

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
28 October 2021 (28.10.2021)



(10) International Publication Number
WO 2021/216226 A1

(51) International Patent Classification:

C10G 31/11 (2006.01) *B01D 71/08* (2006.01)
C10G 45/00 (2006.01) *B01D 71/56* (2006.01)
C10G 47/00 (2006.01) *B01D 71/50* (2006.01)
C10G 33/00 (2006.01) *B01D 71/68* (2006.01)
B01D 61/00 (2006.01) *C10M 175/00* (2006.01)

(21) International Application Number:

PCT/US2021/022704

(22) International Filing Date:

17 March 2021 (17.03.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/012,561 20 April 2020 (20.04.2020) US

(71) Applicant: **EXXONMOBIL RESEARCH AND ENGINEERING COMPANY** [US/US]; 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801-0900 (US).

(72) Inventors: **ZIELINSKI, Christine, A.**; 2408 S. Whittmore Street, Furlong, PA 18925 (US). **NAEGELY, Paul, C.**; 12 Kings Croft Lane, Voorhees, NJ 08043 (US). **SHAH, Meha, H.**; 2355 Raya Way, Easton, PA 18045 (US). **BAKER, Charles, L., Jr.**; 21 Memel Drive, Thornton, PA 19373 (US). **WANG, Chengrong**; 4770 Dealtrey Drive, Easton, PA 18045 (US).

(74) Agent: **YARNELL, Scott, F.** et al.; ExxonMobil Research and Engineering Company, 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801 (US).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): 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, IT, 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, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (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), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

(54) Title: MEMBRANE SEPARATION OF USED OIL AND COMPOSITIONS GENERATED

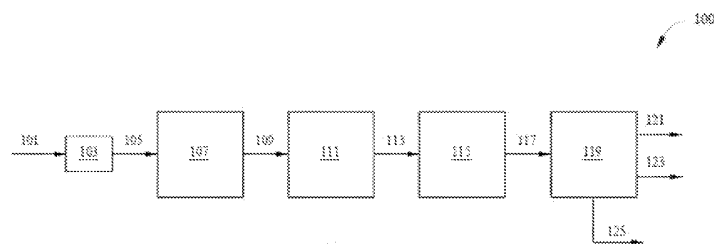


FIG. 1

(57) Abstract: In an embodiment is provided a process to re-refine used oil that includes introducing a used oil and a solvent to a separation unit under separation conditions selected to produce a purified oil product, the separation unit comprising a porous membrane, a semiporous membrane, or both; and separating the used oil to obtain an effluent comprising a purified oil product. In another embodiment is provided an apparatus for re-refining used oil that includes a separation unit comprising a porous or semiporous membrane; a used oil feed coupled to an inlet of the separation unit; and an inlet of a diffusate collection unit coupled to an outlet of the separation unit. In another embodiment is provided a composition generated from a membrane separation process that includes a base oil, the composition having a soot content of about 0.05% or less.

[Continued on next page]

WO 2021/216226 A1

Published:

— *with international search report (Art. 21(3))*