CITATION LIST

Patent Literatures

[0008]

Patent Document 1: Japanese Unexamined Patent Application Publication No. 2010-5841

Patent Document 2: Japanese Patent No. 4154595

Patent Document 3: Japanese Unexamined Patent Application Publication No. 2004-306030

SUMMARY ~~OF INVENTION~~

Problem to be Solved ~~by the Invention~~

[0009]

An object of the ~~present invention~~embodiments disclosed herein is to provide a resin mold for imprinting without transfer defects, that has excellent releasability from the resin to be imprinted, and that is free of shedding of the mold release agent when imprinting. Moreover, another object of the ~~present invention~~embodiments disclosed herein is to provide a resin mold that is capable of inexpensive mass production. Yet another object of the ~~present invention~~embodiments disclosed herein is to provide a resin mold that has flexibility and can be used by fixing to a roller or the like.

Solution to Problem

[0010]

[1] A resin mold comprising:

where the resin mold is fixed to a roller.

[0011a]

In a first aspect, there is provided a resin mold comprising:

a substrate,

a resin layer formed upon the substrate and having a depressions and protrusions pattern formed on the surface of the resin layer,

and a release layer containing a mold release agent and being formed with uniform thickness on at least the surface of the depressions and protrusions pattern of said resin layer;

wherein said resin layer comprises a solvent soluble resin and an additive; said additive is a compound, or hydrolysate thereof, of General Formula (1):

$Y_{3-n}(CH_3)_nSiX$ (1)

wherein Y is a methoxy or ethoxy group; X is an organic group including one type selected from the group consisting of an epoxy group, glycidoxy group, and optionally substituted phenyl group or amino group; and n is 0 or 1;

the solvent soluble resin has a constituent unit having a substituent group of the same type as X in said General Formula (1); and

said additive is localized in the vicinity of said resin layer surface, the substituent group Y in said General Formula (1) of the additive, or a hydrolysate of such substituent group Y, bonding chemically with said mold release agent to couple together said resin layer and release layer.

[0011b]

In a second aspect, there is provided a method of production of a resin mold comprising steps of:

(I) applying to a substrate a solution dissolving a solvent soluble resin and an additive in a solvent, and forming a resin solution layer on the substrate;

(II) removing the solvent from said resin solution layer and forming a resin layer upon the substrate;

(III) contacting a mold against said resin layer, and transferring a depressions and protrusions pattern formed in the surface of said mold to the surface of said resin layer; and

(IV) coating a mold release agent on the surface of at least the depressions and protrusions pattern of said resin layer, and forming a release layer of uniform thickness;

wherein the additive is a compound, or hydrolysate thereof, of General Formula (1):

$Y_{3-n}(CH_3)_nSiX$ (1)

wherein Y is a methoxy or ethoxy group; X is an organic group including one type selected from the group consisting of an epoxy group, glycidoxy group, and optionally substituted phenyl group or amino group; and n is 0 or 1,

and the solvent soluble resin has a constituent unit having a substituent group of the same type as X in said General Formula (1).

[0011c]

In a third aspect, there is provided a method of use of a resin mold comprising steps of:

contacting the resin surface against the resin mold as defined above;

and peeling said resin mold from said resin.

ADVANTAGEOUS EFFECTS ~~OF INVENTION~~

[0012]

The resin mold of the present ~~invention~~disclosure has excellent releasability from the resin to be imprinted, and there is no shedding of mold release agent due to imprinting. Moreover, the imprinted resin has no transfer defects.

[0013]

The resin mold of the present ~~invention~~disclosure is mainly composed of resin, and thus inexpensive mass production is possible, and the resin mold is flexible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 shows a resin mold of the present invention that has a quasi-4 layer structure.

FIG. 2 shows the method of production of the resin mold of the present invention that has a quasi-4 layer structure.

FIG. 3 shows the method of use of the resin mold of the present invention.

FIG. 4 shows the method of use of the roller type resin mold.

DESCRIPTION OF EMBODIMENTS