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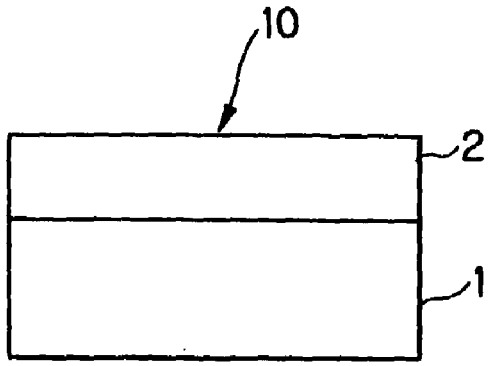
(54) Rubber stamp element and production method thereof

(57) A rubber stamp element is composed of, at least, two layers, i.e. a continuous-foam sponge rubber layer and a rubber layer, wherein the continuous-foam sponge rubber layer has a spring hardness of 15 to 35. This rubber stamp element is produced by the steps of: laying an unvulcanized rubber sheet (A) having a rubber composition including raw rubber, a vulcanizing agent and a filler, over another unvulcanized rubber sheet (B) having a sponge-type rubber composition including raw rubber, a vulcanizing agent, a filler and a water-soluble powder; heating and compressing them so as to be integrated; making the rubber layer (B) porous by treating the integrated structure with water; and carving the surface of either the (A) layer or the (B) layer of the integrated structure using a laser beam.

FIG. 1



EP 0 997 313 A1

Description

BACKGROUND OF THE INVENTION

(1) Field of the Invention

[0001] The present invention relates to a rubber stamp element and a production method thereof.

(2) Description of the Prior Art

[0002] Conventional rubber stamp elements of a type which is not impregnated with ink beforehand and hence needs to be inked by a stamp pad every time it is stamped, have been formed by, at first, irradiating a base plate of a photo curable resin with ultraviolet light through a stamp-pattern negative, cleansing the base plate with a jet flow of water to form a raised stamp pattern, drying it, exposing it to light again to complete a stamp pattern original mold, compressing and heating phenol resin or the like onto the original mold to form a mother die, and thermo-compressing a blank stamp element of rubber onto the mother die to form a finished stamp element. Thereafter, when a rubber stamp needs to be formed, a simple-foam sponge is fixed between the handle block and the stamp element using a double-sided tape, to complete the product.

[0003] Another method of a rubber stamp has been known by which the above blank stamp element is formed using a laser beam. Also in this case, after the production of the stamp element, a single-foam sponge is needed similarly to the above method.

[0004] These methods need a single-foam sponge to be interposed between the stamp element and the wood base so as to provide a good stamping sensation during stamping, and also are less productive. Further, the stamp needs to be inked every stamping since the ink is applied to the smooth surface of the rubber stamp element, so that when the stamp is repeatedly used it is very inconvenient.

SUMMARY OF THE INVENTION

[0005] The present invention is to solve the above conventional problems, and it is therefore an object of the present invention to provide a productive and handy rubber stamp, of which the rubber stamp element is formed of at least two layers, i.e., a continuous-foam sponge rubber layer and a rubber layer, wherein the surface of the continuous-foam sponge rubber layer or the rubber layer is carved while a single-foam sponge does not need to be adhered after the fabrication of the stamp element, and which is capable of stamping a multiple number of times with only once inked when the continuous-foam portion has been carved. Another object of the invention is to provide a production method of this rubber stamp element. To attain the above objects, the present inventors have intensively studied about the conventional problems and have completed the present invention. That is, the present inventors have succeeded in manufacturing the aimed, rubber stamp element, by the method comprising the steps of: laying an unvulcanized rubber sheet (A) over another unvulcanized rubber sheet (B) of a specific type; heating and compressing them so as to be integrated; making the specific rubber layer (B) porous by treating the integrated structure with water; and caning the surface of either the (A) layer or the (B) layer of the integrated structure using a laser beam.

[0006] In order to achieve the above objects, the present invention is configured as follows:

[0007] In accordance with the first aspect of the present invention, a rubber stamp element includes: at least two layers, i.e., a continuous-foam sponge rubber layer; and a rubber layer, and is characterized in that the continuous-foam sponge rubber layer has a spring hardness of 15 to 35.

[0008] In accordance with the second aspect of the present invention, a method of producing a rubber stamp element, comprises the steps of: laying an unvulcanized rubber sheet (A) having a rubber composition including a raw rubber, a vulcanizing agent and a filler, over another unvulcanized rubber sheet (B) having a sponge-type rubber composition including a raw rubber, a vulcanizing agent, a filler and a water-soluble powder; heating and compressing them so as to be integrated; making the rubber layer (B) porous by treating the integrated structure with water; and carving the surface of either the (A) layer or the (B) layer of the integrated structure using a laser beam.

[0009] In accordance with the third aspect of the present invention, the method of producing a rubber stamp element having the above second feature is characterized in that the water-soluble power is, at least, one or more selected from the group of sodium chloride, sodium sulfate, sodium carbonate, aluminum sulfate and sodium nitrate.

[0010] In accordance with the fourth aspect of the present invention, the method of producing a rubber stamp element having the above third feature is characterized in that the laser beam is of a carbon dioxide gas laser having a power of 80 to 400 W with a spot size of 40 to 80 μm.

[0011] Here, the 'continuous-foam sponge rubber layer' used in the present invention indicates a rubber layer having continuous pores. The 'spring hardness' indicates the measured value (Japan Rubber Association standards SRIS

0101-1968) using a spring harness tester.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig.1 is an illustrative view showing a section of an example of a rubber material for a stamp element of the present invention;
Fig.2A is an illustrative view showing a section of an example of a rubber stamp element of the present invention; and
Fig.2B is an illustrative view showing a section of another example of a rubber stamp element of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The embodiment of the present invention will hereinafter be described in detail.

[0014] A rubber stamp element of the present invention is configured of, at least, two layers, that is, a continuous-foam sponge rubber layer and a rubber layer, and the continuous-foam sponge rubber layer has a spring hardness of 15 to 35.

[0015] A manufacturing method of the rubber stamp element of the present invention comprises the steps of: laying an unvulcanized rubber sheet (A) having a rubber composition including a raw rubber, a vulcanizing agent and a filler over another unvulcanized rubber sheet (B) having a sponge-type rubber composition including a raw rubber, a vulcanizing agent, a filler and a water-soluble powder; heating and compressing these sheets to integrate them; processing the integrated rubber-lamination with water to make the (B) layer porous; and carving the surface of either the (A) layer or the (B) layer of the integrated structure using a laser beam.

[0016] In the present invention, the rubber composition used for the aforementioned continuous-foam sponge rubber layer at least includes: a raw rubber, a vulcanizing agent and a filler while the sponge-type rubber composition at least includes: a raw rubber, a vulcanizing agent, a filler and a water-soluble powder.

[0017] The raw rubber used for each rubber composition may be at least one or more, selected from natural rubber (NR) and synthetic rubber. Specific examples include: a crude rubber (CR), styrene-butadiene rubber (SBR), ethylene-propylene-dien monomer (EPDM), acrylonitrile-butadiene rubber (NBR), silicone rubber (Q) and acrylic rubber (ACM).

[0018] As the vulcanizing agent used for each rubber composition, sulfur or its homologous elements (selenium, tellurium) can be used. Other than these, organic compounds containing sulfur, organic peroxides (di-cumyl peroxide, di-tert-butyl peroxide, etc.), metal oxides (magnesium oxide (MgO), lead oxide (PbO), zinc oxide (ZnO) etc.), organic polyhydric amine, modified phenol resin, isocyanate group, etc. may be typically used.

[0019] As the filler used for each rubber composition, those which are usually used for the production of rubber materials may be used. A vulcanization accelerator (aldehyde ammonia group, aldehyde amine, guanidine, thiourea group, thiazole group, thiuram group, sulfenic amide group, di-thiocarbamate, xanthate, etc.), an accelerator aid (for example, sodium hydroxide, calcium oxide, magnesia, zinc flower, lead monoxide), a reinforcer (calcium carbonate, colloidal clay, soft hydroxy magnesium carbonate, soft hydroxy magnesium carbonate, diatom earth, silicon dioxide, carbon black, litopone, barium sulfate, etc.), an antioxidant (aromatic amine group, hydroquinone, aldehyde amine condensation products, etc.) and other additives can be used.

[0020] These, the raw rubber, vulcanizing agent and filler should be selected as appropriate depending upon the desired properties of the continuous-foam sponge rubber layer and rubber layer. The compound ratio of the above vulcanizing agent and the filler used for each rubber composition is not particularly specified but may be selected as appropriate depending upon the desired usage of the rubber stamp.

[0021] The salt powder used in the rubber composition for sponge rubber in the present invention is used as a pore forming substance. So those which will not decompose and gasify and are easily dissolved into water should be used. The salt power is at least one or more selected from the group of sodium chloride, sodium sulfate, sodium carbonate, aluminum sulfate and sodium nitrate. These salt powders are preferably 0.01 to 0.2 mm in mean particle diameter.

[0022] The content of the salt power should be determined depending upon the desired porosity of the continuous-foam sponge rubber layer, but is preferably 250 to 550 parts by weight to 100 parts by weight of the raw rubber composition.

[0023] Unless the content of the salt power falls within the above range, the aimed at, spring hardness cannot be sufficed resulting in failure to provide the rubber stamp element of the present invention.

[0024] In the present invention, the unvulcanized rubber sheet for the rubber layer (A) is prepared by mixing the raw rubber, vulcanizing agent, filler, antioxidant, softener and the like in the mixer and rolling it by calender roll. The unvulcanized rubber sheet for the sponge rubber layer (B) is prepared by mixing first the raw rubber, vulcanizing agent, filler,

antioxidant, softener and the like in the mixer and then adding and blending the salt power thereinto and rolling it by calender roll.

[0025] As to the compounding amounts of the materials in the production of these two sheets, for example, for 100 parts by weight of the raw rubber, 0.3 to 5 parts by weight of the vulcanizing agent, 50 to 110 parts by weight of the filler, 1 to 3 parts by weight of the antioxidant, 5 to 20 parts by weight of the softener and 400 to 1200 parts by weight of the salt powder are used.

[0026] Next, to integrate the two sheets, the sheets, after they are put one over the other, are heated and pressed by heat pressing at a temperature of 150 to 180 °C, with a pressure of 30 to 100 kg/cm^2 over 5 to 20 minutes so as to be integrated.

[0027] After the integration, it is rinsed with an ample amount of cold or warm water so as to wash out the salt powder, then is dried to thereby provide a rubber blank for stamp element composed of two layers, i.e., the continuous-foam sponge rubber layer and rubber layer.

[0028] Here, the material for a rubber stamp element is formed of two layers, that is, the continuous-foam sponge rubber layer and the rubber layer, but may be formed of three or more layers, of a continuous-foam sponge rubber layer, a rubber layer (middle layer) and a continuous-foam sponge rubber layer.

[0029] Next, the method of forming the stamping face comprises the steps of: preparing an original of a stamp pattern by photo composition; scanning the stamp pattern by image scanner for data processing; and carving the pattern based on the data by directly irradiating the layer (B) i.e., the sponge layer with a laser beam.

[0030] As the laser beam, a carbon dioxide gas laser is preferably used. Preferably, the intensity is 80 to 400 W and the spot size is 40 to 80 μm. These specifications of the intensity and the spot size will produce a clear stamping face .

[0031] The stamping face may be formed on the rubber layer (A) using the above laser beam.

[0032] The rubber stamp element thus obtained is composed of two layers, or the continuous-foam sponge rubber layer and the rubber layer and the continuous-foam sponge rubber layer has a spring hardness of 15 to 35.

[0033] If the spring hardness is less than 15, physical properties such as tearing strength, wear resistance, anti-bending property and the like degrade. If the spring hardness exceeds 35, the user will have hard stamping sensation when stamping, which is unpreferred.

[0034] The thicknesses of the continuous-foam sponge rubber layer and the rubber layer should be specified as appropriate depending upon the desired usage etc., of the rubber stamp. The continuous-foam sponge rubber layer should be 0.5 to 10 mm in thickness and the rubber layer should be 1 to 3 mm in thickness.

[0035] In the present invention, when the continuous-foam sponge rubber layer, integrated with the rubber layer and having a spring hardness of 15 to 35 is carved by a laser beam so as to produce a rubber stamp element for a rubber stamp, the rubber stamp element is inked from the stamp pad through the continuous-foam sponge rubber layer, in contrast to the conventional rubber stamp where it is inked through the smooth face. Therefore, the ink impregnates into the continuous-foam sponge rubber layer, enabling multiple number of stampings with only once inked.

[0036] The conventional rubber stamp needed the aftertreatment of attaching a sponge rubber to the stamp element after the production thereof, with double-sided tape in order to provide a comfortable stamping sensation. In contrast, in the present invention, since the stamp element is originally composed of at least two layers, the sponge rubber layer and the rubber layer, it can also provide excellency in work efficiency.

[0037] Further, in the present invention, when the rubber layer integrated with the continuous-foam sponge rubber layer having a spring hardness of 15 to 35 is carved by a laser beam, its fabrication can be performed with half the time compared to the conventional method of fabrication using a base plate of a photocurable resin. When the thus produced rubber stamp element is used for a rubber stamp, it can provide excellency in its work environment and work time since the stamp element is originally composed of at least two layers or the sponge rubber layer and the rubber layer, in contrast to the conventional rubber stamp for which the aftertreatment of attaching a sponge rubber to the stamp element after the production thereof with double-sided tape is needed in order to provide a comfortable stamping sensation.

[0038] Next, the present invention will be further described in detail referring to examples and comparative examples, but the present invention should not be limited to the following specific examples. In the following description, 'parts by weight' representing the unit for mixing proportion, will be abbreviated as 'parts'.

(Example 1)

[0039] Added to 100 parts by weight of synthetic rubber (NBR) were 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of dioctyl phthalate (to be referred to simply as 'DOP'), 65 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation, and the mixture was masticated and blended and formed into an unvulcanized rubber sheet of 1.6 mm thick.

[0040] Similarly, 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of DOP, 55 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation were added to 100 parts by weight of synthetic rubber (NBR), and the mixture was masticated and

blended. Then 350 parts of sodium chloride having a particle size of 0.03 to 0.06 mm were added and the mixture was masticated and blended, and formed into an unvulcanized sponge rubber sheet of 1.5 mm thick.

[0041] Subsequently, the above unvulcanized rubber sheet and the unvulcanized sponge rubber sheet were put one over the other and compression molded at a temperature of 160 °C with a pressure of 50 kg/cm^2 over 15 minutes so that they were integrated.

[0042] After the integration, it was rinsed with warm water (80°C ~ 95°C) so as to fully wash out the sodium chloride powder, then was dried to thereby form a rubber blank for stamp element 10 (3 mm) shown in Fig.1 in which a sponge rubber layer having a spring hardness of 30 was united over a rubber layer.

[0043] Then, sponge rubber layer 2 of the rubber blank for the stamp element was carved using a carbon dioxide gas laser having a power of 300 W with a spot diameter of 50 μm to thereby form a rubber stamp element 20 with a carved stamp face 3 shown in Fig.2A.

(Example 2)

[0044] After the production of a rubber blank for the stamp element in the same way as in example 1, rubber layer 1 shown in Fig.1 was carved using a carbon dioxide gas laser having a power of 300 W with a spot diameter of 50 μm to thereby form a rubber stamp element 30 with a carved stamp face shown in Fig.2B.

(Comparative example 1)

[0045] Added to 100 parts by weight of synthetic rubber (NBR) were 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of DOP, 65 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation, and the mixture was masticated and blended and formed into an unvulcanized rubber sheet of 1.6 mm thick.

[0046] Similarly, 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of DOP, 55 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation were added to 100 parts by weight of synthetic rubber (NBR), and the mixture was masticated and blended. Then 1000 parts of sodium chloride having a particle size of 0.03 to 0.06 mm were added and the mixture was masticated and blended, and formed into an unvulcanized sponge rubber sheet of 1.5 mm thick.

[0047] Subsequently, the above unvulcanized rubber sheet and the unvulcanized sponge rubber sheet were put one over the other and compression molded at a temperature of 160 °C with a pressure of 50 kg/cm^2 over 15 minutes so that they were integrated.

[0048] After the integration, it was rinsed with warm water (80°C ~ 95°C) so as to fully wash out the sodium chloride powder, then was dried to thereby form a rubber blank for the stamp element (3 mm) shown in Fig.1 in which a sponge rubber layer having a spring hardness of 10 was united over a rubber layer.

[0049] Then, sponge rubber layer 2 of the rubber blank for the stamp element was carved using a carbon dioxide gas laser having a power of 300 W with a spot diameter of 50 μm to thereby form a rubber stamp element 20 with a carved stamp face 3.

(Comparative example 2)

[0050] Added to 100 parts by weight of synthetic resin (NBR) were 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of DOP, 65 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation, and the mixture was masticated and blended and formed into an unvulcanized rubber sheet of 1.6 mm thick.

[0051] Similarly, 2 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 5 parts of DOP, 75 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation were added to 85 parts by weight of synthetic resin (NBR) and 15 parts of high styrene resin (SBR), and the mixture was masticated and blended. Then 300 parts of sodium chloride having a particle size of 0.03 to 0.06 mm were added and the mixture was masticated and blended, and formed into an unvulcanized sponge rubber sheet of 1.5 mm thick.

[0052] Subsequently, the above unvulcanized rubber sheet and the unvulcanized sponge rubber sheet were put one over the other and compression molded at a temperature of 160 °C with a pressure of 50 kg/cm^2 over 15 minutes so that they were integrated.

[0053] After the integration, it was rinsed with warm water (80°C ~ 95°C) so as to fully wash out the sodium chloride powder, then was dried to thereby form a rubber blank for stamp element 10 (3 mm) shown in Fig. 1 in which a sponge rubber layer having a spring hardness of 40 was united over a rubber layer.

[0054] Then, the sponge rubber layer of the rubber blank for the stamp element was carved using a carbon dioxide

gas laser having a power of 300 W with a spot diameter of 50 μm to thereby form a rubber stamp element 20 with a carved stamp face 3.

(Comparative example 3)

[0055] Added to 100 parts by weight of synthetic resin (NBR) were 1 part of sulfur, 5 parts of zinc flower, 2 parts of tetramethylthiuram disulfide, 2 parts of n-cyclohexl-2-benzthiazole-sulfonamide, 8 parts of DOP, 65 parts of carbon black and 2 parts of diphenylamine and aldehydeamine condensation, and the mixture was masticated and blended and formed into an unvulcanized rubber sheet of 3.1 mm thick.

[0056] Subsequently, the above unvulcanized rubber sheet for the stamp element was compression molded at a temperature of 160 °C with a pressure of 50 kg/cm^2 over 15 minutes so as to produce a stamp element rubber of 3 mm thick. This rubber for the stamp element was carved using a carbon dioxide gas laser having a power of 500 W with a spot diameter of 50 μm to thereby form a rubber stamp element with a carved stamp face.

[0057] Each of the rubber stamp elements obtained from examples 1 and 2 and comparative examples 1 to 3 was attached to the wood base and was inked by the stamp pad so that they could be evaluated as to their stamping performance, imprint sharpness, feeling during stamping, rubber durability, work efficiency (productivity) in the following evaluation methods.

[0058] In this evaluation, a sponge rubber of 1 mm thick was interposed between the wood base and the stamp element of comparative example 3, forming a rubber stamp of usual specifications.

[0059] The results are shown in Table 1 below.

(Evaluation for the stamping performance of a rubber stamp element):

[0060] This was evaluated based on the number of stampings of each rubber stamp element with only once inked.

(Evaluation for the imprint sharpness):

[0061] This was evaluated based on the extent to which the imprint blurred.

Evaluation criteria:

[0062]

Good: sharp imprint without blur
Bad : blurred, dirty imprint

(Evaluation for the feeling during stamping)

[0063] This was evaluated based on the elasticity during stamping and the operator's fatigue resulting from repetition of stampings (1000 times of stampings).

Evaluation criteria:

[0064]

Good: appropriate elasticity during stamping and the operator felt no fatigue from the repetition of stampings.
Bad : poor elasticity during stamping and the operator felt fatigue from the repetition of stampings.

(Evaluation for the rubber durability)

[0065] This was evaluated based on the imprint sharpness after stampings of 10000 times.

Evaluation criteria:

[0066]

Good: good enough to form a sharp imprint at a level equal to that of the initial imprint
Bad : inferior in character sharpness compared to the initial imprint (unable to form a sharp imprint due to wear of

the stamp face)

(Evaluation for the work efficiency)

[0067] This was evaluated based on the number of steps after the production of a rubber stamp element.

Evaluation criteria:

[0068]

Good: one step (fixing the rubber element to the wood base)
Bad : two steps (applying the rubber element to a sponge and then fixing it to the wood base)

[0069]

Table 1

	Ex.1	Ex.2	Comp. Ex.1	Comp. Ex.2	Comp. Ex.3
Stamping performance (with once inked)	Five times	Once	Three times	Three times	Once
Imprint sharpness	Good	Good	Bad	Good	Good
Stamping feeling	Good	Good	Good	Bad	Good
Rubber durability	Good	Good	Bad	Good	Good
Work efficiency (productivity)	Good	Good	Good	Good	Bad

[0070] As apparent from the result of Table 1 above, examples 1 and 2 as the rubber stamp element of the present invention, turned out to provide excellency in stamping performance, imprint sharpness, feeling upon stamping, rubber durability and work efficiency (productivity), with respect to comparative examples 1 to 3 which are not satisfying condition of the present invention.

[0071] In accordance with the present invention, it is possible to provide a rubber stamp element which allows multiple number of stampings with only once inked and which is productive and handy for use as well as to provide a fabrication method of the rubber stamp element.

[0072] Particularly, in the present invention, the continuous-foam sponge layer, which has a spring hardness of 15 to 35 and is integrated with the rubber layer, is carved with a laser beam so as to be used as a rubber stamp element of a rubber stamp. In this case, in contrast to the conventional rubber stamp of which the smooth surface is inked, the rubber stamp element of the present invention is inked so that the continuous-foam sponge rubber layer is impregnated with ink. Therefore, the stamp element enables multiple number of stampings with only once inked.

[0073] In the present invention, when the rubber layer integrated with the continuous-foam sponge rubber layer having a spring hardness of 15 to 35 is carved by a laser beam, its fabrication can be simplified compared to the conventional method of fabrication using a base plate of a photocurable resin. When the thus produced rubber stamp element is used for a rubber stamp, it can provide excellency in its work environment and work time since the stamp element is originally composed of at least two layers, in contrast to the conventional rubber stamp for which the after-treatment of attaching a sponge rubber to the stamp element after the production thereof with double-sided tape is needed in order to provide a comfortable stamping sensation.

Claims

1. A rubber stamp element comprising:

   at least two layers,
   a continuous-foam sponge rubber layer; and a rubber layer,
   wherein the continuous-foam sponge rubber layer has a spring hardness of 15 to 35.

2. A method of producing a rubber stamp element, comprising the steps of:

   laying an unvulcanized rubber sheet (A) having a rubber composition including a raw rubber, a vulcanizing

agent and a filler, over another unvulcanized rubber sheet (B) having a sponge-type rubber composition including a raw rubber, a vulcanizing agent, a filler and a water-soluble powder;
heating and compressing them so as to be integrated;
making the rubber layer (B) porous by treating the integrated structure with water; and
carving the surface of either the (A) layer or the (B) layer of the integrated structure using a laser beam.

3. The method of producing a rubber stamp element according to Claim 2, wherein the water-soluble power is, at least, one or more selected from the group of sodium chloride, sodium sulfate, sodium carbonate, aluminum sulfate and sodium nitrate.

4. The method of producing a rubber stamp element according to Claim 3, wherein the laser beam is of a carbon dioxide gas laser having a power of 80 to 400 W with a spot size of 40 to 80 μm.

FIG.1

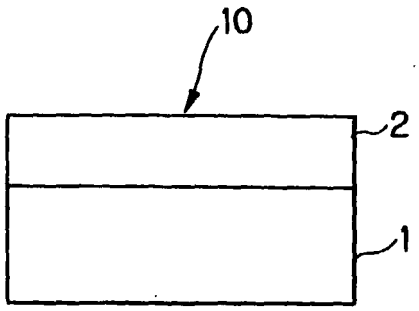


FIG.2A

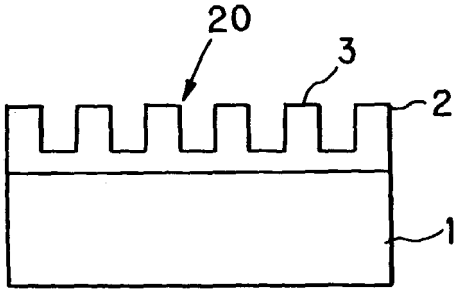
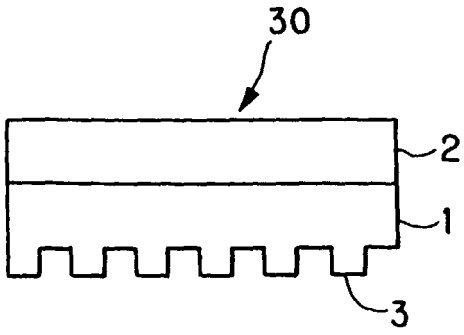


FIG.2B



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 1387

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 397 417 A (GOTO KAZUMI ET AL) 14 March 1995 (1995-03-14) * the whole document *	1-4	B41M1/00 B41C3/04
X	US 5 620 777 A (GOTO KAZUMI ET AL) 15 April 1997 (1997-04-15)	1	
A	* examples 1,2 *	2-4	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B41M
B41C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 January 2000	Balsters, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 12 1387

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5397417 A	14-03-1995	JP 6191002 A	12-07-1994
US 5620777 A	15-04-1997	JP 7149032 A	13-06-1995

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82