REGULATION 11(1)

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1976

CONVENTION APPLICATION FOR A PATENT

We, BALLAST-NEDAM GROEP N.V. AND SKIMOYEX B.V., both Body Corporates organised and existing under the Laws of the Netherlands, of 2 Laan van Kronenburg, Amstelveen, the Netherlands and of 135 Binckhorstlaan, the Hague, the Netherlands, respectively, hereby apply for the grant of a Patent for an invention entitled:

"DEVICE FOR SEPARATING WATER FROM SUBSTANCES CONTAINED THEREIN"

which is described in the accompanying Complete Specification.

This application is a Convention Application and is based on the Application numbered 76 04390 for a Patent or similar protection made in the Netherlands on 23rd April, 1976.

Our address for service is:--

SHELSTON WATERS,
55 Clarence Street,

DATED this 8th day of April, 1977

BALLAST-NEDAM GROEP N.V. AND SKIMOYEX B.V.

by Robert J. Shelston.

Fellow Institute of Patent Attorneys of Australia of SHELSTON WATERS

To: The Commissioner of Patents,
WODEN. A.C.T.

D.B. 85E
mg

Fee: $38.00
DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention Application No. 24460/77 made by Ballast-Nedam Groep N.V. and Skimove B.V. (hereinafter referred to as "Applicants") for a patent for an invention entitled:

(b) Device for separating water from substances contained therein

We, Helenus Johannes van Lookeren Campagne and Cornelis Gerardus Middelbeek of No. 10, Laan van Oud Poelgeest, Oegstgeest and of No. 12, Gooland, Nootdorp, the Netherlands, do solemnly and sincerely declare as follows:

1. We are authorised by Applicants to make this declaration on their behalf.

2. The basic Application(s) as defined by section 141 of the Act was/were made in the Netherlands on the 23rd day of April 1977 by Ballast-Nedam Groep N.V. and Skimove B.V.

3. We, Helenus Johannes van Lookeren Campagne and Cornelis Gerardus Middelbeek; Tjakko Aaldrik Wolters and Jan Barend ten Boer of No. 12, Gooland, Nootdorp; No. 4, Sanatoriumweg, Zeist, and No. 55, Pruimengaarde, Zoetermeer, all the Netherlands, are the actual Inventor(s) of the invention and the facts upon which Applicants are entitled to make the Application are as follows:

Applicants are the Assignees of the said Inventor(s).

4. The basic Application(s) referred to in paragraph 2 of this Declaration was/were the first Application(s) made in a Convention country in respect of the invention, the subject of the Application.

DECLARED at Oegstgeest and Nootdorp this 4th and 6th day of April 1977

(Signature of Declarant)

To THE COMMISSIONER OF PATENTS.
CLAIM 1.

A device for separating water by means of gravity segregation from water-unsoluble substances contained therein, comprising a reservoir having a mixture supply, a water discharge and at least one discharge for separated substances which is separate from said water discharge, at least one flow stretch being set in the reservoir, in which a plurality of flat separation channels and a supply chamber and a discharge chamber communicating with said separation channels are arranged, said separation channels being piled up in parallel relationship and bounded by channel walls, characterized in that for obtaining a uniform distribution of the substances over the separation channels displacer means are arranged which restrict the passage of the flow stretch gradually stronger in the segregation direction.
Name of Applicant: BALLAST-NEDAM Groep N.V. AND SKIMO VEX B.V.

Address of Applicant: 2, Laan van Kronenburg, Amstelveen and 135 Binckhorstlaan, the Hague, the Netherlands, respectively.

Actual Inventor: CORNELIS GERARDUS MIDDLEBEK: TJAKO AALDRIK WOLTERS AND JAN BAREND DEN BOER

Address for Service: Shelston Waters, 55 Clarence Street, Sydney

Complete Specification for the Invention entitled: "DEVICE FOR SEPARATING WATER FROM SUBSTANCES CONTENTED THEREIN"

The following statement is a full description of this invention, including the best method of performing it known to me/us:
The invention relates to a device for separating water by means of gravity segregation from water-unsoluble substances contained therein, comprising a reservoir having a mixture supply, a water discharge and at least one discharge for separated substances which is separate from said water discharge, at least one flow stretch being set in the reservoir, in which a plurality of flat separation channels and a supply chamber and a discharge chamber communicating with said separation channels are arranged, said separation channels being piled up in parallel relationship and bounded by channel walls.

Such a device is known. Herein the inlets of the separation channels piled above each other join a large supply chamber, so that the disadvantage occurs that the large particles of light substances may rise in the supply chamber and the large particles of heavy substances may sag in said chamber, as a result of which the upper separation channels have to work up proportionally to many light substances and the lower separation channels have to work up proportionally to many heavy substances.

The invention has for its object to divide the substances better over the separation channels.

To this aim the device in accordance with the invention is characterized in that for obtaining a uniform distribution of the substances over the separation channels displacer means are arranged which restrict the passage of the flow stretch gradually stronger in the segregation direction. The displacer means are preferably constituted by
a plurality of teeth divided over the width of the separation channels and mainly extending in the piling direction of the separation channels, the width of said teeth increasing in the segregation direction of the substances.

If the substances are lighter than water the tooth width will increase in an upward direction, whereas in the case of heavier substances the tooth width will increase in a downward direction. However, in case large particles of heavy substances as well as of light substances occur in the water, then teeth are preferably applied, whose width increase in both segregation directions.

In order to prevent that the flow of separated substances from the separation channels is hindered, the ends of the separation channels, at which many separated substances are delivered, are preferably free from said teeth.

A further preferred embodiment of the device in accordance with the invention, which has a particular separation operation when separating water and light substances, is characterized in that a discharge for light substances is arranged separately from said water discharge, said discharge for light substances communicating with a collecting space for light substances which is arranged in the reservoir at a high level and in that the displacer means are constituted by a wall which narrows the supply chamber in the segregation direction of the light substances and which also constitutes a guide member for large particles of light substances which can be easily separated in the direction towards the collecting space for light substances.
The displacer means are preferably adjustable in the flow direction in the supply chamber.

A rather compact device is obtained when the separation channels are annular and incline upwardly from the supply chamber.

The invention will be described more fully hereinafter with reference to examples.

In the drawing there show schematically:

Figures 1, 3, 5, 7, 8, 11 and 12 each a longitudinal sectional view of a preferred embodiment of a device in accordance with the invention,

Figure 2 an elevational view taken on the line II-II in Figure 1,

Figure 4 an elevational view taken on the line IV-IV in Figure 3,

Figure 6 an elevational view taken on the line VI-VI in Figure 5,

Figure 9 a plan view of a variant of detail IX of Figure 8, and

Figure 10 a sectional view taken on the line X-X in Figure 9.

The device 1 shown in Figures 1 and 2 for separating water 2 from water-unsoluble, light-weight substances 3 contained therein, such as oil, comprises a reservoir 4 for receiving a mixture 5 of water 2 and substances 3 and a plurality of sloping separation channels 6 arranged in said reservoir, piled up in parallel relationship and bounded by separation walls 7, an inlet chamber 9, a mixture inlet 8 opening out in the inlet chamber 9, a tube 11 provided with a basket 10 and
forming a communication between the inlet chamber 9 and the reservoir 4, a substance outlet 12, an interface sensor 13, an overflow 14 with an overflow rim 15, a water outlet 16 communicating with the overflow 14 and a screen 18 separating the overflow 14 from a space 17 for collecting the substances 3. The pile 19 of separation channels 6 is arranged between a feeding chamber 20 and a delivery chamber 21 of the reservoir 4. In this way a flow way according to arrows 80, 27 and 81 is set in the reservoir 4, wherein the separation channels 6 and the feeding chamber 20 and the delivery chamber 21 communicating with said channels 6 are incorporated.

Large particles of light-weight substances 3 intend to rise in the feeding chamber 20 so that the risk would occur that the upper separation channels 6 have to work up too much light-weight substance. In order to prevent said risk and in order to divide the light-weight substance 3 more equally among the separation channels 6, the mixture 5 is guided to the separation channels 6 through a plurality of teeth 24 divided among the width of the separation channels 6, the width of said teeth increasing in the segregation direction of the light-weight substance, that is to say in the upward direction. These teeth 24 which converge equally according to Figure 2, throttle the flow of mixture towards the upper separation channels 6 more than the flow of mixture towards the lower separation channels 6 so that the lower separation channels 6 have to work up a larger output of mixture having a smaller percentage of light-weight substance and thus nearly as much light-weight substance as the upper separation channels 6. The teeth 24 constitute displacer means. The separation walls 7 comprise at their top ends gutter-shaped substance guide members 25.
Using the device 1 shown in Figures 1 and 2 or anyone of the devices to be described hereinafter a mixture 5 of water 2 and substances 3 is passed in the direction of the arrow 27 through the plurality of separation channels 6 with such a low speed that by gravity the substances 3 are urged against the lower sides of the separation walls 7, along which they are moved in the direction of the arrow 27. The substances 3 are joined by the guide members 25 to narrow streams, which enter the delivery chamber 21, where they rise in the form of ascending drop streams 26 into the collecting space 17.

When the interface sensor 13 indicates that substances 3 are present at the level 28, the substance outlet 12 is turned about an axis 29, for example, by manually actuating a lever 30, for tapping the substances 3.

The purified water 2 flows through the overflow 14 towards the water outlet 16.

In the device 1 of Figure 1 the teeth 24 are spaced apart at their top ends at a small distance from the separation channels 6. They form part of an unbroken comb 22.

On the contrary the teeth 24 of the device 76 shown in Figures 3 and 4 are lying against the separation channels 6. Furthermore they are spaced apart from each other, do not reach to the complete height of the separation channels 6 and have a width increasing in downward direction, because the device 76 is destined for working up much water having a considerable amount of heavy substances 77 which easily sag and which land into a collecting space 78 from which they are tapped through a closing member 79.
Just as the separation channels 6 of Figures 1 and 2
the separation channels 6 of Figures 3 and 4 are free from
the teeth 24 at those ends at which many separated substances
are delivered. As a result the teeth 24 considerably throttle
the inflow in the upper separation channels 5 in Figures 1 and 2,
whereas the teeth 24 of Figures 3 and 4 considerably throttle
the outflow from the lower separation channels 6.

The device 80 shown in Figure 5 only differs from
that shown in Figure 4 in that the teeth 24 for throttling
the mixture having many heavy substances 77 are shorter and
in that at the top side also teeth 24 for throttling the
mixture having many light-weight substances 3 are arranged.

The device 46 shown in Figure 7 comprises a reservoir
having a mixture inlet 8 on the bottom side and separation
channels 6 whose inlets 47 are arranged in superposition and
communicate with a standing feeding chamber 49 converging in
the direction of flow 48 in order to ensure that the separation
channels 6 all receive equal quantities of substances 3.

The readily separated substance 3, for example, light oil,
arrives at the inclined wall 50 and flows there along into
the collecting space 17, which is arranged at a high level
in the reservoir 4. The inclined wall 50 forms displacer means
distributing a mixture 5 among the separation channels 6 in
the piling direction 23, in that the passage of the flow way
near the feeding chamber 49 is restricted by the wall 50
gradually stronger in upward direction, that is to say in the
segregation direction. Furthermore substances 3 flow in a
counter-flow along the separation walls 7 with respect to the
direction of flow 27 of the mixture 5, into the collecting space 17. The device 46 comprises furthermore a water outlet 16 and a separate substance outlet 12 having a controllable closing member 83. The flow way in the reservoir 4 runs from the mixture inlet 8 according to arrow 48 through the feeding chamber 49 parallel according to arrows 27 through the separation channels 6 and according to arrow 84 through the delivery chamber 21 towards the water outlet 16.

The device 51 shown in Figure 8 comprises in the reservoir 4 a plurality of annular separation channels 6 with separation walls 7 having the shape of a truncated cone. The mixture 5 enters via a mixture inlet 8 the inlet chamber 9, in which the readily separable substances 3 rise into a collecting space 37, the substances being removed through a delivery part 52 having a closing member 85. The mixture 5 flows through a tube 11 in the direction of flow 48 from a central feeding chamber 49, in which a displacer 53 converging opposite the direction of flow 48 is adjustably disposed by means of screws 54 in order to adapt the distribution of the substances 3 in the mixture 5 among the separation channels 6 to the operation conditions, whilst a standard packet of separation walls 7 is maintained. The purified water 2 emerges from a water outlet 16 and the light substances 3 collected in the space 17 are removed via the substance outlet 12 comprising the closing member 83.

The heavy substances 38 collected in the spaces 39 and 55 are removed through outlets 43 and 56.
A variant of the device 51 comprises, instead of an adjustable, central displacer 53, a plurality of gutter-shaped displacers 58 shown in Figures 9 and 10, each forming a guide for substances 3 delivered by separation channels 6 and thus passed to the collecting space 17. The displacers 58 distribute the mixture 5 evenly among the separation channels 6 and screen the separated substances 3 from the mixture 5 flowing out in the direction of the arrows 60.

The separation walls 7 have substance guide members in the form of inner rims 61 joining finger-shaped substance guide members 62, which are fastened by strips 63 to the gutter-shaped displacers 58.

The device 64 shown in Figure 11 is distinguished from device 51 in that the displacer 53 is arranged around a communicating tube 67 between the collecting spaces 37 and 17.

The device 68 shown in Figure 12 differs from device 64 in that the separation channels 6 are inclined away from the central feeding chamber 49 in an upward and outward direction and in that substance guide members 25 are arranged on the outer walls of the separation walls 7. The mixture 5 and the substances 3 then flow in the same direction 27 through the separation channels 6. Large particles of light substance 3 may rise along the displacer 53 and through a tube 86 reaching into the collecting space 17, whereas the mixture is urged through the separation channels 6 towards the delivery chamber 21.
1. A device for separating water by means of gravity segregation from water-unsoluble substances contained therein, comprising a reservoir having a mixture supply, a water discharge and at least one discharge for separated substances which is separate from said water discharge, at least one flow stretch being set in the reservoir, in which a plurality of flat separation channels and a supply chamber and a discharge chamber communicating with said separation channels are arranged, said separation channels being piled up in parallel relationship and bounded by channel walls, characterized in that for obtaining a uniform distribution of the substances over the separation channels displacer means are arranged which restrict the passage of the flow stretch gradually stronger in the segregation direction.

2. A device as claimed in claim 1, characterized in that the displacer means are constituted by a plurality of teeth divided over the width of the separation channels and mainly extending in the piling direction of the separation channels, the width of said teeth increasing in the segregation direction of the substances.

3. A device as claimed in claim 2, characterized in that the ends of the separation channels, at which many separated substances are delivered, are free from said teeth.
4. A device as claimed in claim 1, characterized in that a discharge for light substances is arranged separately from said water discharge, said discharge for light substances communicating with a collecting space for light substances which is arranged in the reservoir at a high level and in that the displacer means are constituted by a wall which narrows the supply chamber in the segregation direction of the light substances and which also constitutes a guide member for large particles of light substances which can be easily separated in the direction towards the collecting space for light substances.

5. A device as claimed in claim 4, characterized in that the displacer means are adjustable in the flow direction in the supply chamber.

6. A device as claimed in claim 4 or 5, characterized in that the separation channels are annular and incline upwardly from the supply chamber.

7. A device for separating water by means of gravity segregation from water-unsoluble substances contained therein, substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 18th day of April, 1977

BALLAST-NEDAM GROEP N.V. AND SKIMOEX N.V.

ASSOCIATION

Fellow Inhabitants from the City of Australia of SHELL PETROLIUM

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