

Bogotá D.C., septiembre 22 de 2003

Señores

SUPERINTENDENCIA DE INDUS
Departamento de Propiedad Industrial
División de Nuevas Creaciones
E. S. D.

16
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
Radicación: 0083482 / 00000001 Folios: 2
Fecha (MM): 2003-09-22 11:11:29
Trámite: 002 PATENTES D A REGISTRO/ 528 PETICION
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

Ref.: Solicitud Patente de Invención denominada
"Procedimiento para Recuperar grasas, aceites e hidrocarburos
derramados en cuerpos de agua, mediante la utilización d
plumas de pollo como elemento oleofílico"
Solicitante: Rodrigo Suárez Castaño
Radicación No.: 02-83482

RODRIGO SUAREZ CASTAÑO, identificado con la cédula de ciudadanía No. 79'870.933 de Bogotá, actuando en mi propio nombre y en mi calidad de inventor del procedimiento de la referencia, por medio del presente escrito me dirijo a este Despacho con el fin de solicitar, dentro del término de seis (6) meses a partir de la publicación en la Gaceta de Propiedad Industrial, de conformidad con la Decisión 486 de 2000, que se proceda a realizar el examen de patentabilidad dentro del trámite de la referencia, vale decir, dentro de la solicitud de patente de invención denominada "Procedimiento para Recuperar grasas, aceites e hidrocarburos derramados en cuerpos de agua, mediante la utilización de plumas de pollo como elemento oleofílico".

Para efecto de lo anterior, allego la constancia de consignación del examen de patentabilidad.

Agradezco de antemano la atención prestada a la presente,

Atentamente,


RODRIGO SUAREZ CASTAÑO
C. C. N . 79'870.933 de Bogotá

7/

SUPERINDUSTRIA Y COMERCIO
Radicación : 0803402 0000000 Folios: 2
Fecha (AMB): 2003-09-22 11:11/29
Trámite : 002 PATENTES 1 REGISTRO/ 530 PETICION
Dependencia: 2009 DIVISION DE NUEVAS CREACIONES

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 03 - 69,115
FECHA : SEPTIEMBRE 22 DE 2003

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
RODRIGO SUAREZ C.	CONSIGNACION	BANCO POPULAR	050-00110-6	17252551	22/09/2003	335,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	85 EXAMEN DE PATENTABILIDAD DE INVEN	335,000.00
		TOTAL :	335,000.00

SON: TRESCIENTOS TREINTA Y CINCO MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

DIVISION DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 02- 83482

EL EXTRACTO DE LA PRESENTE SOLICITUD DE PATENTE DE INVENCION FUE PUBLICADO

EN LA GACETA DE PROPIEDAD INDUSTRIAL No 537, DE FECHA 27 DE FEBRERO DE 2004,

EL TERMINO HABIL SEÑALADO POR LA LEY EXPIRA EL 27 DE MAYO DE 2004.

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud calga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI

NO **X**

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES**

2020

Bogotá, D. C., 20 de Abril de 2006

Doctor

RODRIGO SUAREZ CASTAÑO

ASUNTO	Radicación No.	02-83482
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	4539
	Folios	034

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica

1) Documentos estudiados:

- a) Para el presente estudio se tendrán en cuenta el capítulo descriptivo, comprendido en los folios 4 a 10 de la solicitud en estudio.
- b) Para el presente estudio se tendrá en cuenta el capítulo reivindicatorio que comprende 1 reivindicación en los folios 10 y 11 de la solicitud en estudio.
- c) Conforme lo establece los artículos 9, 10 y 11 de la decisión 486 de la Comisión de la Comunidad Andina, la presente solicitud en estudio fue presentada el 18 de septiembre de 2002, y en el momento de la radicación NO se reclamo prioridad alguna.

2) Objeto de la Invención

- a) La reivindicación 1 de la solicitud en estudio se refieren a un procedimiento para recuperar grasas, aceites e hidrocarburos derramados en cuerpos de agua, mediante la utilización de plumas de pollo como elemento oleofílico que abarcar los siguientes pasos, a saber: - Recolectar el material, vale decir, las plumas, en el sitio de producción, en donde es posible encontrarlas separadas de los demás subproductos de las aves, como por ejemplo las vísceras. - Lavar las plumas inmediatamente después de la recolección, sin que transcurra nunca un tiempo superior a 8 horas, - El proceso de lavado deberá desarrollarse mediante la inmersión total de las plumas en el agua, la cual deberá ser llevada a una temperatura no superior a 70°C (Centígrados) y no inferior a 40°C. - El lavado se debe extender por un lapso de tiempo entre veinte (20) y treinta (30) minutos. - El agua con la cual se desarrolla el lavado debe ser llevada a un potencial hidrógeno (pH) de carácter alcalino, es decir, mayor de siete, el cual se puede obtener mediante la adición de soda cáustica al agua. - Se debe igualmente, adicionar un desinfectante como hipoclorito de sodio, a una concentración del 10% como máximo, y además un detergente no iónico. - Después de haber concluido el proceso de lavado, se debe proceder a adelantar el proceso de secado, el cual se desarrolla hasta que la humedad de las plumas sea reducida en su totalidad: este proceso se hace mediante la utilización de ventiladores eléctricos. - Después de haber concluido las etapas de lavado y secado, se procede a empacar las plumas dentro de materiales contenedores de diferentes formas, de acuerdo con las necesidades del terreno a tratar.

- b) El anterior procedimiento busca recuperar grasas, aceites e hidrocarburos derramados en agua.
- c) Según la Clasificación Internacional de Patentes, la codificación para esta solicitud corresponde a C 02 F 1/40

3) Claridad de la Solicitud

- a) El artículo 28 de la Decisión 486 de la Comisión de la Comunidad Andina de Naciones establece

"La descripción deberá divulgar la invención de manera suficientemente clara y completa para su comprensión y para que una persona capacitada en la materia técnica correspondiente pueda ejecutarla"

"La descripción de la invención incluirá el nombre de la invención e incluirá la siguiente información:"

"a) el sector tecnológico al que se refiere o al cual se aplica la invención;"

"b) la tecnología anterior conocida por el solicitante que fuese útil para la comprensión y el examen de la invención, y las referencias a los documentos y publicaciones anteriores relativas a dichas tecnología"

"c) una descripción de la invención en términos que permitan la comprensión del problema técnico y de la solución aportada por la invención, exponiendo las diferencias y ventajas con respecto a la tecnología anterior;"

"d) una reseña sobre los dibujos cuando los hubiera;"

"e) una descripción de la mejor manera conocida por el solicitante para ejecutar o llevar a práctica la invención, utilizando ejemplos y referencias a los dibujos, de ser estos pertinentes; y,"

"f) una indicación de la manera en que la invención satisface la condición de ser susceptible de aplicación industrial, si ello no fuese evidente de la descripción o de la naturaleza de la invención"

La descripción no es clara toda vez que: no cumple con lo establecido con la legislación. En efecto, la presente solicitud no tiene:

"b) la tecnología anterior conocida por el solicitante que fuese útil para la comprensión y el examen de la invención, y las referencias a los documentos y publicaciones anteriores relativas a dichas tecnología"

"c) una descripción de la invención en términos que permitan la comprensión del problema técnico y de la solución aportada por la invención, exponiendo las diferencias y ventajas con respecto a la tecnología anterior;"

"e) una descripción de la mejor manera conocida por el solicitante para ejecutar o llevar a práctica la invención, utilizando ejemplos y referencias a los dibujos, de ser estos pertinentes;"

Además de eso, el solicitante refiere que se trata de un método para recuperar grasa, aceites e hidrocarburos que se encuentran en cuerpos de agua. Pero la totalidad de la solicitud se refiere a la preparación de plumas. No a método alguno de recuperación de sustancias grasas.

Por último, se le recuerda al solicitante que todas las unidades de medida deben venir en el Sistema Internacional de Unidades.

Por lo anterior, la presente solicitud no cumple con el Artículo 28 de la Decisión 486 de la Comisión de la Comunidad Andina de Naciones.

- b) El artículo 30 de la Decisión 486 de la Comisión de la Comunidad Andina establece que

"Las reivindicaciones definirán la materia que se desea proteger mediante la patente. Deben ser claras y concisas y estar enteramente sustentadas por la descripción. Las reivindicaciones podrán ser independientes o dependientes. Una reivindicación será independiente cuando defina la materia que se desea proteger sin referencia a otra reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior.- Una reivindicación que se refiera a dos o más reivindicaciones anteriores se considerará reivindicación dependiente múltiple."

El capítulo reivindicatorio no es claro toda vez que:

- i) Las reivindicaciones deben ir numeradas, así se trate de solo una reivindicación. Este no es el caso. Por tanto, el solicitante deberá numerar su capítulo.
- ii) El objeto de la solicitud no concuerda con lo se quiere proteger. Nótese como lo que está en el capítulo reivindicatorio es un método para tratar plumas de pollo, y el objeto de la solicitud se refiere a un procedimiento para recuperar grasas. Son dos cosas diferentes. Por tanto, el solicitante deberá ajustar el título o el capítulo reivindicatorio.
- iii) En congruencia con lo anterior, el encabezamiento de la reivindicación está referido a un procedimiento para recuperar grasas pero la reivindicación habla de un método para tratar plumas de pollo. En consecuencia, el encabezamiento no guarda correspondencia con la reivindicación.

Se le recuerda al solicitante, que no podrá ampliar la materia contenida en la solicitud inicial.

De acuerdo a lo anterior, el capítulo reivindicatorio no cumple con el requisito de claridad de acuerdo a lo establecido en el Art. 30 de la Decisión 486.

4) **Determinación del Estado de la Técnica**

El artículo 16 de la Decisión 486 de la Comisión establece:

"El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida."

"Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido este incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40."

Consultadas las bases de datos y los archivos con que cuenta la entidad, especialmente bajo las clasificaciones C 02 F 1/40 y las más cercanas a ellas, se encontró que antes del 18 de septiembre de 2002 (fecha para determinar el estado de la técnica) habían sido publicados los documentos que se enumeran en la siguiente tabla los cuales se relacionan con métodos para recuperar grasas en cuerpos de agua, empleando plumas de aves.

De acuerdo con o establecido en el artículo 16 se determinó el estado de la técnica y se encontró el siguiente antecedente:

Nº	Documento	Título	Fecha de Publicación
D1	GB 2020265	Method and apparatus for Picking up oil	1979.11.14
D2	US 4439324	Removal of oil from water	1984.03.27
D3	US 4512890	Means for the sorption of a petroleum product from a liquid	1985.04.23
D4	DE 4104898	Verfahren und Bindemittel zum Entfernen einer auf Wasse schwimmenden Flüssigkeitsschicht	1992.08.20
D5	EP 1 130 073	A procedure for the removal and collection of hydrocarbons, a product to be used in the procedure, and procedure for embodying the product and the use of the same in the procedure	2001.09.05

5) **Evaluación de los requisitos de patentabilidad**

El artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina establece:

"Los Países Miembros otorgarán patentes para las invenciones, sean de producto o procedimiento, en todos los campos de la tecnología, siempre que sean nuevas tengan nivel inventivo y sean susceptibles de aplicación industrial".

En cumplimiento con este artículo, se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicación industrial con el fin de establecer la patentabilidad de la Invención reivindicada en la solicitud en estudio.

a) **Evaluación del Nivel Inventivo**

El art. 18 de la Decisión 486 de la Comisión de la Comunidad Andina establece:

"Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en el arte en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica".

En la técnica conocida es muy normal el uso de plumas de aves para la recuperación de grasas contenidas en el agua. Los 5 documentos relacionados son solo una muestra de los muchos documentos encontrados en la técnica referidos al manejo de grasas, en particular de petróleo, derramadas en agua. Por tanto, la presente solicitud no poseería la altura inventiva necesaria para que se le conceda el privilegio solicitado.

b) Resumen

En conclusión los requisitos de patentabilidad de la presente solicitud se podrían ver afectados así:

Nº	Documento	Relvindicaciones afectadas	Requisito que afecta
D1	GB 2020265	1	Nivel inventivo
D2	US 4439324	1	Nivel inventivo
D3	US 4512890	1	Nivel inventivo
D4	DE 4104898	1	Nivel inventivo
D5	EP 1 130 073	1	Nivel inventivo

6) Notificación

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que dentro del término de sesenta días contados a partir de la fecha de la notificación de la presente comunicación debe responder a la notificación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto por el numeral 5.2, literal e) del capítulo quinto del título primero de la Circular Única N° 10 de 2001



ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en la lista, de fecha
27 ABR. 2006

Concepto Técnico N° 634	EXAMINADOR TÉCNICO Código No. 202003	EXAMINADOR JURÍDICO Código No.
--------------------------------	--	-----------------------------------

(12) UK Patent Application (19) GB (11) 2 020 265 A

- (21) Application No 7820884
 (22) Date of filing 18 Jun 1979
 (23) Claims filed 18 Jun 1979
 (30) Priority data
 (31) 14848/78
 (32) 13 Apr 1978
 (33) United Kingdom (GB)
 (43) Application published 14 Nov 1979
 (51) INT CL³
 G02B 8/02
 (52) Domestic classification
 G1C 22X 2B3 314 407 B
 B1D 1801 1707 CA
 (56) Documents cited
 None
 (58) Field of search
 B1D
 G1C
 E1H
 (71) Applicant
 George Hoff, P.O. Box 88,
 Kebayoran, Jakarta,
 Indonesia
 (72) Inventor
 George Hoff
 (74) Agent
 D. Young & Co.

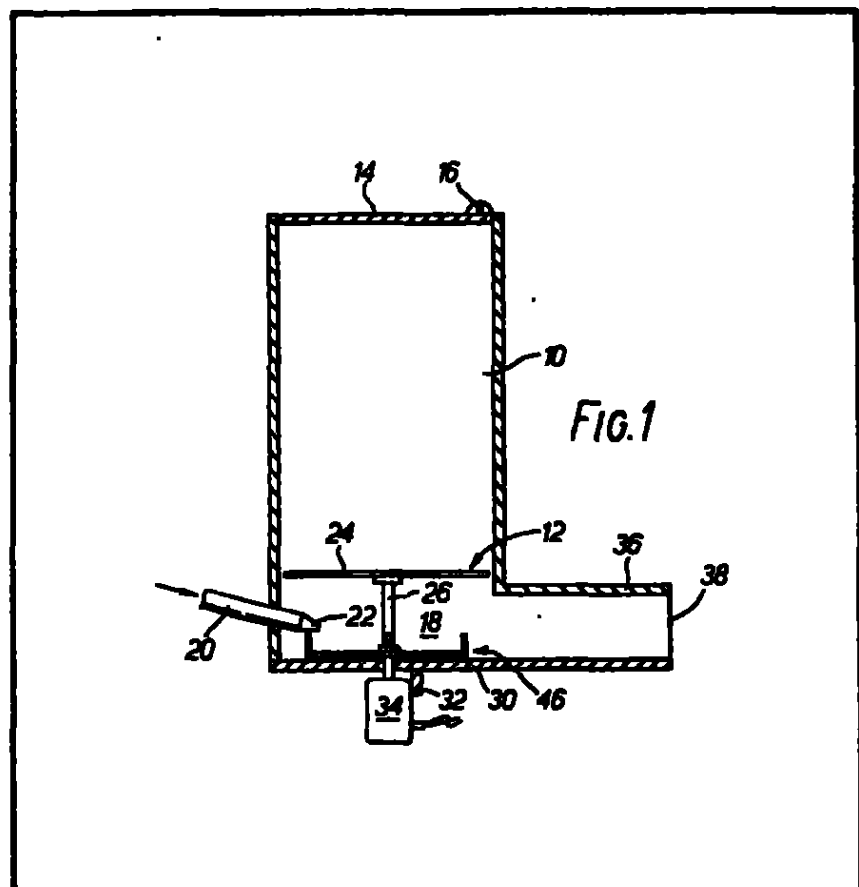
(54) Method and Apparatus for Picking up Oil

(57) A method of picking up oil split on water includes distributing bird feathers throughout the oil to produce a coherent mass of feathers carrying and stuck together by adsorbed oil, and picking up the coherent mass in any suitable manner.

Bird feathers may be distributed around the peripheral boundary of a

slick or body of oil and water, in order to form a confining barrier which prevents the oil spreading.

An apparatus for distributing feathers over a substantial area includes a chamber 10 having a substantially constant cross-sectional area, an open end 12 and a closed end 14, means 20 for supplying air or gas under pressure to the region of the open end, and a movable cutter device 24 at or near the open end.



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

WOL 707 020

2020265

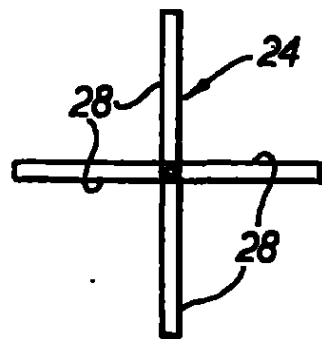
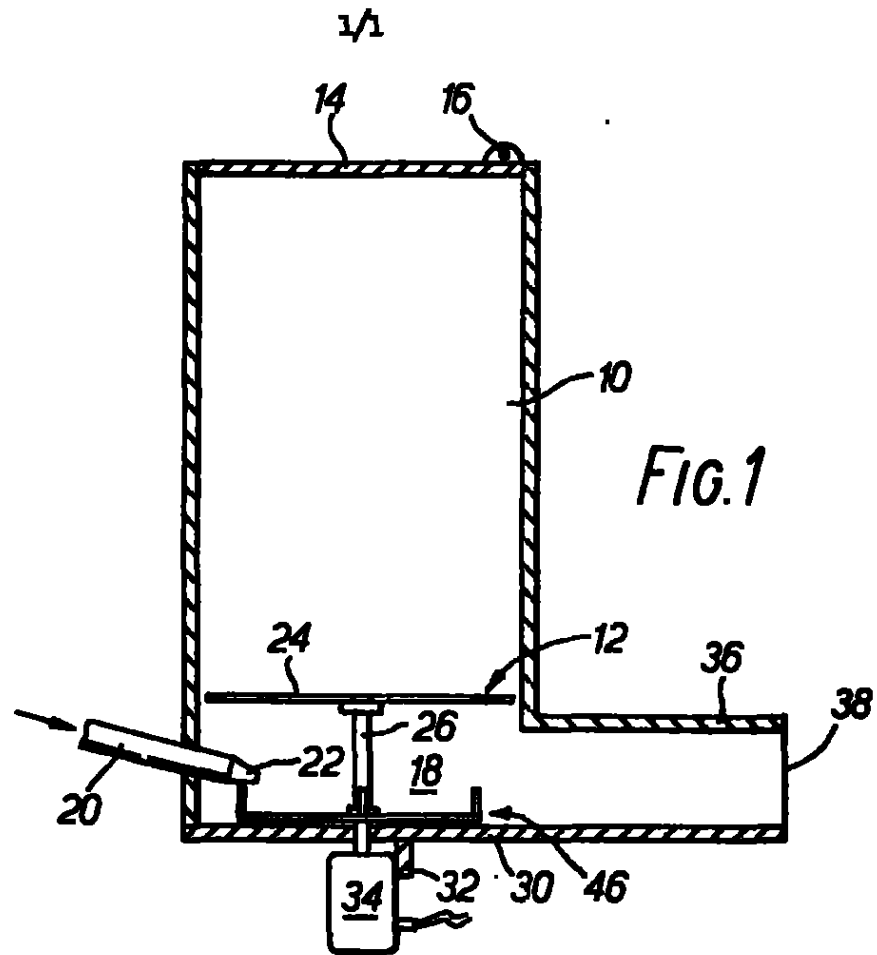


FIG. 2

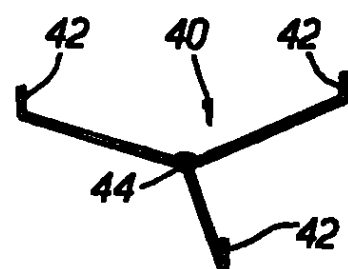


FIG. 3

SPECIFICATION

Method and Apparatus for Picking Up Oil

This invention relates to an invention and apparatus for picking up oil.

5 There have been numerous proposals made or picking up oil split on water. Split or discharged oil from tankers or other ships is a wide spread and worrying element in marine pollution. Moreover, it may also be necessary to remove oil
10 split or accumulating on water in tanks, ponds, reservoirs, and other inland water-containing structures.

Present approaches to the problem basically focus on two possibilities. Firstly it has
15 been proposed to disperse the oil with a detergent and secondly it has been proposed to attempt to confine the oil from spreading and to pick it up with various kinds of skimmer devices. For example, there have been proposals for two
20 different kinds of skimmer device, namely that known as the "Framo" and that known as the "Vikoma". These are briefly described in the periodical "Offshore Engineer", June 1977, pages 27—28.

25 The disadvantage of using detergents is that detergents are costly manufactured materials which utilise scarce natural resources in their manufacture. They are therefore economically relatively unattractive. A serious problem with
30 skimmer devices is that they are usually complex mechanical contrivances, requiring considerable capital investment to manufacture and considerable engineering and maintenance effort to keep in fully satisfactory operational condition,
35 bearing in mind the demanding conditions of use applicable on the seas and oceans of the world.

The present invention involves a radical new approach.

40 According to the invention, a method of picking up oil split on water includes distributing bird feathers throughout the oil to produce a coherent mass of feathers carrying and stuck together by adsorbed oil, and picking up the coherent mass in
45 any suitable manner.

50 In a preferred version of the invention, bird feathers are distributed around the peripheral boundary of a slick or body of oil and water, in order to form a confining barrier which prevents the oil spreading. This is preferably done as a first step.

One may use feathers taken from the breast of a hen chicken but the invention is not regarded as limited to the use of such feathers.

55 The invention also provides apparatus for distributing feathers over a substantial area. Such apparatus includes a chamber for containing compressed feathers and having a substantially constant cross-sectional area, an open end and a closable end, the apparatus also including means
60 for supplying air or gas under pressure to a space below the open end, and a mechanical agitator or rotating cutter device at or near the open end.

The latter device may be a rotatable arm or a rotatable fan or a rotatable cutter. In use the

65 chamber is filled with compressed feathers and when it is desired to distribute them over an oil spill the air or gas is supplied under pressure and the cutter is rotated. In rotating it contacts and cuts the feathers at the lower end of the chamber, so loosening and cutting them so that they peel or
70 are cut off from the compressed bulk of feathers, are fed into space, and are blown in the desired direction by the air or gas under pressure.

Further features of the invention will appear from the following description. These features are not to be regarded as limiting the invention.

The most preferred feathers for use in the method and apparatus of the invention are those known as purified colled chicken feathers, those
80 from a hen bird used when washed being presently considered as the most satisfactory. The word "purified" is used to mean feathers which have been washed and sorted to be all of similar size and type. Those known as down feathers are also satisfactory. The weight of feathers to be
85 used may be approximately 1/14th to 1/20th of the weight of the oil, and they should be scattered over and preferably stirred into the surface of the slick. The weight of feathers used depends in part
90 on the nature of the oil, particularly its viscosity. Per hundred weight units of oil to be picked up, the weight of feathers used should range from 3 to 12, with 4 to 10 being preferred and the most effective results be obtained with 6 to 8. The
95 larger the average size of the feathers the more feathers will be required per unit weight of oil. The coherent mass so produced can then be lifted off the surface of the water by means of an expanded metal gauze, a fishing net, or other suitable
100 perforated sheet. It is preferred to stir the feathers into the oil, and after the sticky cohesive mass has been removed, it may be put to use. For example, it may be burned to provide heat and energy or if desired the feathers may be recovered by washing
105 of the oil with kerosene. It will often be found advantageous to compress the recovered mass, e.g. in a mangle-type device such as a roller press, in order to squeeze off some of the oil. After washing with kerosene, the oil-kerosene mixture
110 can be used as boiler fuel. It has been found that some water is picked up with the cohesive mass but it is relatively small in quantity. It is found that approximately 15% to 25% by weight of water is present in the cohesive sticky mass consisting mainly of feathers and oil. If the coherent mass,
115 i.e. the sludge is allowed to drain after being lifted off the water, the water content is naturally reduced. It has been found that the weight of feathers required to pick up a given weight of oil is greater
120 when the oil slick is widely dispersed than when it is concentrated over a small area. A centrifuge may be used to separate water from the oil-impregnated feathers.

The present invention envisages that, in practice, feathers of the required kind could be
125 scattered on oil slicks at sea from a helicopter, and the downdraft of air from the helicopter rotor would effectively drive the feathers down onto the surface of the oil. Naturally if conditions were

windy, the feathers would be jettisoned from a point upwind of the slick. It is also envisaged that confining "bolsters" consisting for example of feathers compressed into long tubular fabric casings could be used as booms and laid on the sea to confine the oil slick and prevent it spreading. When complete peripheral confinement has been obtained with such booms, each bolster could be automatically opened or exploded so releasing the feathers to act on the adjacent oil and bind it into the cohesive sticky mass referred to above. Thereafter, or simultaneously, further feathers could be dropped on the remainder of the oil so confined. The fabric used for the "bolsters" could be one which is soluble in either water or oil.

Also in accordance with the invention, apparatus for dispensing feathers will now be particularly described by way of example, with reference to the accompanying drawing.

The illustrated apparatus for dispensing and distributing feathers includes a generally cylindrical chamber 10 having a substantially constant cross sectional area. In the illustrated embodiment of the invention, the chamber is cylindrical, with an open end 12 and a closed end 14. In fact the closed end 14 is a door pivoted at 16 which can be opened to allow the chamber 10 to be loaded with compressed feathers. The open end 12 opens into a space 18 which, when the chamber 10 has its axis upright, is below the chamber 10. Means for supplying air or gas under pressure is connected to the closed end 14. One example of such means is diagrammatically indicated as a pipe 20 and nozzle 22, the pipe being connected to a pump or blower, not shown. A rotatable cutter 24 mounted on a shaft 26 is located at the lower end of the chamber 10 and divides it from the space 18. The cutter 24 may be a single straight blade, rotating about its mid-point, or may be a cross-blade form of cutter such as is shown in plan in Figure 2 herein the blade edges are referenced 28. Attached to the lower end of a wall 30 of the space 18 is a bracket 32 which supports a motor 34 driving the rotatable shaft 26. This shaft 26 in its rotation passes the open end 12 and in use engages, cuts and agitates the feathers thereat. In this way, rotation of the cutter 24 causes these feathers at the lower end of the chamber 12 to be separated from the compressed bulk of feathers therein, and they fall or pass into the space 18. Compressed gas or air is supplied along the pipe 20 and as a result the feathers (or part-feathers) are blown out of the lateral exit passage 36 having an open end 38. With appropriate choice of air pressure, matters may be arranged so that a jet of feathers can be "sprayed" a distance of many feet. It is envisaged that use of this apparatus will enable feathers to be distributed at approximately the correct spacing over an oil slick. It is preferred to rotate the cutter 24 at about 50 revolutions per minute or more.

As an optional and not an essential feature of the invention, a rotatable spider 40 may be

located in the space 18. It may take the form shown in the perspective view of Figure 3, having 3 radial arms at 120° to each other, each of which carries an upstanding peg 42 at its distal end, and possible other upstanding pegs (not shown). It has a boss 44 by which it is fixed to the shaft 26. Of course it need not be driven by the motor 34 but instead could be driven by a different motor if desired. Its function is to keep the feathers in space 18 in an agitated condition and especially to keep a build-up of feathers from blocking the exit zone indicated at 46.

The direction of the pipe and nozzle is preferably in the plane of the axis of the chamber 10 and at an angle of from 60 to 70° to the said axis. Around 70° has been found to be suitable.

It will be appreciated that the invention is closed particularly herein offers considerable advantages over present methods of dealing with oil pollution. Firstly, it utilises a raw material, feathers, which is an unwanted by-product from food producers such as firms selling frozen chicken. Secondly, the oil recovered may if desired be separated from the feathers by the use of kerosene and used in any desired manner. Alternatively, the cohesive sticky mass of oil and feathers can be burnt directly, yielding useful energy. Thirdly, the method does not involve any adverse effects on wildlife such as sea birds. In contrast to the present use of detergent. Fourthly, the invention is well adapted to use in confining polluting oil, as well as picking it up, and can be employed by either ships or aircraft. No expensive capital investment is required.

As a further feature of the invention, strips of cloth having feathers woven therewith, or carrying feathers at their ends, may be suspended from a support and held or dragged over an oil slick which is situated in a place to which access is difficult, for example a confined corner area in a harbour. In this way oil could be removed therefrom, even though access for conventional equipment is difficult or impossible.

Further features of the invention will appear from the following. My method is based on the phenomenon that bird feathers, for reasons which I don't know, will attract and bind oil particles and molecules to their surface. This was observed, for example, shortly after the 'Torrey Canyon' oil spill off the coast of England. It was observed then that the birds recovered from the sea were totally covered in oil. I believe that the preening oil in the feathers whilst repelling water and "wetness" attracts oil.

It is therefore possible and is part of my invention to take advantage of the other characteristics of feathers and provide a method using feathers to clear up or sweep oil from the surface, such as occurs at sea in an oil spill. This method can also be modified to prevent oil from reaching coastlines and contaminating beaches. The following is a brief description of the invention.

The feathers being very light in weight and flexible can be compressed and concentrated into

packages of varying sizes. The shape of the package so far as I can determine makes no difference, the more important feature of the packaging material being that it be soluble in water. In my method, the container with an amount of feathers compressed therein can be dropped directly on the surface of the oil slick and being weighted in any suitable manner to penetrate and sink through the oil slick will reach the underlying water. The water will then dissolve the packaging material thereby releasing the feathers. The feathers being water repellent and lighter than water will rise into the oil slick and the process of attraction of the oil particles and molecules will begin immediately on contact. I have also found that feathers though coated with an initial coat of the adsorbed oil will continue to attract the oil immediately surrounding them until they are totally saturated. The feathers saturated with oil can then be easily swept from the surface of the sea by mechanical means and, if desired, the oil may be reclaimed by treatment of the feathers. If it is not desired to reclaim the oil, or indeed to simply sweep the feathers from the sea, I have found that the feathers and oil can be burned away. This is advantageous because it is known that oil on the surface of the sea is not always easily set alight and burned off, but in my invention this disadvantage is overcome and once the oil has been adsorbed by the feathers, the material and the oil can be easily burned.

A variation of my invention can be useful for the prevention of contamination of coastlines and beaches. Bundles of feathers can be enclosed in net-like material or material that will be permeable to oil. These bundles can then, if desired, be linked to each other in chains and can be anchored off-shore. The thus contained feathers will then act as a barrier to an oil slick approaching the coastline. Indeed, the feathers will act more than just as a barrier but will actually adsorb the oil as the oil approaches the coastline. When the bundles of feathers have then become entirely saturated with the oil, they can either be burned or removed as desired. It will be appreciated that this method will be particularly suitable for the protection of selected fishing grounds or bays protecting wildlife, sanctuaries, holiday resorts, etc., at the same time as actually removing the oil from the sea.

Although I have described above a method in which the feathers are compressed within a water soluble material and are then dropped or placed on the surface of the oil and sink to the water beneath the oil, there is yet another variation. The feathers can be packaged in a manner similar to that described above in connection with the prevention of contamination of coastlines and beaches. These bundles can themselves be dropped directly on the surface of an oil slick. The oil will then penetrate the interstices of the enclosing material. The bundles of feathers will eventually become totally saturated and can be removed or burned as desired. If the net-like material is made of a water soluble substance, it

can also happen that as the oil is being adsorbed through the interstices the enclosing material will eventually touch water and be dissolved, thereby releasing the feathers from the enclosing material. It is clear that yet another alternative is to have enclosing material which is dissolved by the oil itself and not necessarily only by water. In any case, whether the enclosing material is soluble in water or in oil, the feathers will be released into contact with the oil to be adsorbed.

Claims

1. A method of picking up oil split on water which includes distributing bird feathers throughout the oil to produce a coherent mass of feathers carrying and stuck together by adsorbed oil, and picking up the coherent mass in any suitable manner.

2. A method according to claim 1 in which the feathers are distributed around the peripheral boundary of a slick or body of oil and water, in order to form a confining barrier which prevents the oil spreading.

3. A method according to claim 1 or 2 in which the feathers used are feathers taken from the breast of a hen chicken.

4. A method according to claim 1, 2 or 3 in which the feathers are predominantly washed curled chicken feathers from a hen bird.

5. A method according to claim 1, 2, 3 or 4 in which the weight of feathers used is approximately 1/14th to 1/20th by weight of the weight of the oil, and the feathers are scattered over the oil and stirred or agitated therein.

6. A method according to any preceding claim in which the feathers are lifted off the surface of the water by means of a perforated sheet such as an expanded metal gauze or net such as a fishing net.

7. A method of confining oil split on water in which feathers compressed into long tubular casings herein called bolsters are used as booms and laid on the sea to confine the oil slick and prevent it spreading.

8. A method according to claim 7 in which each bolster is automatically opened or exploded so releasing the feathers to act on the adjacent oil.

9. A method according to claim 7 in which the casing is soluble in water.

10. A method according to claim 7 in which the casing is soluble in oil.

11. Apparatus for distributing feathers over a substantial area, including a chamber for containing compressed feathers and having a substantially constant cross-sectional area, an open end and a closed end, means for supplying air or gas under pressure in the region of the open end, and a mechanical agitator or cutter device at or near the open end.

12. Apparatus according to claim 11 in which the agitator or cutter device is a rotatable blade.

13. Apparatus according to claim 11 or 12 including an exit chamber in communication with the open end of the first mentioned chamber, and

a rotatable agitator located in the exit chamber.

14. Apparatus according to claim 13 in which an air pipe terminating in a nozzle extends into the exit chamber and is directed towards an exit
5 orifice thereof.

15. A tubular casing for forming a confining barrier to prevent an oil slick on water from spreading, said casing containing feathers which are predominantly purified curled hen bird
10 feathers.

16. A container having walls which define a space containing compressed feathers, the feathers being predominantly purified curled hen bird feathers.

15 17. A container according to claim 16 in which the walls are made of a material which is soluble in water.

20 18. A container according to claim 16 in which the walls are made of a material which is soluble in hydrocarbon oil.

United States Patent [19]
Crotti

[11] 4,439,324
[45] Mar. 27, 1984

[54] REMOVAL OF OIL FROM WATER

[76] Inventor: Alfred F. Crotti, 5, Deanery St.,
London, W1Y 5LH, England

[21] Appl. No.: 389,760

[22] Filed: Jan. 18, 1982

Related U.S. Application Data

[63] Continuation of Ser. No. 194,976, Oct. 8, 1980, abandoned.

[30] Foreign Application Priority Data

Oct. 10, 1979 [GB] United Kingdom 7935253
Mar. 11, 1980 [GB] United Kingdom 8008198

[31] Int. Cl.³ E02B 15/04
[32] U.S. Cl. 210/691; 210/924
[58] Field of Search 5/434; 210/671, 680,
210/691, 242.4; 924

[56]

References Cited

U.S. PATENT DOCUMENTS

1,201,534 10/1916 Burton 5/434
3,739,913 6/1973 Bogdan 210/242.4

OTHER PUBLICATIONS

Sittig, M., Oil Spill Prevention and Removal Handbook, Noyes Data Corp., 1974, p. 392.
"Pouring Feathers on Oily Waters", Evening Standard, London, U.K., Apr. 10, 1978, p. 11.

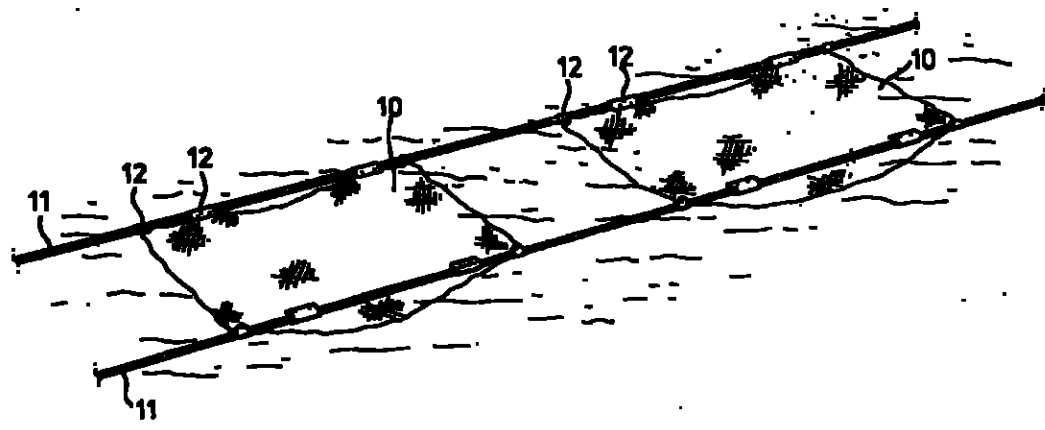
Primary Examiner—Ivars C. Clinton
Attorney, Agent, or Firm—Maky, Renner, Otto & Boismelle

[57]

ABSTRACT

Bags loosely containing feathers are distributed onto oil on water to enable the feathers to take up the oil. The bags have openings sufficiently large to permit the oil to enter and contact the feathers within the bags. The bags can be linked together, for example in a chain using ropes. Once the feathers have become saturated with oil the bags can be picked up from the water.

8 Claims, 3 Drawing Figures



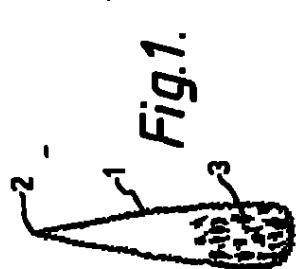
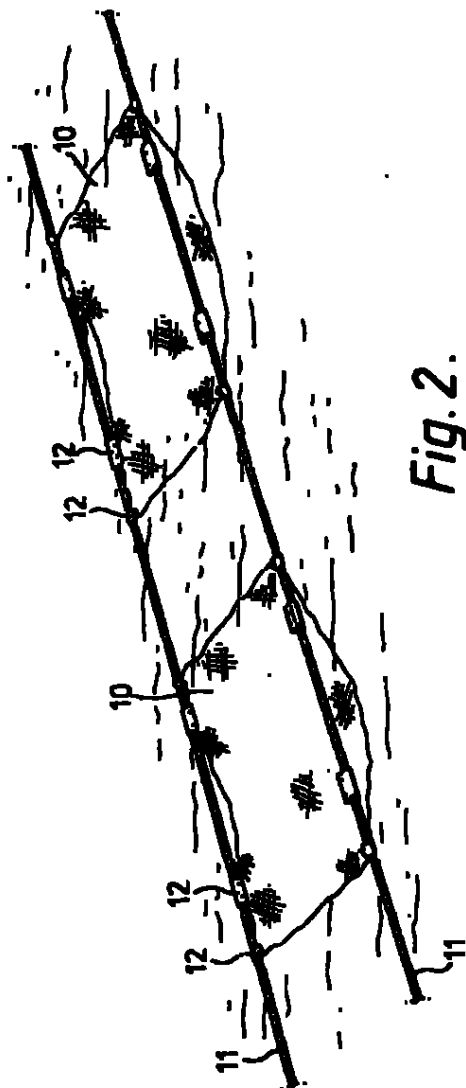
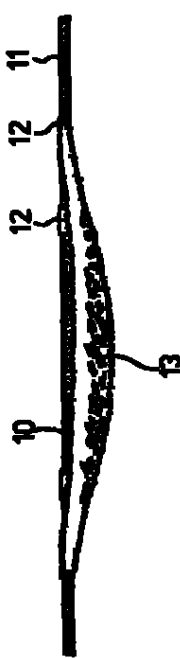


Fig. 3.



4,439,324

1

REMOVAL OF OIL FROM WATER

This is a continuation, of application Ser. No. 194,976, filed Oct. 8, 1980, now abandoned.

This invention relates to the removal of oil from water.

In recent years, the problem of dealing with oil on water, for example as the result of spillage from tankers or of the blow-out of an offshore oil well, has become of increasing concern. Various approaches have been adopted to combat the problem, including the use of detergents and of skimmer devices to pick up the oil from the surface of the water. However detergents are costly and present pollution hazards themselves. Skimmer devices are usually complex, require considerable capital investment to manufacture and engineering and maintenance to keep fully operational, and in general only operate fully satisfactorily in calm conditions.

U.K. Specification No. 2,020,265 A describes an alternative approach to dealing with oil spilt on water involving the use of feathers to take up the oil. The specification envisages distributing feathers onto the oil. This method is also proposed in Oil Spill Prevention and Removal Handbook, M. Sittig, Noyes Data Corp., 1974, p.392 and in an article published in the "Evening Standard" newspaper, London, United Kingdom on Apr. 10, 1978. However, the suggested technique of using feathers is impracticable in even mild weather conditions. It is difficult to off-load the feathers accurately onto the oil. It was found that the feathers tend simply to blow over and off the oil, picking up little if any of it. U.K. Specification No. 2,020,265 A also describes the use of feathers compressed into packages which are dropped onto oil. However, this has several disadvantages. It is difficult for the oil to penetrate into the interior of the packages. It inevitably takes some time for the oil to contact the inner feathers, and in the meantime the feathers will have become sodden with water. Consequently their effectiveness in picking up the oil will be reduced.

U.S. Pat. No. 3,739,913 discloses an open-mesh container for collecting oil from the surface of open water. The container is packed with an oil-absorbing material, in particular a mixture of glass fibre and reclaimed tire cord. Again, it is difficult for oil to reach the interior of the container. A further disadvantage is that oil leaks from the absorbing material once the container has been removed from the water. The containers also require a flotation material to ensure that they do not ride too low in the water.

It has now been found that the problems mentioned above can be overcome by removing oil from water by a method which comprises applying to water to be treated at least one bag loosely containing bird feathers, the or each bag having openings sufficiently large to permit oil to contact the feathers yet sufficiently small to retain the feathers within the bag, and allowing the feathers to take up the oil. At present, the exact process by which feathers attract and pick up oil, be it absorption or adsorption, is not sufficiently understood, and for convenience will be referred to herein as "taking up".

The use of bags loosely containing feathers can greatly improve the efficiency with which oil may be removed from water. Individual bags are sufficiently heavy not to be blown up into the air off the surface of the oil without affording the feathers an opportunity to

2

contact the oil. Further, it has been found that for ease of operation the bags may be linked together and distributed on the surface of the oil slick.

The present invention further provides a bag for removing oil from water, the bag loosely containing bird feathers and having openings sufficiently large to permit oil to enter the bag and contact the feathers yet sufficiently small to retain the feathers within the bag. Preferably, two or more such bags may be linked together.

In the description which follows, reference will be made by way of example to the accompanying drawings in which:

FIG. 1 is a cross-section through one embodiment of a bag according to the invention;

FIG. 2 is a perspective view of an embodiment of two bags in accordance with the present invention linked together and floating on the surface of an oil slick, and

FIG. 3 is a cross-section through one of the bags of FIG. 2.

The bags of the present invention are loosely packed with bird feathers. Advantageously, washed and dried chicken or turkey feathers may be employed. Preferably, the feathers are breast, down or marabou feathers. Washed and dried curled chicken feathers in particular hen bird feathers are most preferred.

The exact quantity of feathers in each bag is variable but should be less than sufficient to fill the bag and be such that the feathers can shift and mix within the bag so that they can all become coated with oil. The feathers should not be so numerous as to be stuffed or compressed in the bag. The bag should have at least some flexibility and not so stuffed with feathers as to retain their shape when placed on the oil on the water. Preferably, from about one third to three quarters, more preferably from one third to two thirds of the volume of a bag is occupied by feathers in their normal uncompressed state when the bag is held at one end and the feathers have settled within the bag.

An example of the relationship between the volume of a bag and the feathers it contains is shown in FIG. 1. In this Figure a bag 1 hangs from means (not shown) holding the top end 2 of the bag. The feathers 3 which have settled at the bottom of the bag are in their normal uncompressed state. The feathers occupy approximately one half of the volume of the bag.

Each bag of loosely packed feathers preferably has a "tea bag" configuration, that is an approximately rectangular shape to permit a large surface area of feathers to be in contact with the oil. Alternatively the bag may be sausage-shaped. Preferably the bags are made of a mesh material. The mesh material may be non-woven or woven material which may be synthetic fibre, such as nylon, or natural fibre. The size of the openings in each bag will depend on the size of feathers to be enclosed. Nevertheless, the openings in each bag must be sufficiently large to permit oil to contact the feathers contained in the bag yet sufficiently small to retain the feathers within the bag. Typically, the maximum dimensions of each opening may be from about 1.5×10^{-3} m (1.5 mm) to 3.0×10^{-3} m (3.0 mm). The bag may be 4.57×10^{-1} m (1½ feet) square and contain up to 3.3×10^{-1} kg (350 g) of feathers. The dimensions of the bag can be varied to suit different conditions of use. For example for large oil slicks, bigger bags may be used. For coastal waters near to the shore or in harbour use in difficult areas to reach smaller bags may be used. The

4,439,324

3

feathers can be dyed to enable the ready identification of the bags when off loaded onto an oil slick.

The bags may be applied individually or linked together. In the latter case, they are preferably connected in a chain, in groups of any number. For example, a chain of 5, 50 or more linked bags can be employed. The bags can be linked together in any suitable manner using, for example, hook, tie or clip means. Thus ropes or chains can be employed to link the bags to each other.

An embodiment in which bags are linked together by ropes is illustrated in FIGS. 2 and 3. In these Figures, bags 10 of mesh material are attached spaced apart along two runs 11 of rope by clip means 12. Each bag 10 is made of mesh material, thus enabling oil on the surface of the water on which the bags are distributed to contact the feathers 13 within each bag.

A variety of techniques can be employed to construct the bags. When constructed of a thermoplastic material, the open side or sides of bags appropriately partly filled with feathers can be sealed by the application of heat and/or pressure. Alternatively, the open ends may be stitched closed. A chain of linked bags may be manufactured, for example, by feeding a strip or two strips of mesh material through apparatus comprising means to seal together an appropriate part or parts of the strip(s) so as to form pockets open along at least a portion of one side thereof, means for packing feathers loosely in the pockets through the open portion of one side of the pockets and means for sealing said open portion of the thus-packed pockets. If bags are produced individually and it is desired to link the bags together, each bag may be provided with means to link it to another bag. Chains of bags can be broken into small lengths or can be joined to form longer chains. Chains may be arranged side by side and connected together. The length of the chain that is used in any particular instance will depend on several factors including the kind and size of an oil spill, weather conditions and location.

The bags can be packed into containers prior to use. For example, chains of bags can be folded accordion-like and packed under high pressure in a container. In this way from 6 to 8 tons or more of purified chicken feathers can be packed in a standard 40 foot container.

The bags of loose feathers are applied to water to be treated to allow the feathers to take up the oil. The bags may be distributed by any suitable means, for example from a helicopter, aeroplane or boat. Alternatively, linked bags can be towed by a boat through oil or they may be pulled through a slick between two boats, one boat off-loading mesh bags onto the oil whilst the other boat pulls in oil-laden bags. The bags can be off-loaded directly onto the oil or in the estimated path of drift of the oil, although in the latter case this must be done with caution because when the feathers are wet they lose some of their efficiency in taking up oil.

It is possible to employ the method of the invention on oil slicks both on salt water and fresh water. Consequently, it can be employed to deal with oil spillages on inland waters, in harbours where tankers are loaded and unloaded, and out at sea. It is possible to calculate approximately the quantity of feathers that are needed to combat a particular oil slick by first estimating the weight of oil to be picked up and then applying feathers in an amount of 1/14th to 1/20th by weight of the estimated weight of the oil. More or less can be used as desired.

Once the bags have been distributed, the feathers within each bag can slowly take up the oil with which

4

they are in contact without further agitation. However, both the wind and the movement of the sea can help by tossing each bag about and thereby more quickly exposing all the feathers in the bag to contact with oil. Thus unlike other methods of treating oil slicks rougher conditions are beneficial. The feathers become saturated with oil after a comparatively short space of time, in some cases even within a few minutes. This will depend on, for example, the nature of the oil slick and the weather conditions.

The oil saturated feathers can easily be removed from the water. The bags can be lifted out of the sea using nets. The feathers retain the oil while the water drains from the bags. It is then possible to reclaim the oil taken up by the feathers if desired. Generally, the oil-laden bags will float. Alternatively, the bags may be sunk, if desired, by means of weights in or attached to the bags.

The use of bags containing loose feathers can result in significantly high weight ratios of oil to feathers being recovered in short intervals of time. A variety of oils have been successfully removed from water in tests, including Argyll crude, Kuwait crude, North Sea crude, diesel oil, petroleum and mixtures of fuel and diesel oil.

Bags of loose feathers can be used to take up oil which is in the form of "mousse". When crude oil or fuel oil or mixtures of fuel and boiler oil is spilled, for example, on the surface of the sea, the consistency of the oil passes through various stages. When the oil is first spilled on the surface, the more volatile fractions of it begin to evaporate thus causing some increase in the viscosity of the oil remaining on the sea. Depending on weather conditions this oil begins to emulsify with the sea water. If conditions are more turbulent, the sea water mixes with the oil and forms emulsions increasing in the amount of water. It is difficult to plot the time over which this occurs because it depends very much on conditions, but this can take place anywhere from four hours to 24 hours. The consistency of the water-oil emulsion becomes somewhat creamy, hence the name "mousse." The mousse can form as a continuous layer on the sea or in time can fragment into lumps of varying sizes. Bags for use in picking up "mousse" need to be very loosely filled with feathers. The content of feathers in the bags should be at the lower end of the preferred ranges stated above, or less. It appears that the "mousse" adheres to the feathers and is taken up in this way.

We claim:

1. A method of removing oil from water, which method comprises the steps of applying to water to be treated at least one bag loosely containing washed and dried chicken or turkey feathers, the or each bag having means defining openings sufficiently large to permit oil to contact the feathers yet sufficiently small to retain feathers within the bag, and allowing feathers to take up the oil.

2. A method according to claim 1 which further comprises the step of picking up the or each bag of oil-laden feathers from the water.

3. A method according to claim 1 wherein the or each bag is made of mesh material.

4. A method according to claim 1 wherein from one third to three quarters of the volume of the or each bag is occupied by feathers in their normal uncompressed state when the bag is held at one end and the feathers have settled within the bag.

5

6

- 5. A method according to claim 1 wherein the or each bag is selected from the group consisting of a bag with a rectangular "tea bag" configuration and a sausage-shaped bag.
- 6. A method according to claim 1 wherein individual bags are applied to water to be treated.
- 7. A method according to claim 1 wherein two or

- more bags linked together are applied to water to be treated.
- 8. A method according to claim 7 wherein the bags are linked in a chain.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65

United States Patent [19]
Medbury

[11] **Patent Number:** **4,512,890**
[45] **Date of Patent:** **Apr. 23, 1985**

[34] **MEANS FOR THE SORPTION OF A PETROLEUM PRODUCT FROM A LIQUID**
[76] **Inventor:** Seward J. Medbury, 28785 Oak Point, Farmington Hills, Mich. 48018
[21] **Appl. No.:** 557,863
[22] **Filed:** Dec. 5, 1983
[51] **Int. Cl.³** B01D 29/06
[52] **U.S. Cl.** 210/335; 210/341; 210/418; 210/435; 210/494.1
[58] **Field of Search** 210/680, 691, 799, 335, 210/340, 341, 400, 401, 924, 671, 418, 435, 437, 457, 483, 484, 494.1, 499, 502.1, 506-508; 422/6

[56] **References Cited**

U.S. PATENT DOCUMENTS			
2,365,502	12/1944	Weener	422/6
2,387,714	10/1945	Briggs	210/680
3,193,100	7/1965	Broughton	210/340
3,494,863	2/1970	Greenman	210/680
3,617,555	11/1971	Ginsburgh et al.	210/671
3,668,118	6/1972	Rhodes	210/671
3,804,257	4/1974	Sommermeier	210/335
4,061,569	12/1977	Bennett et al.	210/924

4,439,324 3/1984 Crotti 210/691
OTHER PUBLICATIONS
Sittig, M. *Oil Spill Prevention and Removal Handbook*, Noyes Data Corp., 1974, p. 392.
Primary Examiner—Ivars Cintins
Attorney, Agent, or Firm—Brooks & Kushman

[57] **ABSTRACT**
A filter including a flexible plastic mesh having feathers adhesively attached thereto on opposite sides thereof is disclosed for separating out oil from an oily liquid. The filter comprises an oil sorption element of a filtering device which houses the filter. A filtering system comprises a plurality of interconnected filtering devices which may be arranged in parallel or in series with each other. Control valves are provided for controlling the flow of the oily liquid to the filtering devices. A filter assembly, including a plurality of filters supported by a movable conveyor in spaced relationship, is also disclosed.

6 Claims, 7 Drawing Figures

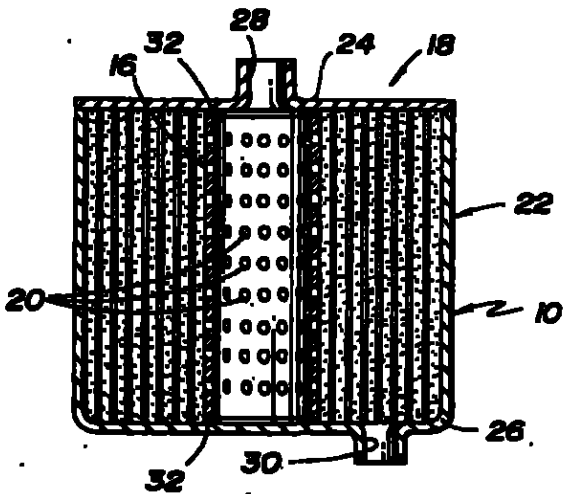


Fig. 1

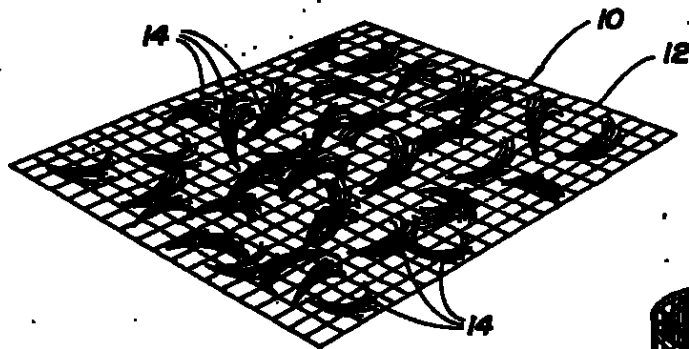


Fig. 2

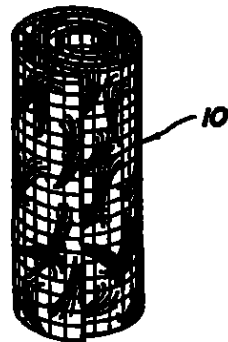


Fig. 3

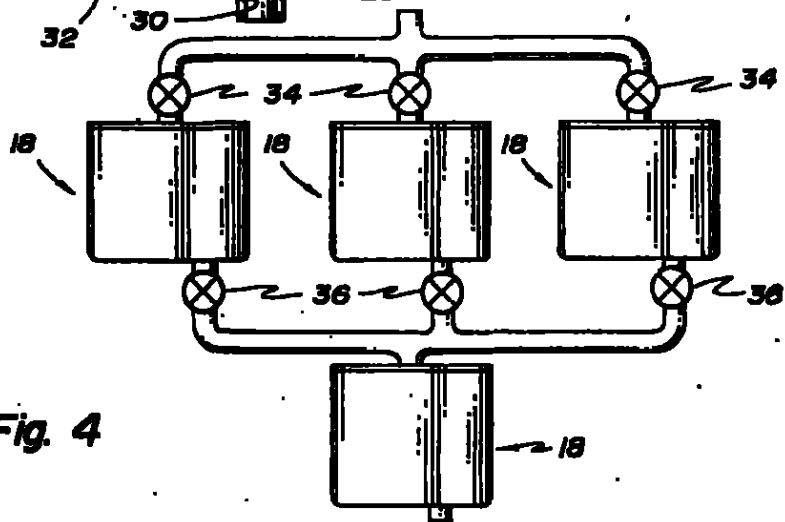
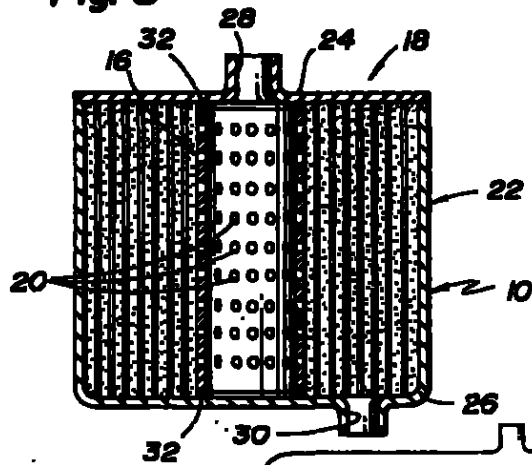


Fig. 4

Fig. 5

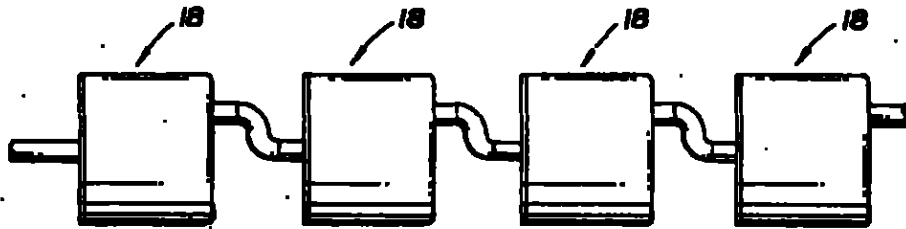


Fig. 6

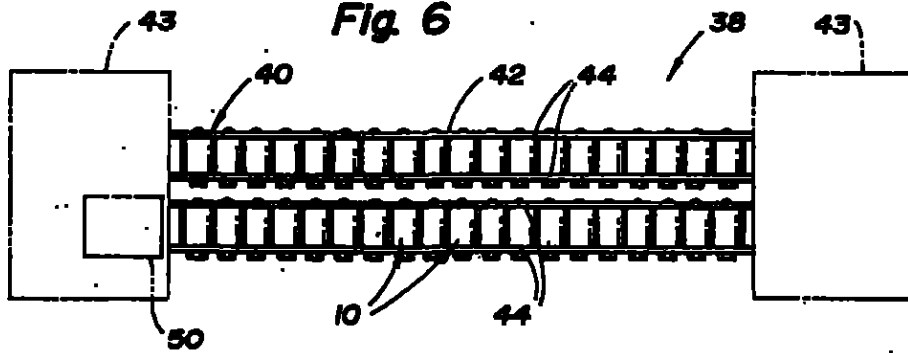
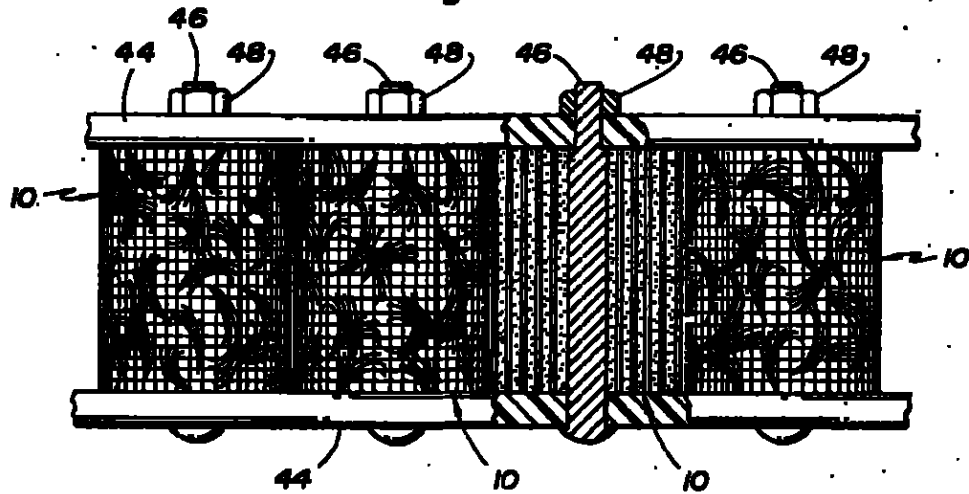


Fig. 7



MEANS FOR THE SORPTION OF A PETROLEUM PRODUCT FROM A LIQUID

TECHNICAL FIELD

This invention relates to the removal of oil and oil-like products from a liquid and, in particular, to the removal of oil and oil-like products from a liquid by means of sorption.

BACKGROUND ART

The difficulty in separating oil or oil-like products from oily liquids has generated several approaches to solve the problem. The problem is particularly troublesome with respect to removal of oil spills from water, especially turbulent water. One approach is to employ skimming devices and processes. One problem with this method is that water is often skimmed off with the separated oil, thereby necessitating further treatment.

Another method of separating the oil from the water is through the use of a sorbent. There are two types of sorbent materials, absorbents and adsorbents. Absorbents soak up oil whereas adsorbents provide a surface for the oil particles to cling to.

Sorbents may be divided into three general classes: (1) natural products, (2) modified or chemically treated natural products, and (3) synthetic or man-made products. U.S. patent to Sohi U.S. Pat. No. Re. 31,087 discloses a fibrous web which comprises a plurality of entangled oleophilic fibers. The fibers are hydrophobic in the presence of oil. The web comprises a plastic, such as nylon or polypropylene, having a large number of interconnected, interstitial spaces for reception and retention of oil to the exclusion of water.

Sorbents of a natural origin may be derived from a mineral source, which may include various clays and other micas and perlite and mixtures thereof. Examples of such sorbents are disclosed in the U.S. patents to Press U.S. Pat. No. 4,111,813 and Weller U.S. Pat. No. 3,527,701.

Other sorbents of a natural origin may be derived from vegetative sources, such as bark, as disclosed in the U.S. patent to Fahlvik U.S. Pat. No. 3,617,563. Wood pulp which has been chemically treated is disclosed as a sorbent in the U.S. patent to Field et al U.S. Pat. No. 4,343,680. A fibrous sorbent material, such as hemp, is disclosed in the U.S. patent to Armaly U.S. Pat. No. 2,399,158.

Some sorbents of a natural origin are derived from animal sources as disclosed in the U.S. patent to Schwartzwalder et al U.S. Pat. No. 3,219,194 (i.e. wood) and in the book "Oil Spill Prevention and Removal Handbook", pages 392 through 393, (i.e. feathers) published by the Noyes Data Corporation in 1974.

The use of such sorbent materials by themselves, however, have failed to provide a workable system in removing oil from water. Also, there are relatively high labor costs associated with the acquisition, transportation, stockpiling, deployment, distribution on and working into an oil slick, as well as retrieval and ultimate disposal thereof. Furthermore, such sorbent materials are typically only manually retrievable and only then under calm water conditions. Such products also interfere with equipment which physically removes the oil by clogging such skimming and suction devices. Such sorbent materials may also present a pollution problem

on disposal. Many of such sorbent materials also ultimately sink, thereby limiting their usefulness.

Other prior art patents which are generally concerned with the problems addressed by the present invention include the U.S. patents to Jakubek U.S. Pat. No. 3,836,000, Grutsch et al U.S. Pat. No. 3,608,727 and Hiller U.S. Pat. No. 2,768,913.

DISCLOSURE OF THE INVENTION

10 An object of the present invention is to provide a low cost filter including a plurality of feathers attached to a layer of sheet material wherein the filter is not only oleophilic but also hydrophobic.

Another object of the present invention is to provide 15 a filter and a filtering device for separating out oil from an oily liquid including a plurality of feathers attached to a layer of sheet material wherein the filter, and, in particular, the feathers of the filter are not only adsorptive but also have a high oil capacity.

Yet still another object of the present invention is to 20 provide filters and a filter assembly for separating out oil from an oily liquid wherein each filter includes a plurality of feathers attached to a layer of sheet material and wherein each filter is not only retentive (i.e. displays minimal leakage upon saturation) but also is relatively low in cost and may be reused after the oil has been removed therefrom.

Yet a further object of the present invention is to 30 provide a filtering system including a plurality of interconnected filtering devices for separating out oil from an oily liquid passed therethrough wherein a filter of each of the filtering devices includes a plurality of feathers attached to a layer of sheet material and wherein the layer of sheet material is substantially continuous and is 35 folded around itself to form multiple overlapping layers of feather-covered sheet material.

In carrying out the above objects and other objects of the present invention, a filter for separating out oil from 40 an oily liquid comprises a layer of sheet material, a plurality of feathers and an attachment means for attaching a layer of the feathers to the layer of sheet material. The feathers sorb the oil in the liquid upon contact therewith.

Further in carrying out the above objects and other 45 objects of the present invention a filtering device for separating out oil from an oily liquid passed therethrough comprises an outer housing having an inlet port and an outlet port and a hollow inner member disposed within the housing and in communication with the inlet 50 port. The member has a plurality of spaced apertures extending therethrough for communicating the oily liquid therethrough. The device also includes a filter which is positioned over the apertures. The filter comprises a layer of sheet material, a plurality of feathers 55 and an attachment means for attaching at least one layer of the feathers to the layer of sheet material. The feathers of the filter sorb the oil in the liquid and the sheet material passes the rest of the liquid therethrough upon relative movement between the liquid and the filter, said liquid thereafter passing out the outlet port.

A filtering system constructed in accordance with the 60 present invention comprises at least two interconnected filtering devices in fluid communication with each other. Each of the devices includes an outer housing having an inlet port and an outlet port and a hollow inner member disposed within the housing and in communication with the inlet port. The inner member has a plurality of spaced apertures extending therethrough

3

for communicating the oily liquid therethrough. Each of the devices also includes a filter positioned over the apertures. The filter comprises a layer of sheet material, a plurality of feathers and an attachment means for attaching at least one layer of the feathers to a layer of the sheet material. The feathers of each of the filters sorb the oil in the liquid and the sheet material of each of the filters passes the rest of the liquid therethrough upon relative movement between the liquid and the filter of its respective device, said liquid thereafter passing out the outlet port of its respective housing.

A filter assembly for separating out oil from an oily liquid includes a conveyor mounted for movement relative to the liquid and a plurality of filters supported by the conveyor at spaced intervals thereon for movement therewith. Each of the filters comprises a layer of sheet material, a plurality of feathers and an attachment means for attaching a layer of the feathers to the layer of sheet material. The feathers sorb the oil in the liquid upon relative movement between the liquid and the conveyor.

Preferably, the layer of sheet material is substantially continuous and is wound around itself to form multiple overlapping layers of feather-covered sheet material.

The objects, features and advantages of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a filter constructed in accordance with the present invention in its unfolded condition;

FIG. 2 is a perspective view of the filter of FIG. 1 after it has been wound around itself;

FIG. 3 is a sectional, side elevational view of a filtering device utilizing the filter of FIG. 2;

FIG. 4 is a view illustrating a filtering system including a plurality of fluidly interconnected filtering devices of FIG. 3;

FIG. 5 is a view illustrating a filtering system including a plurality of filtering devices of FIG. 3 interconnected in series;

FIG. 6 is a view illustrating a filter assembly including a conveyor extending between a pair of structures for removing oil from a liquid body; and

FIG. 7 is an enlarged view, partially broken away and in cross section, showing the interconnection of the filters to the conveyor of the assembly.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to FIG. 1, there is shown in its unfolded condition, a filter constructed in accordance with the present invention, at 10. The filter includes a layer of permeable sheet material which preferably comprises a plastic, flexible net 12. It is to be understood, however, that the net 12 may also be metallic.

A plurality of bird feathers 14, such as chicken or duck feathers, are attached to the net 12 by a glue or other quick-drying adhesive to both sides of the net 12. For example, the net 12 may be dipped in the glue and thereafter the feathers 14 may be blown against the net 12 on both sides thereof.

After the glue has at least partially dried on the net 12, the net 12 is rolled in a helical fashion to the cylindrical form shown in FIG. 2. The net 12 may be wound

4

around about itself, as shown in FIG. 2, or, alternatively, as shown in FIG. 3, may be wound around about a hollow cylindrical member, generally indicated at 16 of a filtering device, generally indicated at 18. The hollow member 16 preferably comprises a perforated hollow metal or plastic cylinder, having a plurality of spaced apertures 20 extending therethrough. The hollow member 16 can also be inserted in the filter after it is wound.

The member 16 is supported within an outer plastic or metal housing, generally indicated at 22, including a top member 24 and a bottom member 26. The top member 24 includes an inlet port 28 for allowing the introduction of an oily liquid therethrough and into the hollow member 20. The bottom member 26 includes an outlet port 30 for allowing the filtered fluid to exit the filtering device 18. The housing 22 preferably holds anywhere between 50 to 100 gallons of oil which has been sorbed by the feathers 14.

The hollow member 16 is supported within the housing 22 between the top and bottom members 24 and 26, respectively, between flat, compressible seals 32. The top and bottom members 24 and 26, respectively, are removably held together in any well-known fashion to permit the removal of the filter 10 from the housing 22 when the filter 10 is saturated with oil. The filter 10 may thereafter be washed of oil by squeezing and/or air blowing and replaced within the housing, thereby allowing the oil to be recaptured for use. Alternatively, the filter may be installed and used as an oily base or combusted to provide a source of heat.

Referring now to FIG. 4 and FIG. 5, there are shown two different configurations or systems of fluidly interconnected filtering devices, such as the filtering device 18, for separating out oil from an oily liquid passed therethrough. As shown in FIG. 4, the uppermost filtering devices 18 are connected in parallel and the fluid communicated through each of the filtering devices 18 is controlled by inlet and outlet valves 34 and 36, respectively. The valves 34 and 36 permit the removal of a certain filter or filters from their respective housings without affecting the filtering operation performed by the other filtering devices.

Referring now to FIG. 5, a plurality of the filtering devices 18 are shown connected in series to perform successive stages of filtering. The system may be periodically shut down to replace those filters which are close to saturation. Also, during a shut-down the filters may be interchanged among the various devices.

Referring now to FIG. 6 there is illustrated a filter assembly, generally indicated at 38, for separating oil from oily liquids, such as by removing an oil slick from the surface of a body of water. The assembly 38 includes a conveyor, generally indicated at 40, including an endless chain 42 which extends between a pair of structures 43 which may comprise a pair of boats or a boat and an underwater mechanism. The chain 42 includes a pair of cables 44 spaced apart by mounting bolts or supports 46 as best shown in FIG. 7. The mounting supports 46 are removably connected to the cables by nuts 48. In turn, a filter such as the filter 10 as shown in FIG. 2 is disposed about each mounting support 46 for sorbing the oil in the liquid upon movement of the conveyor chain 42 between the two structures 43. Onboard the boat structure 43 there is schematically shown a squeezing and drive mechanism at 50 for the chain 42 which may include a pair of rotating wheels to squeeze each of the filters 10 to release the sorbed oil

5

6

contained therein. Such a squeezing mechanism is shown in the U.S. patent to Grutsch U.S. Pat. No. 3,608,727. Other such squeezing and drive mechanisms are well-known in the art and need not be described.

The invention has been described in an illustrative manner and it is to be understood that the terminology that has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A filtering device for separating out oil from an oily liquid passed therethrough, said device comprising: an outer housing having an inlet port and an outlet port; a hollow inner member disposed within said housing and in communication with said inlet port, said member having a plurality of spaced apertures extending therethrough for communicating said oily liquid therethrough; and a filter positioned over said apertures, said filter comprising: a layer of sheet material; a plurality of feathers; and attachment means for individually attaching each of said feathers in a fixed position on the layer of sheet material to form at least one layer of said feathers; wherein the feathers of said filter sorb the oil in the liquid and the sheet material passes the rest of the liquid therethrough upon relative movement between the liquid and the filter, said liquid thereafter passing out of the outlet port.

2. A filtering system for separating out oil from an oily liquid passed therethrough, said system comprising

at least two interconnected filtering devices in fluid communication with each other, each of said devices comprising:

an outer housing having an inlet port and an outlet port; a hollow inner member disposed within said housing and in communication with said inlet port, said member having a plurality of spaced apertures extending therethrough for communicating said oily liquid therethrough; and a filter positioned over said apertures, said filter comprising: a layer of sheet material; a plurality of feathers; and attachment means for individually attaching each of said feathers in a fixed position on the layer of sheet material to form at least one layer of said feathers, wherein the feathers of each of said filters sorb the oil in the liquid and the sheet material of each of said filters passes the rest of the liquid therethrough upon relative movement between the liquid and the filter of its respective device, said liquid thereafter passing out the outlet port of its respective housing.

3. The system as claimed in claim 2 wherein two of said filtering devices are connected in series.

4. The system as claimed in claim 2 or claim 3 wherein two of said filtering devices are connected in parallel.

5. The system as claimed in claim 4 including fluid control means for controlling the flow of fluid to at least one of said devices.

6. The system as claimed in claim 2 wherein said layer of sheet material is substantially continuous and is wound around itself to form multiple overlapping layers of feather-covered sheet material.

* * * * *

40

45

50

55

60

65

United States Patent [19]

Lafay et al.

[11] Patent Number: 4,919,820

[45] Date of Patent: Apr. 24, 1990

[54] OIL ABSORPTION METHOD

[76] Inventors: William T. Lafay, 2629 Manhattan Ave., Hermosa Beach, Calif. 90254; William F. Makstrell, 669 Seventeenth St., Manhattan Beach, Calif. 90266

[21] Appl. No.: 339,289

[22] Filed: Apr. 17, 1989

[31] Int. Cl.³ G02F 1/28; B02B 15/04

[52] U.S. Cl. 210/671; 210/691;

210/242.4; 210/924

[38] Field of Search 210/671, 680, 691, 242.4, 210/924

[56] References Cited

U.S. PATENT DOCUMENTS

3,679,038 7/1972 Smith 210/242.4

4,439,324 3/1984 Crotti 210/924

4,512,890 4/1985 Medbury 210/494.1

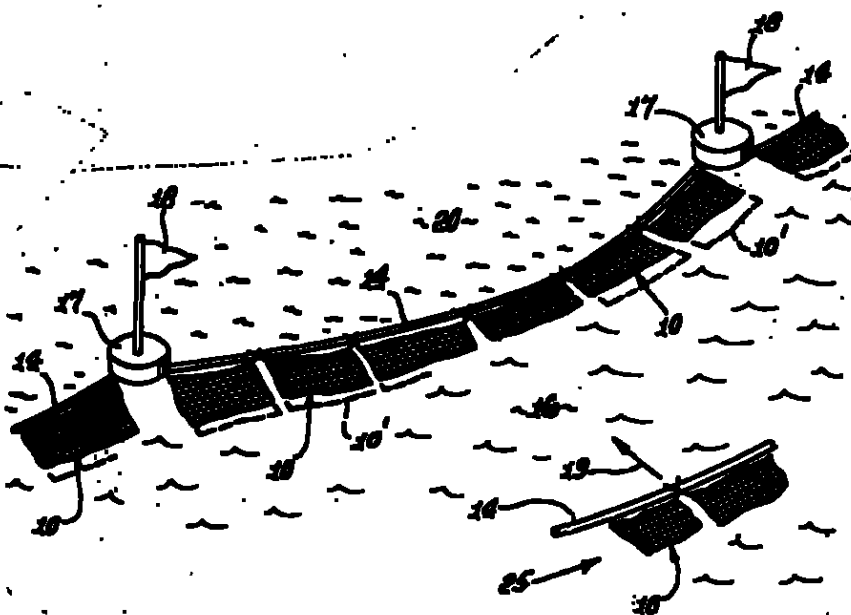
Primary Examiner—Ivan Clinton

Attorney, Agent, or Firm—William W. Haefliger

[57] ABSTRACT

The method of removing oil from a body of water that includes providing a flexible mesh container, and filling waterfowl feathers into the container, introducing the feather filled mesh container into contact with the oil near or at the surface of the water body, allowing absorption of the oil through the mesh into the feathers in the container, and removing the container from the body of water, for disposition of the absorbed oil. Reclamation of the oil may be effected by squeezing the container and feathers therein to separate oil from the feathers, and collecting the separated oil.

3 Claims, 2 Drawing Sheets



U.S. Patent

Apr. 24, 1990

Sheet 1 of 2

4,919,820

FIG. 1.

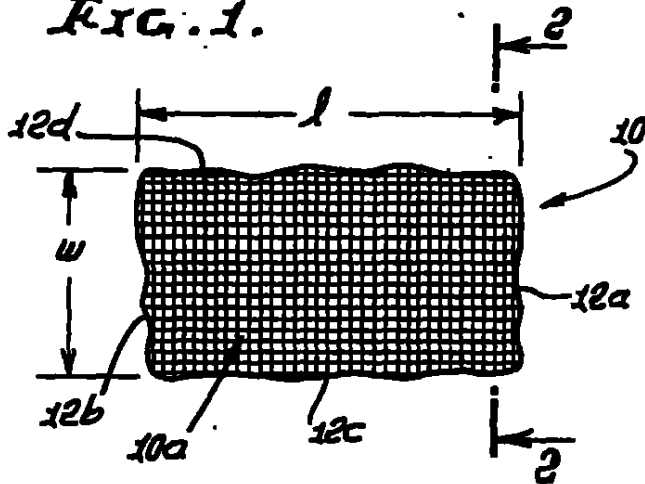


FIG. 2a.

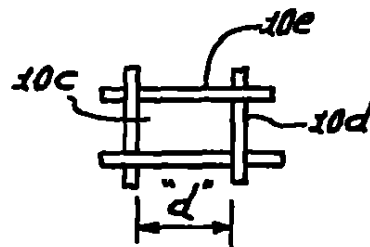


FIG. 2.

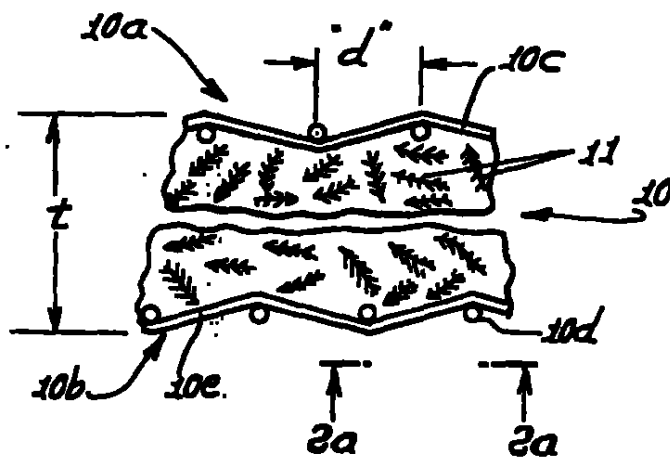


FIG. 3.

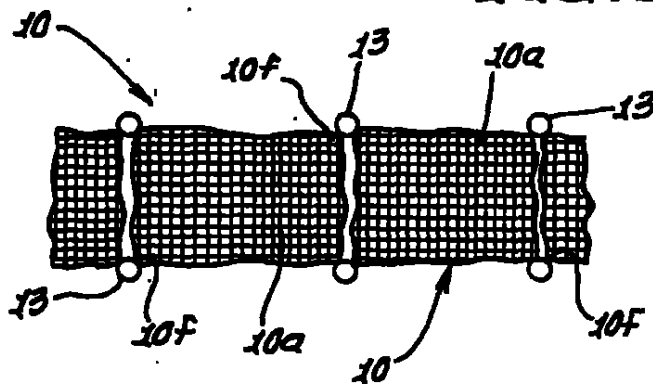


FIG. 4.

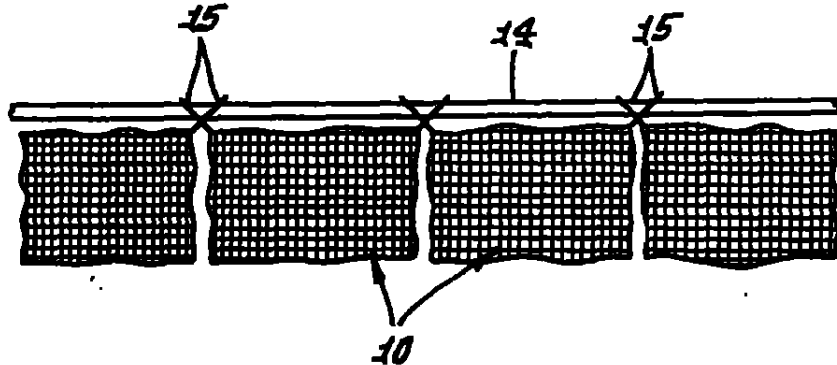


FIG. 5.

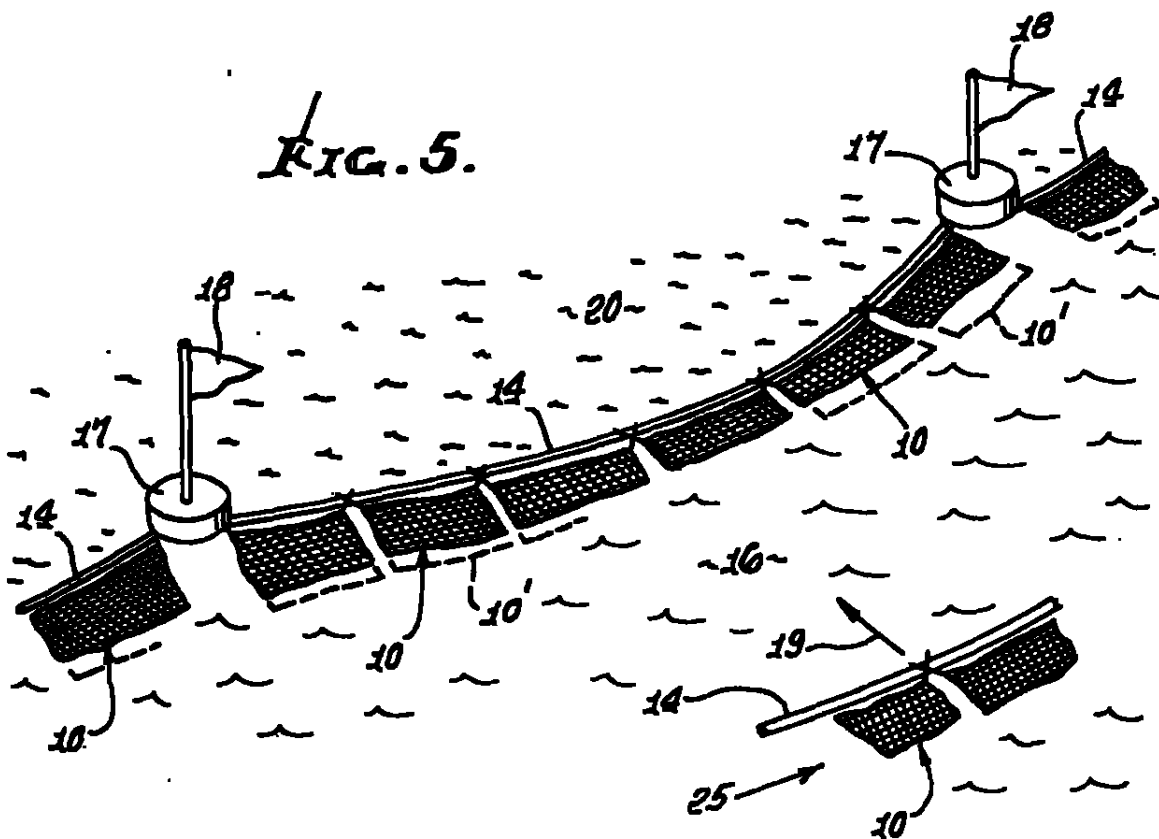
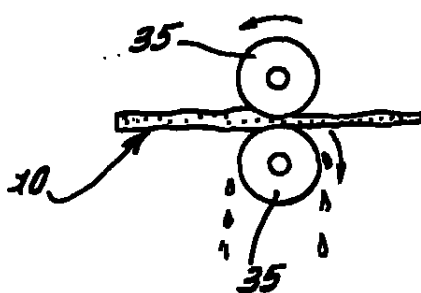


FIG. 6.



1

2

OIL ABSORPTION METHOD

BACKGROUND OF THE INVENTION

This invention relates generally to oil or petroleum clean-up, and removal, as from bodies of water, and more particularly, to the efficient use of oil absorbent waterfowl feathers for this purpose.

Rapid removal of petroleum from water bodies, of as after an oil spill from a tanker vessel, has become crucial importance to protect the environment. Reference is made to the Valdez, Ak., spill, in 1989, in this regard. There is a clear and compelling need for apparatus to enable efficient removal of such oil. While plastic booms have been used, they generally serve to confine floating oil in an area, and become of less use as the oil dissipates, hardens, or drops in the water. There is need for apparatus that will rapidly and efficiently absorb the floating oil, while also confining it as the oil is being absorbed, i.e., a double function means. Oil-consuming microbes do not permit reaccess to the oil removal from the water body, i.e., the oil is lost.

SUMMARY OF THE INVENTION

A major object of the invention is to provide method and means to meet the above need. Basically, the method of the invention involves performing the steps that include:

- (a) providing a flexible mesh container, and filling waterfowl feathers into the container, and
- (b) introducing the feather filled mesh container into contact with the oil near or at the surface of the water body, and
- (c) allowing absorption of the oil through the mesh into the feathers in the container, and
- (d) removing the container from the body of water, for disposition of the absorbed oil.

Further steps comprise squeezing the container and feathers therein to separate oil from the feathers, and collecting the separated oil. A series of such containers, with feathers therein, may be provided by connecting them end-to-end, or in end-to-end relation as by means of a cable, thereby allowing their deployment as a boom which confines or contains floating oil, while also rapidly and efficiently absorbing it before the oil dissipates or drops in the sea. A succession of such booms can be provided and advanced toward the oil, and as each becomes oil-saturated, it is removed for reconstitution (as by squeeze removal of oil from the feathers in each container) and reuse.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following specification and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is a plan view of oil absorbing apparatus incorporating the invention;

FIG. 2 is an enlarged section taken on lines 2-2 of FIG. 1;

FIG. 2a shows a mesh configuration of the container.

FIG. 3 is a plan view showing end-to-end interconnection of a series of oil absorbing devices as seen in FIG. 1;

FIG. 4 is a plan view showing a series of devices as seen in FIG. 1 attached to a line or cable;

FIG. 5 is a perspective view, showing the FIG. 4 cable supported device deployed on a body of water to

absorb oil on the water body, with floats connected to the line.

FIG. 6 shows a device squeezing operation to remove oil from the feathers, enabling reuse of the device.

DETAIL DESCRIPTION

In FIGS. 1, 2, and 2a, a flexible mesh container 10 has two flexible sides or walls 10a and 10b, each of mesh material, and forming openings 10c between warp and wool strands 10d and 10e. The latter may consist of plastic stringers, and they may be woven, or joined together in a single plane. The mesh size "d" is such that approximately 3/16 inch square openings 10c are formed by the strands. Slightly larger or smaller openings are usable. The bag or container may have length "l" of about 32 inches and width "w" of about 18 inches, these being practical examples. Bag size ranges from 12 inches by 24 inches, to 24 inches by 40 inches.

Waterfowl feathers 11 are filled into the bag, and its edges at 12a-12d are closed. The resulting bag thickness is about 1 1/2 to 3 inches. The feathers, being larger than the mesh openings, cannot escape. Yet, the mesh freely allows water to enter the porous container, and ready absorption of oil through the mesh into the feathers, the latter having exceptional oil absorption capacity, as packed into the bag, against the mesh, to contact oil through the mesh.

For example, a bag of the size referred to (18 by 32 inches) containing about 1/2 pound of duck feathers can readily absorb 10 to 20 pounds of oil, such as petroleum, in its condition found after an oil spill on a body of water, such as sea water. Further, the feathers and bag readily give up and discharge their oil absorbed contents, when squeezed, as for example between rollers 28 as seen in FIG. 6 showing an oil filled bag of feathers being passed between the rotating rollers. As a result, the bag and feathers are reconstituted and ready for reuse to absorb oil on the body of water. Tests show that the amount of oil that a reconstituted feather filled mesh bag can absorb is about 80% to 90% of the amount of oil absorbed initially.

FIG. 3 shows a series of such feather-filled porous mesh bags or containers 10 connected end-to-end, as by connectors 13 at the bag corners 10a. This establishes a long line of such oil absorbing units that can be deployed as a boom on a water body, for absorbing the oil. FIG. 4 shows a cable or line 14 to which such containers 10 are corner connected. Note the cross-over connectors 15 joining successive bags to the cable to keep the successive bag in adjacent relation, along the cable.

FIG. 5 shows the line 14 deployed on a body of water 16, such as the sea, the bags of feathers partly floating and partly submerged (see 10 and broken lines 10'). Floats 17 on the water support opposite ends of the line 14, and flags 18 on the floats show their locations. Oil in a slick is shown at 20, at one side of the line and row of feather-filled bags. The line 14 may be detached from the floats along with attached bags for removal of absorbed oil from the feathers, and then redeployed, as described.

The next in series absorber boom is advanced to the remaining oil (see arrow 19), so that successive booms become effective, one by one, to remove the oil. See the next boom at 25 in FIG. 5, advancing toward the first boom at the edge of the oil slick. This procedure removes the oil along a "front", and a succession of oil boom "fronts".

3

4

As used herein, the term "oil" refers to petroleum, and oil or petroleum-like substances, or oil or petroleum-based substances, particularly those absorbed by waterfowl feathers.

I claim:

1. The method of removing oil from a body of water that includes:

(a) providing multiple flexible mesh containers, and filling duck feathers into each container, the mesh size of the container being about 3/16 inch, the duck feathers packed against the mesh at the inside of the container, and interconnecting said containers in series and connecting float means to the series of containers, in series therewith.

(b) introducing the feather filled mesh containers into the water body for deployment into contact with the oil near or at the surface of the water body, and advancing the series of containers as a front, toward and into an oil slick on the body of water,

(c) allowing absorption of the oil through the mesh into the feathers in each container,

(d) removing each container from the body of water, for disposition of the absorbed oil,

(e) and including squeezing each container and feathers therein to separate oil from the feathers, and collecting the separated oil,

(f) and including reusing said feather-filled containers from which oil has been squeezed, by reintroducing the series of containers into oil at or near the surface of the water body for oil absorption by the feathers, and again removing the containers from the body of water for disposition of the absorbed oil,

(g) each container provided to be between 12 and 24 inches long, and between 24 and 40 inches wide.

2. The method of claim 1 including providing and advancing a second series of such containers, as a second and fresh front, toward and into the oil slick, from which the first referenced containers have been removed, for continued oil absorption and removal from the slick for reclamation of such oil.

3. The method of claim 1 wherein the containers are each packed to contain about 1/2 pound of duck feathers.

25

30

35

40

45

50

55

60

65



⑩ BUNDESREPUBLIK
DEUTSCHLAND



DEUTSCHES
PATENTAMT

⑫ Offenlegungsschrift
⑪ DE 41 04 898 A 1

⑤ Int. Cl.⁸:
C 09 K 3/32
E 02 B 15/04
B 63 B 35/44
B 01 J 20/28
B 01 J 20/24
C 02 F 1/40

⑲ Aktenzeichen: P 41 04 898.9
⑳ Anmeldetag: 18. 2. 91
㉑ Offenlegungstag: 20. 8. 92

DE 41 04 898 A 1

⑦ Anmelder:
Edama GmbH, 7500 Karlsruhe, DE

⑧ Vertreter:
Trappenberg, H., Pat.-Ing., 7500 Karlsruhe

⑦ Erfinder:
Edalat-Pur, Morteza, 7500 Karlsruhe, DE

④ Verfahren und Bindemittel zum Entfernen einer auf Wasser schwimmenden Flüssigkeitsschicht

Das öfteren besteht die Aufgabe, auf Wasser schwimmende Flüssigkeiten möglichst vollständig, schnell und auf wirtschaftliche Weise zu entfernen. Nach der Erfindung gelingt dies dadurch, daß ein aus Federmehl bestehendes Bindemittel die zu entfernende Flüssigkeit aufnimmt, so daß ein Flüssigkeit/Bindemittel-Gemisch breiartiger Konsistenz entsteht, das ohne Schwierigkeiten von der Wasseroberfläche abgeschöpft werden kann.

DE 41 04 898 A 1

Die Erfindung betrifft ein Verfahren zum Entfernen einer auf Wasser schwimmenden Flüssigkeitsschicht, insbesondere einer Ölschicht (Erdölschicht), sowie ein Bindemittel zum Durchführen des Verfahrens.

Auf Wasser schwimmende Flüssigkeiten, also Flüssigkeiten, deren spezifisches Gewicht unter 1 liegt, sind meistens unerwünscht. Andererseits stellt sich das öfteren die Aufgabe, Flüssigkeiten mit unterschiedlichem spezifischen Gewicht voneinander zu trennen. Insbesondere jedoch wird nach einem Verfahren gesucht, um auf Wasser schwimmende Ölschichten von der Wasseroberfläche zu entfernen. Dieser Einsatz ist insbesondere dann erwünscht, wenn Erdöl beziehungsweise Erdölprodukte die Wasseroberfläche benetzen und hierbei dort befindliche Lebewesen behindern oder gar, zusammen mit der möglichen Toxizität der benetzenden Flüssigkeit, abtöten. In aller Regel soll auch das Entfernen der auf dem Wasser schwimmenden Flüssigkeit schnellstmöglich durchgeführt werden können, um ein Zusammenballen von in der Flüssigkeit mitgeführten Feststoffen und damit das Abtauchen von sich bildenden Klumpen auf den Grund zu vermeiden. Bisher gegen Verunreinigungen von Wasserbauten eingesetzte, oberflächlich wirkende Wassersperren können zwar das Weiterdringen des schwimmenden Flüssigkeitsfilmes vermeiden, nicht jedoch dieses angesprochene Verklumpen und Absetzen.

Aufgabe der Erfindung ist es daher ein Verfahren anzugeben, wie ein derartiger auf Wasser schwimmender Flüssigkeitsfilm auf möglichst einfache Art und Weise und zudem schnell entfernt werden kann. Erreicht wird dies in erfindungsgemäßer Weise dadurch, daß die zu entfernende Flüssigkeit durch ein auf Wasser schwimmfähiges, Kapillaren aufweisendes Mittel, das auf die Oberfläche der zu entfernenden Flüssigkeit aufgebracht wird, gebunden wird, daß sodann das mit der Flüssigkeit vollgesaugte Bindemittel abgeschöpft wird und daß schließlich das Bindemittel von der Flüssigkeit getrennt wird.

Bei der Anwendung des Verfahrens wird die auf dem Wasser schwimmende Flüssigkeit in die Kapillaren des Mittels aufgenommen und dort gebunden. Danach wird das immer noch schwimmfähige, mit der Flüssigkeit vollgesaugte Bindemittel abgeschöpft, was nunmehr, da das Bindemittel eine breiartige Konsistenz besitzt, ohne weiteres möglich ist. Danach wird dieser Bindemittel-/Flüssigkeit-Brei durch geeignete Verfahren in Bindemittel und Flüssigkeit, beispielsweise durch Zentrifugieren, durch Filtrieren, durch thermische oder chemische Einwirkungen, voneinander getrennt, wonach das Bindemittel wieder einsatzfähig ist.

Der entscheidende Schritt ist darin zu ersehen, daß die auf dem Wasser schwimmende Flüssigkeit in die Kapillaren des Bindemittels eintritt, so daß sich ein Bindemittel-/Flüssigkeit-Brei ergibt, der unachser von der Wasseroberfläche entfernt werden kann. Um dies mit Sicherheit zu erreichen, sollen die Adhäsionskräfte zwischen der Flüssigkeit und der Kapillarwandung der Kapillaren des Mittels größer sein als die Kohäsionskräfte zwischen den Molekülen der Flüssigkeit. Außerdem soll nach der Erfindung der Quotient Adhäsionskraft/Kohäsionskraft zwischen dem Bindemittel und der zu entfernenden Flüssigkeit größer sein als zwischen dem Bindemittel und Wasser. Diese Eigenschaften sind durch ein erfindungsgemäßes Bindemittel gegeben, und zwar durch Federmehl, das aus gemahlenden Vogelfedern, ins-

besondere Hühnerfedern, gewonnen wird. Dieses Federmehl, dessen Partikel kleiner als 200 μm sein sollen, ist deutlich leichter als Wasser, schwimmt also sowohl auf der Wasseroberfläche wie selbstverständlich auch auf der Oberfläche der auf dem Wasser schwimmenden Flüssigkeit. Insbesondere zu Öl sind die Adhäsionskräfte der Federmehlpartikel deutlich größer als die Kohäsionskräfte der Ölmoleküle und auch der Wassermoleküle. Dadurch saugen sich diese Federmehlpartikel durch deren Kapillarkräfte mit Öl voll, so daß sich letztlich der oben angeführte, leicht abschöpfbare Brei aus mit Öl vollgesaugtem Bindemittel ergibt. Die Bevorzugung von Öl durch Federmehl ergibt sich dadurch, daß die Federn und auch die Innenwandungen der Kapillaren mit einem Fettsfilm versehen sind, sich gegenüber Öl also eine hohe Kapillarspannung, jedoch gegen Wasser eine ebenso hohe Kapillardepression einstellt.

Zu beachten ist, daß dieses Federmehl eine organische nicht toxische Substanz ist, so daß eventuell absinkende Federmehlpartikel keinesfalls zu einer Vergiftung des Wassers führen. Im Gegenteil können diese organischen Partikel zur Belebung der Fauna und Flora des Wassers beitragen.

Zu erwähnen ist schließlich auch noch, daß dieses Federmehl, bedingt durch den großen Anfall von Vogelfedern, insbesondere von Vogelfedern von zum Verzehr bestimmtem Geflügel, verhältnismäßig preiswert ist, das Entfernen von schwimmenden Flüssigkeiten dadurch auch wirtschaftlich durchführbar ist. Weiter ist anzumerken, daß das Federmehl mit seinem geringen spezifischen Gewicht auch leicht zu transportieren und auf die zu entfernende Flüssigkeitsschicht aufzubringen ist. Dieses Aufbringen kann durch Aufstreuen oder beispielsweise auch durch Aufblasen durchgeführt werden.

Patentansprüche

1. Verfahren zum Entfernen einer auf Wasser schwimmenden Flüssigkeitsschicht, insbesondere einer Ölschicht (Erdölschicht), dadurch gekennzeichnet, daß die zu entfernende Flüssigkeit durch ein auf Wasser schwimmfähiges, Kapillaren aufweisendes Mittel, das auf die Oberfläche der zu entfernenden Flüssigkeit aufgebracht wird, gebunden wird, daß sodann das mit der Flüssigkeit vollgesaugte Bindemittel abgeschöpft wird und daß schließlich das Bindemittel von der Flüssigkeit getrennt wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Adhäsionskräfte zwischen der Flüssigkeit und der Kapillarwandung der Kapillaren des Mittels größer sind als die Kohäsionskräfte zwischen den Molekülen der Flüssigkeit.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß der Quotient Adhäsionskraft/Kohäsionskraft zwischen dem Bindemittel und der zu entfernenden Flüssigkeit größer ist als zwischen dem Bindemittel und Wasser.

4. Bindemittel zur Durchführung des Verfahrens nach den Ansprüchen 1 bis 3, dadurch gekennzeichnet, gekennzeichnet durch aus gemahlenden Vogelfedern, insbesondere Hühnerfedern, gewonnenes Federmehl.

5. Bindemittel nach Anspruch 4, dadurch gekennzeichnet, daß die Federmehlpartikel eine Partikelgröße $< 200 \mu\text{m}$ aufweisen.



(11) EP 1 130 073 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.09.2001 Bulletin 2001/38

(51) Int Cl.7: C09K 3/00, E02B 15/04

(21) Application number: 01200712.8

(22) Date of filing: 29.02.2001

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LJ LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 29.02.2000 AR 0000890

(71) Applicant: R. Ciancaglini y Asociados, S.A.
1012 Capital Federal (AR)

(72) Inventors:
• Ciancaglini, Ricardo Horacio
1642 San Isidro - Pcia. de Buenos Aires (AR)
• Mazzao, Francisco Antonio
1642 San Isidro - Pcia. de Buenos Aires (AR)
• Chiesa, Luis Oscar
1642 San Isidro - Pcia. de Buenos Aires (AR)

(74) Representative: Davila Baz, Angel
c/o Clarke, Modet & Co.,
Goya, 11
28001 Madrid (ES)

(54) A procedure for the removal and collection of hydrocarbons, a product to be used in the procedure, and procedure for embodying the product and the use of the same in the procedure

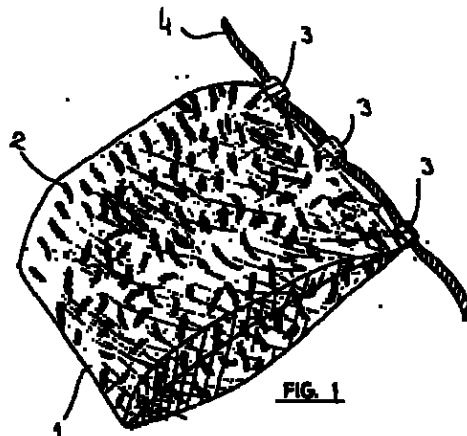
(57) 1. Purpose of the invention: A procedure for the removing and collection of spilled hydrocarbons that does not contaminate the environment with its application and which is economical.

2. Characteristics of the invention: Bird feathers are scattered over the polluted surface on which there are non-polar or low density substances, the feathers are allowed to act until they are saturated with the substances and the saturated feathers are collected. Unlike chemical dispersants, the feathers avoid contamination at the time of their application, and the costs are lower with respect to the methods commonly employed.

3. Field of application: Solid or liquid surfaces that have undergone hydrocarbon pollution produced by an oil spill.

4. Alternatives: None exist.

5. Example: The feathers are located inside a mesh of open weave and then said meshes are laid on the surface contaminated with hydrocarbons to be treated, after absorption of the hydrocarbons on the part of the feathers, said meshes are withdrawn and their recycling takes place.



EP 1 130 073 A1

Description

[0001] The present invention relates to a procedure for the removal and collection of hydrocarbons, a product to be used in the procedure, a procedure for embodying the product and the use thereof in the procedure, and more precisely it relates to the removal and collection of oil spills occurring on solid or liquid surfaces, or even those contained in liquid masses, for example due to accidents and/or sinking of tanker ships on rivers, seas and oceans, or spills on land from tanker trucks, etc.

[0002] Everyone is familiar with the disasters produced by oil spills caused by tankers, such as the oil tanker VALDEZ of the EXXON company. In March 1989, the VALDEZ ran aground on a sand bank in Alaska, spilling more than 232,000 barrels of crude oil. The effects of the incident are still not known in their entirety, however it is known that only 25% of the migratory salmon returned to the area of the accident the following year, thousands of sea otters were poisoned and thousands of sea birds perished. This was only one of the hundreds of cases of oil spillage that occur on the high seas.

[0003] The most effective method for cleaning up the oil slicks from the ocean, is that of gathering the oil together. This characteristic not only removes the oil from the sea, but also, as well, it can be recovered for use. The first step in gathering up the oil is to surround the slick with a floating barrier which can comprise an inflatable boom which has a membrane that retains the spilled oil and said membrane includes in its base a chain to keep it straight. On the other hand, the inflatable boom can be replaced with an absorbent material which acts like a sponge, and can be of a natural material like for example straw, or of a synthetic material like for example polypropylene.

In the case of the inflatable barrier, this, as well as being costly, does not withstand damage produced by rocks or the like and in the event of tearing or breakage, the oil leaks out through said tear or breakage. Moreover, in the case of employing absorbent materials, these, on absorbing the oil, also absorb large quantities of water, it being possible for water to represent 90% of the liquid absorbed. Moreover, said absorbent materials are not suitable for absorbing large amounts of oil and their use is restricted to small spills or pockets remaining from large spills.

[0004] Likewise, given that one of the main problems in oil pollution is that oil slicks remain together and float on the surface of the water, chemical products, generally termed dispersants, have been developed, which can be spread on the oil slicks to divide up a large slick into smaller ones, which are diluted into the water without causing greater harm. Nevertheless, due to the way these chemical dispersants work, they cannot be employed on thick or viscous oils, in which are included some crude oils and all heavy fuel oils. In addition, the majority of crude oils capable of being dispersed,

change their properties after being a few hours in cold water and cannot be dispersed, for which reason the application of said dispersant must be carried out straightaway by means of helicopters, which are not always available in the vicinity of the spill.

[0005] Scientists have also developed a new type of dispersant which consists mainly of micro-organisms. This type of oil removal is termed bioremediation, in which the oil can be degraded biologically by a great variety of micro-organisms among which are to be found the pseudomonas, various cornibacteria and microbacteria, and even some yeasts.

[0006] In the elimination of oil spills, the micro-organisms work by oxidizing the oil to CO₂. When large oil spills occur, the volatile hydrocarbon fractions quickly evaporate, leaving the long chain, aliphatic and aromatic components to be eliminated by the organisms.

[0007] These dispersants, however, contain contaminating components, for which reason, before they are used, consideration must be given to the depth of the water where the spill is located, the strength of the currents, and what type of sea life is present in the zone in question. Also, these dispersants are very expensive, and, by way of example, it can be remarked that the EXXON company has spent more than 1.5 billion dollars in cleaning up the oil spilled from the VALDEZ using bioremediation processes.

[0008] In response to the VALDEZ incident, as a solution to apply to oil spills, the United States' oil pollution act has dictated that all new oil tankers are to be built with double hulls in order that, in the event of the ship colliding with some object, only the outer hull is punctured, and spillage is avoided. A further measure taken, in the event of spillage should the ship be punctured, is to have the tank fitted with hydrostatic controls whereby the internal pressure of the tank is made the same as the external pressure, preventing the oil from running out. These measures are however very expensive to implement and, since they are only voluntary, they have not been taken up extensively by shipbuilders.

[0009] It is therefore an object of the present invention to provide a procedure for removing and collecting spilled hydrocarbons that does not pollute the environment when applied and is economical.

[0010] It is a further object to provide a procedure for the removal and collecting of spilled hydrocarbons that only absorbs the hydrocarbons, without absorbing water or other components.

[0011] It is therefore an object of the present invention to provide a procedure for the removal and collection of hydrocarbons spilled on solid or liquid surfaces polluted with said hydrocarbons, wherein said procedure comprises the steps of: scattering bird feathers over the surface on which non-polar or low density substances are present, permitting the feathers to act until saturated with said substances and gathering up said saturated feathers.

[0012] For greater clarity and understanding of the

present invention, it has been illustrated in several figures, in which said invention is shown in some of the preferred forms of embodiment, all by way of example, wherein:

Figure 1 is a top view, in perspective, which illustrates a product of the invention consisting of feathers within a mesh;

Figure 2 is an illustration of the application of the product of the invention for the absorption of hydrocarbons object of the present invention.

[0013] With reference first to figure 1 a suitably woven mesh 1 can be observed, which holds a plurality of feathers 2. Said mesh has various eyelets 3, through which is passed a rope or chain 4, in order to be able to join adjacent meshes 1 and/or fasten it to a boom 5 such as is shown in figure 2, or to a boat for their transport and subsequent removal (not shown).

[0014] In figure 2 it is possible to appreciate how the feathers 2 held in the mesh 1 perform the function of absorbing the oil slick 6 spilled on the water 7.

[0015] Once said feathers 2 are saturated with oil, the meshes 1 are withdrawn and, in the case of oil slicks remaining, replaced with new meshes 1.

[0016] For a better understanding of why feathers 2 are used for the absorption of oil slicks 6, there follows a brief outline of the properties and characteristics of the feathers and how they are obtained.

[0017] The feathers are the most important features of bird skins, however there exists a large, clearly visible, cutaneous structure, called the uropygial gland, located on the rump at the base of the tail which produced an oily secretion that is spread by the birds over their feathers with the peak when preening. This gland is particularly well developed in aquatic birds, and the secretion therefrom is important in that it renders the feathers waterproof.

[0018] The use of bird feathers for the absorption of spilled oil slicks, is based on the absorption capacity which the feather offers for non-polar or low polarity substances, such as hydrocarbons. This property is known as oleophilia, which contains between 4 and 8% animal fat, due to the uropygial gland described above, it being said fat which has the oleophilic characteristic.

[0019] The feathers with this animal fat and subjected to various treatments, are capable of absorbing hydrocarbons to between 4 and 5 times their own weight, this sorbent feature being favoured in the feather 2 thanks to its extensive contact area. Although the feather has an oleophilic nature, it is not entirely hydrophobic, being capable of absorbing up to 0.25 parts water for each part feather. This, when compared with the known methods of absorption, such as those already mentioned, is a highly appreciated feature.

[0020] Said feather 2 is obtained mainly from the aviculture industry where, up to this time, these feathers were considered to be waste with no other use whatso-

ever. Given that said feather 2 after being plucked from the bird, enters a rancidification process of its fatty part and putrefaction of its proteinic part, before using it for oil slick absorption, it is preferable to subject them to a conditioning treatment which includes washing and drying. Optionally the feathers can undergo a combing, or carding, process. This prior conditioning of the feathers 2 is termed biological stabilisation and permits the subsequent use of the feathers in an optimum state for the absorption of oil slicks. As a final step, after the removal of the spilled oil, it is possible to proceed to its final disposal in incinerating furnaces adapted to burn it, or it can be recycled in order to re-employ the oil in question. The already saturated feathers can also be buried or encapsulated, in accordance with governmental regulations concerning ecology and waste disposal.

[0021] It is to be pointed out that said feathers 2, in this preferred embodiment, are situated inside this open-woven mesh 1, which does not imply a limitation to the same, it being possible to arrange it in the form of blankets, cut and bound by a binding element which does not impair their sorbent property, or simply scattering them from the air in large quantities to be later gathered up by oil slick collection machines, such as the ship AL WASSIT, which can skim more than 1.6 square kilometres per day.

[0022] Finally, from that described above, it can be deduced that the object of the present invention, not only improves the activity of removing slicks of spilled oil for its low cost, but also, in addition, by containing entirely natural products, has no restrictions with respect to areas of use, or run risks of increasing the ecological impact caused by an oil spill.

Claims

1. A procedure for removal and collection of hydrocarbons spilled on or contained in liquids or solids polluted with said hydrocarbons, characterised in that it comprises the steps of:

scattering bird feathers over said surface on which are to be found non-polar or low density substances;
leaving the feathers to act until saturated with said substances;
collecting said saturated feathers.

2. A product to be employed with the procedure of claim 1, characterised in that it is comprised on bird feathers.

3. A product in accordance with claim 2, characterised in that said bird feathers have a capacity to absorb hydrocarbons of the order of 4 to 5 times their weight.

4. A product in accordance with claim 2, character-
ised in that said bird feathers are treated by means
of biological stabilisation.
5. A product in accordance with claim 4, character-
ised in that said biological stabilisation comprises
the washing, drying and carding of the bird feathers.
6. A product in accordance with claim 3, character-
ised in that said bird feathers define layers for ap-
plication on said polluted surfaces.
7. A product in accordance with claim 5, character-
ised in that said layers are defined by compacting
said feathers contained in a mesh.
8. A product in accordance with any of the previous
claims, characterised in that said feathers contain
between 4% and 8% of animal fats.
9. A procedure for preparing the product of claim 2,
characterised in that it is comprised of the steps
of: collecting feathers, washing them and drying
them until a feather is obtained with an animal fat
content of between 4% and 8% by weight and an
absorption capacity of the order to 4 to 5 times its
weight.
10. A procedure in accordance with claim 9, character-
ised in that after the washing and the drying the
feathers are carded.
11. The use of the product of claim 2, characterised in
that it is applied to the recovery of hydrocarbons
spilled on solid or liquid surfaces.

EP 1 130 073 A1

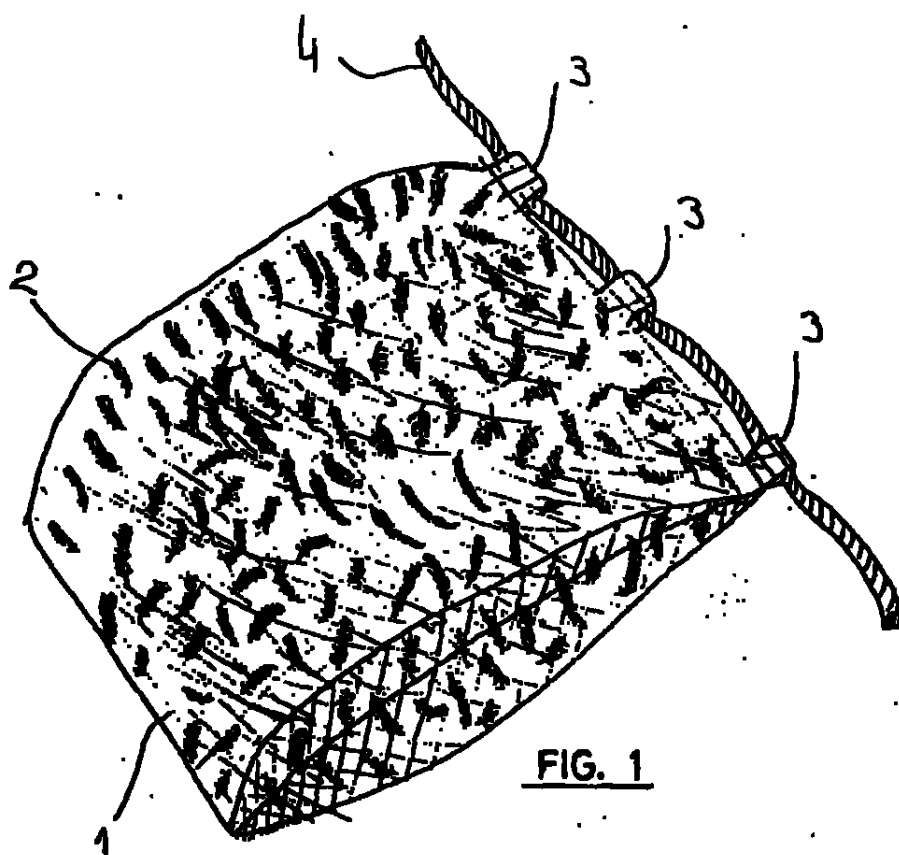


FIG. 1

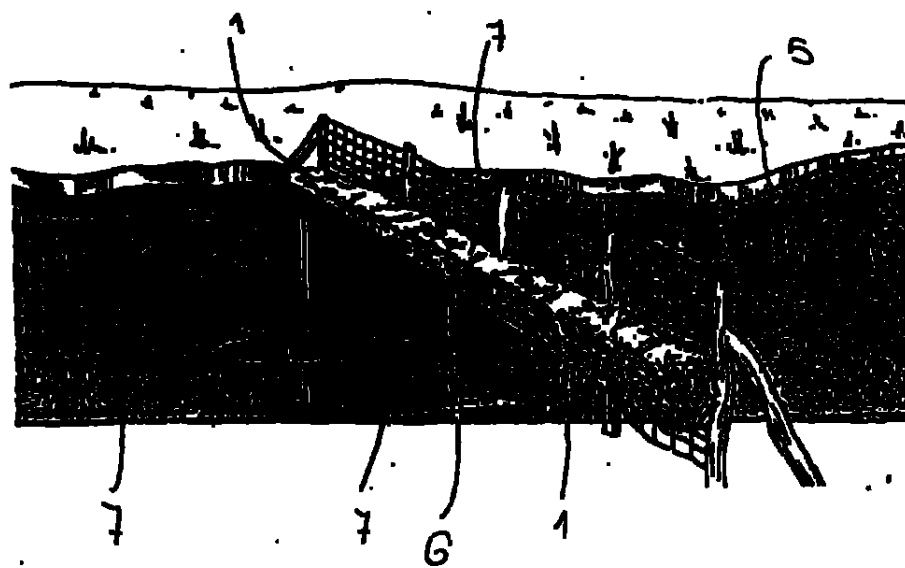


FIG. 2

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO**53**

RADICACIÓN: 2-83482

EDICTO No. 13876

**LA SECRETARÍA GENERAL AD-HOC
HACE SABER:**

Que esta Superintendencia profirió Resolución No. 23241 de 31-AGO-2006. Que el contenido de la parte resolutive es como sigue: El Superintendente de Industria y Comercio.

RESUELVE

ARTICULO PRIMERO: Negar el privilegio de patente de invención para la solicitud

correspondiente a 'PROCEDIMIENTO PARA RECUPERAR GRASAS, ACEITES E HIDROCARBUROS DERRAMADOS EN CUERPOS DE AGUA, MEDIANTE LA UTILIZACION DE PLUMAS DE POLLO COMO ELEMENTO OLEOFILICO'.

ARTICULO SEGUNDO: Notificar personalmente el contenido de la presente resolución al señor Rodrigo Suárez Castaño, quien actúa en nombre propio, entregándole copia de la misma, advirtiéndole que contra ella procede el recurso de reposición interpuesto ante el Superintendente de Industria y Comercio, al momento de la notificación o dentro de los 5 días hábiles siguientes a ella.

NOTIFIQUESE Y CUMPLASE

Dada en Bogotá, D.C., a los 31 ABO. 2006

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO,


JAIME LUIS ESCOBAR

Para notificar a los interesados, se fija el presente EDICTO en lugar visible al público en la SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO, por el término de (10) diez días hábiles contados a partir de las 8:30 a.m. de hoy.

Secretaría General Ad-Hoc 18-SEP-2006 Este edicto se desliza hoy 29-SEP-2006 a las cinco (5:00 p.m.)
Secretaría General Ad-Hoc
EDICTO No. 13876