

(12) International Application Status Report

Received at International Bureau: 01 October 2018 (01.10.2018)

Information valid as of: 28 January 2019 (28.01.2019)

Report generated on: 25 August 2019 (25.08.2019)

(10) Publication number:

WO2019/066732

(43) Publication date:

04 April 2019 (04.04.2019)

(26) Publication language:

English (EN)

(21) Application Number:

PCT/TH2018/000040

(22) Filing Date:

07 September 2018 (07.09.2018)

(25) Filing language:

English (EN)

(31) Priority number(s):

1701005766 (TH)

(31) Priority date(s):

28 September 2017 (28.09.2017)

(31) Priority status:

Priority document received (in compliance with PCT Rule 17.1)

1801003217 (TH)

01 June 2018 (01.06.2018)

Priority document received (in compliance with PCT Rule 17.1)

1801003218 (TH)

01 June 2018 (01.06.2018)

Priority document received (in compliance with PCT Rule 17.1)

(51) International Patent Classification:

B29C 64/124 (2017.01); **B29C 64/135** (2017.01); **B29C 35/00** (2006.01); **B33Y 30/00** (2015.01)

(71) Applicant(s):

NATIONAL SCIENCE AND TECHNOLOGY DEVELOPMENT AGENCY [TH/TH]; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH) *(for all designated states)*

(72) Inventor(s):

WIROONPOCHIT, Panithi; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
SRISAWADI, Sasitorn; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
DOKKHAN, Sopita; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
MUNNAE, Jomkwun; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
LAPAPONG, Sittikorn; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
LOYKULNANT, Surapich; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
NAEWNGERNDÉE, Rattanasuda; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)
UTRA, Kittaporn; 111 Thailand Science Park, Phahonyothin Road, Klong 1, Klong Luang, Pathumthani, 12120 (TH)

(74) Agent(s):

RUANGSIN, Ratchada; 111 Thailand Science Park, Phahonyothin Road, Khlong 1, Khlong Luang, Pathumthani, 12120 (TH)

(54) Title (EN): A METHOD FOR MOLD-FREE MANUFACTURING OF NATURAL RUBBER ARTICLES

(54) Title (FR): PROCÉDÉ POUR LA FABRICATION D'ARTICLES EN CAOUTCHOUC NATUREL SANS MOULE

(57) Abstract:

(EN): This invention relates to the method for mold-free manufacturing of natural rubber articles. Specifically, the articles can be fabricated in the stereolithography process which eliminates the need of mold making and reduces the process time significantly. The method comprises the steps of (1) preparing pre-vulcanized latex compound for sulfur and non-sulfur vulcanization; (2) adding processing aid to make the latex compound curable when exposed to laser irradiation, the processing aid includes heat-sensitive polymer and/or carbon material(s); and (3) fabricating of three-dimensional rubber articles by stereolithography process. The process are capable of fabricating complex shapes and internal features. As the said rubber articles contain more than 95% of natural rubber, they are highly flexible and can be translucent in some embodiments.

(FR): La présente invention concerne un procédé pour la fabrication d'articles en caoutchouc naturel sans moule. Plus précisément, les articles peuvent être fabriqués par un processus de stéréolithographie qui élimine le besoin de fabrication de moule et réduit considérablement le temps de traitement. Le procédé comprend les étapes consistant à (1) préparer un mélange de latex pré-vulcanisé pour la vulcanisation avec du soufre et sans soufre ; (2) ajouter un adjuvant de fabrication pour rendre le mélange de

latex durcissable lorsqu'il est exposé à un rayonnement laser, l'adjuvant de fabrication comprenant un polymère thermosensible et/ou une ou plusieurs matières carbonées ; et (3) fabriquer des articles tridimensionnels en caoutchouc par un processus de stéréolithographie. Le procédé permet de fabriquer des formes complexes et des éléments caractéristiques internes. Étant donné que lesdits articles en caoutchouc contiennent plus de 95 % de caoutchouc naturel, ils sont hautement flexibles et peuvent être translucides dans certains modes de réalisation.

International search report:

Received at International Bureau: 25 January 2019 (25.01.2019) [US]

International Report on Patentability (IPRP) Chapter II of the PCT:

Not available

(81) Designated States:

AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

European Patent Office (EPO) : AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR

African Intellectual Property Organization (OAPI) : BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG

African Regional Intellectual Property Organization (ARIPO) : BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW

Eurasian Patent Organization (EAPO) : AM, AZ, BY, KG, KZ, RU, TJ, TM

Declarations:

Declaration made as applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51bis.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate

Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv)) for the purposes of the designation of the United States of America