 12

The contact as set forth in claim 10, wherein

the insulating film is provided on at least part of each of both main surfaces of the electroformed product.

Claim 13

The contact as set forth in claim 10, wherein

the electroformed product includes a plurality of electroformed products, the insulating film includes a plurality of insulating films, and the plurality of electroformed products and the plurality of insulating films are alternately stacked.

Claim 14

The contact as set forth in claim 10, wherein

the insulating film provided on the electroformed product has a protruding region which is plated.

Claim 15

The contact as set forth in claim 10, wherein

the insulating film is provided on a region other than the spring part of the electroformed product.

Claim 16

The contact as set forth in claim 10, wherein

the insulating film is provided on a region other than a part on which stress is concentrated when the electroformed product is elastically deformed.

Claim 17

An electroformed component comprising:

an insulating film provided on at least part of a main surface of the electroformed component, the main surface being perpendicular to a voltage application direction in which a voltage is applied during formation of the electroformed component by electroforming.

Claims

Claim 1

A method of producing an electroformed component, comprising:

a mold form fabricating step of (i) fabricating an insulating mold form by making an opening through an insulating mold form material which is provided on a surface of an electrically conductive base material so that part of the electrically conductive base material is exposed within the opening and (ii) forming, with use of the insulating mold form material, a recess part or a protrusion part any of which is intended for fabricating a position determining mark;

an electrodepositing step of (i) fabricating an electroformed product by electrodepositing a metal on an exposed surface of the electrically conductive base material, the exposed surface being exposed within the opening and (ii) fabricating, by use of the recess part or the protrusion part, the position determining mark having a protruding form or a recessed form, respectively;

a mold form removing step of removing the insulating mold form from the surface of the electrically conductive base material;

an insulating film forming step of covering a surface of the electroformed product with an insulating film which is a photosensitive film;

after the insulating film forming step, an exposing step of irradiating, part of the insulating film with light while the position determining mark serves as a positional reference; and

an insulating film removing step of subjecting the insulating film to a development process so as to remove part of the insulating film while causing a remaining part of the insulating film to remain on at least part of the surface of the electroformed product.

Claim 2

The method as set forth in claim 1, wherein:

in the exposing step, light irradiation causes a partial region, which corresponds to the at least part of the surface of the electroformed product, to be insoluble in a developing solution; and

in the insulating film removing step, a region of the insulating film, the region not having been made insoluble in the developing solution, is removed by the development process.

Claim 3

The method as set forth in claim 1 wherein:

in the exposing step, light irradiation causes a region of the insulating film, which region is other than a partial region

corresponding to the at least part of the surface of the electroformed product, to be soluble; and

in the insulating film removing step, the region of the insulating film is removed by the development process.

Claim 4

The method as set forth in claim 1, further comprising:

after the insulating film removing step, a peeling step of peeling, from the electrically conductive base material, the electroformed product having the surface on which the remaining part of the insulating film is provided.

Claim 5

The method as set forth in claim 1, wherein

in the insulating film forming step, the insulating film covering the surface of the electroformed product is a dry film resist.

Claim 6

The method as set forth in claim 1, wherein

in the insulating film forming step, the insulating film covering the surface of the electroformed product is a liquid resist which has been applied to the surface of the electroformed product.

Claim 7

A method of producing an electroformed component, comprising:

a mold form material providing step of providing an insulating mold form material on a surface of an electrically conductive base material, which surface has a position determining mark;

a mold form fabricating step of fabricating an insulating mold form by making an opening through part of the insulating mold form material while the position determining mark serves as a positional reference so that part of the electrically conductive base material is exposed within the opening;

an electrodepositing step of fabricating an electroformed product by electrodepositing a metal on an exposed surface of the electrically conductive base material, the exposed surface being exposed within the opening;

a mold form removing step of removing the insulating mold form from the surface of the electrically conductive base material;

an insulating film forming step of covering a surface of the electroformed product with an insulating film which is a photosensitive resin;

after the insulating film forming step, an exposing step of (i) causing a direct writing exposure device to carry out

image recognition of a position of the position determining mark which is visible through the insulating film and (ii) irradiating part of the insulating film with light while the position determining mark serves as a positional reference; and

an insulating film removing step of subjecting the insulating film to a development process so as to remove part of the insulating film while causing a remaining part of the insulating film to remain on at least part of the surface of the electroformed product.

Claim 8

The method as set forth in claim 7, wherein

in the mold form fabricating step, a direct writing exposure device carries out image recognition of the position of the position determining mark which is visible through the insulating mold form material.

Claim 9

The method as set forth in claim 7, wherein:

in the exposing step, light irradiation causes a partial region, which corresponds to the at least part of the surface of the electroformed product, to be insoluble in a developing solution; and

in the insulating film removing step, a region of the insulating film, the region not having been made insoluble in the developing solution, is removed by the development process.

Claim 10

The method as set forth in claim 7, wherein:

in the exposing step, light irradiation causes a region of the insulating film, which region is other than a partial region corresponding to the at least part of the surface of the electroformed product, to be soluble; and

in the insulating film removing step, the region of the insulating film is removed by the development process.

Claim 11

The method as set forth in claim 1 or 7, wherein

the electroformed product is a contact.