

PATENT SPECIFICATION

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(15)

(54) METHOD AND APPARATUS FOR REMOVING FLOATING MATERIAL FROM THE SURFACE OF A BODY OF LIQUID

(71) We, J. B. F. SCIENTIFIC CORPORATION a corporation organised and existing under the laws of the state of Massachusetts United States of America, of 2 Ray Avenue, Burlington, Massachusetts 01083, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method and apparatus for removing floatage (whether liquid or solid) from the surface of a body of liquid and for collecting it. More particularly, the invention provides apparatus for removing oil, oil-sorbents and other floating material from, for example, an open body of water. The apparatus may be deployed on a barge-like or other floating craft, and used for cleaning floatage from a body of water such as a harbor or beach area. The invention will accordingly be described in this context, by way of example, although it provides advantages which can be used in other environments.

The present invention provides from one aspect a method for collecting floatage from a body of liquid, said method comprising the steps of submerging the floatage under a downwardly inclined conveyor having a forward end above the surface of said body of liquid and having a back end below said liquid surface and which advances from said forward end to said back end, thereby to draw floatage from the liquid surface downward under said conveyor toward said back end, releasing the submerged floatage from under said conveyor at said back end into said liquid, and collecting said released floatage within an upwardly extending open-bottomed enclosure as the released floatage buoyantly rises.

From another aspect the invention provides apparatus for collecting floatage from

a body of liquid comprising a downwardly inclined conveyor having a forward end adapted to be disposed above the surface of said liquid and a back end adapted to be disposed below said liquid surface, means for advancing said conveyor from the forward end to the back end whereby to draw floatage from the liquid surface downward under said conveyor toward said back end, and an open-bottomed upwardly-extending enclosure positioned to receive and collect buoyantly-rising floatage released from under the back end of the conveyor into the liquid.

Specific embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:—

Figures 1 and 2 are, respectively, side elevation and top plan views, partly broken away, of a floatage recovering and collecting vessel embodying apparatus according to the invention;

Figure 3 is a simplified view similar to Figure 1 of a floatage recovering and collecting craft embodying a further apparatus of the invention;

Figure 4 is a side elevation view of another floatage recovering and collecting vessel embodying still further apparatus of the invention;

Figures 5A and 5B are fragmentary perspective views showing different forms of materials transports and rollers for use in apparatus of the invention; and

Figures 6 and 7 are, respectively, side elevation and front elevation views, partly broken away, of a surface craft embodying still further apparatus of the invention.

Referring to the accompanying drawings, Figures 1 and 2 show a boat 10 having a downwardly inclined flight 12 of a materials transport 14 openly exposed to the water adjacent the bow 10a for removing floatage 16 from the water surface and collecting it

in a storage well 18. The illustrated boat 10 has side-by-side floats 20 and 22 joined together by a stern wall 24 and a mid-ship structure 26 to form a catamaran-type hull.

5 The transport 14 is a continuous, endless belt trained over rollers 28 and 30, a driving roller 32 and a tensioning roller 34. The rollers have parallel rotation axes which are horizontal and extend transverse to the

10 bow-stern dimension of the boat. Rollers 28, 30 and 32 are journaled to the inner sides of the hull floats and span the width between these floats. The tensioning roller 34 is similarly disposed but is mounted by

15 way of moment arms 36, 36; each of which is pivotally secured to a hull float at a point horizontally removed from its rotational mounting of the roller 34 shaft.

The roller 28 is at an upper, forward

20 location 38 on the boat 10 near the bow and well above the water line 40 so that waves likely to be encountered during floatage-recovering operation do not spill over it. The roller 30 is at a lower location 42

25 spaced sternward and below the location 38 to be continually below the water line 40 during floatage recovering operation. A straight construction line tangent to the lower surfaces of both rollers 28 and 30 is

30 thus inclined downward from location 38 to location 42; the angle of the incline relative to the horizontal typically and preferably is between 10 degrees and 35 degrees. Other angles generally within the range be-

35 tween 5 degrees and 45 degrees can however be used; generally the more bouyant the floatage being recovered, the shallower the desired angle. The belt transport 14 passes outwardly around the rollers 28 and

40 30 to form the lower flight 12 substantially along this common tangent line. The belt transport also passes outwardly around the drive roller 32, which is above the location 30 and preferably above the water line 40;

45 the illustrated drive roller is slightly forward of the roller 30. The tensioning roller 34 rides over the upper flight of the belt transport as it passes between the drive roller 32 and the forward roller 28.

50 The continuous belt which forms the illustrated materials transport 14 is substantially impervious to whatever liquids or other materials which are to be recovered. By way of example, for recovering oil and

55 whatever solid debris is present, the transport can be of woven or extruded construction, or a laminate of both forms of constructions.

As drive mechanism 44, typically including a motor with a gear reducer, is coupled

60 by a drive linkage 46 to roller 32. The mechanism drives this roller clockwise, as seen in Figure 1, so that the belt transport moves in the direction shown with arrows

65 48 to advance the lower flight 12 from roller

28 to roller 30.

As also shown in Figures 1 and 2, an optional belt cleaner 50, illustratively in the form of a scraper, is mounted on the mid-ship structure 26 to remove material which

70 adheres to the belt transport as it travels between rollers 30 and 32.

The inner walls of the hull floats 22 and the stern wall 24 form three peripheral sides of the storage well 18. These walls extend

75 from above the water line 40 to at least the lowest surface of roller 30, and hence to the lowest point along the transport lower flight 12. The back wall 52 of the mid-ship structure 26, and the length of belt transport 14

80 between rollers 30 and 32, form the remaining, frontmost, peripheral wall of the well 18. The well bottom has an unobstructed opening 54 at the forward portion thereof, continuously behind roller 30. A baffle 56

85 for suppressing turbulent fluid flow extends along at least the greater portion of the rest of the well bottom, with the remaining portions being closed solid or open to fluid flow, as desired. The lower surface of the

90 baffle preferably is planar, and it is at, or at least close to, the same horizontal level as the lowest point of the transport flight 12. This arrangement minimizes turbulence between the front end of baffle and the loca-

95 tion 42, and enhances entry of floatage into the well. Although not shown, the boat 10 can have whatever ballast and whatever propelling equipment is desired; these being provided according to conventional tech-

100 niques.

The floatage recovering craft 10 operates by drawing floatage down the lower flight of the belt transport 14 and then releasing it in the collecting well 18. A pump 58 on the

105 craft pumps the collected floatage from the well into further storage as desired. More specifically, forward motion of the craft 10 pushes floatage which engages the transport lower flight 12 slightly under the water line

110 40. The floatage then exerts pressure against the transport. This pressure enables the transport to carry the floatage further under the water line 40 and along the transport as it is driven rearward to the lower roller

115 30. Thus, a combination of hydrodynamic and hydrostatic pressures are understood to hold floatage against the transport lower flight 12, so that the floatage moves with the transport as it travels from the forward

120 upper roller 28 to the lower roller 30. The drive mechanism 44 generally drives the transport 14 at a speed that depends in part on the travel speed of the craft, i.e. it is considered preferable that the horizontal

125 component of transport speed be as close as practical to the speed of the boat relative to the water. Under this condition, there is little if any relative movement between the transport flight 12 and the floatage-bearing

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water adjacent it. However, the invention can be practiced with a transport speed faster and, alternatively, slower than the craft travel. By way of illustrative example, a transport speed between 0.5 foot/second and 5 feet-second can be used in recovering floatage such as oil and oil-sorbents with equipment as shown in Figs. 1 and 2.

At any point along the transport flight 12, the inner sidewall of the hull floats 20 and 22 extend deeper into the water than the flight, and aft of the location 42 they extend deeper than the flight at that location. The portions of the float sidewalls thus depending below the flight 12 block floatage being carried along the flight from flowing or otherwise moving laterally, i.e. sideways, out from under the transport and hence "escaping" from under the flight. Instead, the depending float sidewalls channel the floatage to remain under the transport lower flight.

At the lower location 42, where the lower flight of the materials transport ends and the transport begins to move upward, the trapped floatage is no longer depressed further into the water, but rather is released and allowed to rise due to its buoyancy. As Fig. 1 indicates, much of the floatage enters the well at the opening 54 in front of the baffle. Other increments of floatage are carried aft with the water current as they rise, and enter the well through the baffle. The baffle thus provides the well with a large open bottom area through which floatage can enter the well, thereby increasing the proportion of floatage "trapped" by the conveyor which collects in the well. The opening 54, which can be considered part of the baffle, is made large enough to allow large pieces of solid floatage, typically wood, to enter the well. The floatage that enters the collecting well 18 rises to the top of the water in the well. As indicated above, water displaced by floatage entering the well passes out of it through the baffle 56.

The baffle suppresses turbulent water flow which might draw floatage out of the well. The illustrated baffle is a honeycomb grid of upstanding or on-edge strips. Other constructions and designs can be used for the baffle, the purpose of it being to allow floatage to enter the well and to allow water to flow into and out of the well 18, depending on the height of the column of collected floatage therein, and further to suppress water currents that would tend to draw collected floatage out of the well. By way of further example, the baffle can have strips such as those illustrated but extending only in the single direction transverse to the craft direction of travel, and other constructions will suggest themselves to those having conventional skill in the art. Further, the baffle openings can progressively decrease in size

along the span of the baffle aftward from the location 42. A baffle as illustrated in Figs. 1 and 2 preferably is constructed with openings of between two and eight inches along each side and with a baffle height between one and three times this dimension.

As noted above, the floatage, which the craft 10 of Figs. 1 and 2 can collect includes both solid and liquid materials, including oil, oil-sorbents, and a wide variety of other floating liquid and solid materials. The scraper 50 removes whatever floatage adheres or otherwise sticks to the belt transport 12 after it has passed upward from the lower roller 30 and before it passes around the drive roller 32. The material which the scraper thus removes from the transport remains collected in the well 18.

Fig. 3 is a view of a floatage recovery craft 60 similar to the view shown in Fig. 1 of the boat 10. In the craft 60, a belt transport 62 is trained on three rollers 64, 66 and 68 to provide a lower flight 70 similar to the flight 12 of Fig. 1. However, the roller 68 is located well above the lower roller 66 and the water line. This arrangement forms the entire front wall of the collecting well 72 with the transport length between rollers 66 and 68. Further, the craft 60 has a mid-ship structure 74 which forms a storage tank 75 for collected floatage. A pump 76 transfers floatage from the collection well 72 to the tank 75, by way of a pipe 78 which can pass by the belt transport 62 within one hull float 80, as indicated.

Fig. 4 shows another floatage recovering craft 82, in which a large drum 84, in conjunction with a forward roller 86, drives and positions a belt transport 88 to provide a moving and downwardly-inclined belt flight 90 which carries floatage to a collecting well 92. A stationary drum 94, typically containing fuel, ballast, or equipment for the craft 82, carries three rotatable wheel rollers 96, 98 and 100, that mount the transport-supporting drum 84 for rotation relative to the inner drum 94. One wheel roller is driven to drive the drum 84 and hence the transport 88. Another like set of three wheel rollers (not shown) is mounted on the stationary drum structure 94 and supports the drum 84 at a position axially-spaced from the set of wheel rollers 96, 98 and 100 shown. A storage tank 102 forward of the roller 84 and between the upper and lower flights of the belt transport 88 receives excess collected floatage from the well 92 by way of a pump 104.

The Fig. 4 craft 82 further has a platform 106 providing a continuous backup surface 106a for the belt transport plate 90 between the roller 86 and the drum 84. The surface 106a lies substantially along the construction line tangent to both the drum 84 and roller 86 lower surfaces. The cylindrical

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surface of the drum 84 and the planar surface 106a thus form a substantially continuous surface extending behind the full length of the belt transport engagement with floatage. Where this surface is impervious to the materials being recovered, the belt transport can have an open construction, rather than the continuous, substantially floatage impervious construction shown in Fig. 2.

Figs. 5A and 5B illustrate open constructions for the belt transport 88. In Fig. 5A, the belt transport 88' is perforated with holes 106. The sidewalls of the holes increase the engagement of the transport with some types of floatage, and hence enhance the movement of such floatage down the flight 90 (Fig. 4) to the collecting well 92.

Fig. 5B illustrates another form of open construction belt transport which may be used in practicing the invention. This belt transport 88" is constructed with two endless chains 108 and 110 at the peripheral edges of the transport and interconnected with paddle members 112, in a manner similar to the construction of a belt conveyor. This paddle construction for the belt transport 88" can be cleaned free of adhering floatage by means of a brush 114, shown in Fig. 4. Either a stationary brush or a rotating one, with the direction of rotation preferably being opposite to that of the drum 84, can be used. Such a brush can, of course, also be used to clean other types of belt transports as shown in Figs. 2 and 5A.

Further, the belt transport 88" is supported and driven on the roller 86 and drum 84 (Fig. 4) by means of sprocket wheels as shown in Fig. 5B mounted on the roller or drum, as the case may be. In fact, with this construction of the belt transport 88", the roller 86 can simply have the form of two rotatable sprocket wheels; no cylindrical surface is required. The term "roller" is used herein in a broad sense to include these and other rotatable belt-transport guides and driving wheel members.

Alternative to mounting the materials transport and collecting well on a boat or other craft as illustrated in the Figures, other structures can be used for deploying it. For example, a materials transport as described can be mounted by way of booms or other outrigging from a boat to provide the downwardly inclined lower flight described above in front of a floatage-collecting well.

Turning to Figures 6 and 7, they show a further floatage-collecting craft 110 according to the invention. As with the embodiments of Figures 1-4, the craft 110 has a forwardly-facing declining belt transport 112 that feeds floatage from the water surface 114 downward below the surface and discharges it for entry into a collection well 116. The lowest end of the transport 112

lower flight is spaced forward of, and at the same level as, a baffle 118 spanning across the bottom of the well to curtail currents from drawing floatage downward and out of the well.

The craft 110 has two features not shown in Figures 1-4. One is the provision of a bottom plate 120 spaced below the baffle 118, and the other is the provision of an overall funnel shape to the collection well 116.

The funnel-like geometry of the collection well channels the floatage in the well to a relatively small pocket 122 at the well top. A pumping system 124 draws the pumpable floatage out of the well at the pocket to storage tanks, typically located in the craft hull. This arrangement diminishes the likelihood that the pumping system will pick up water from the well, even in relatively rough waters. Correspondingly it diminishes the volume of floatage that must be in the well to preclude picking up water when pumping out the floatage.

More particularly, as seen in Figures 6 and 7, the horizontal cross-sectional area of the funnelling collection well 116 is smallest at the well top and largest at the well bottom. The horizontal cross-sectional area of the well preferably diminishes progressively with height at least along the upper portion of the well to form the funnelling construction. However, it is not necessary that the well sidewalls taper inwardly in a symmetrical fashion, for the funnel shape does not need to be symmetrical in order to realize the foregoing advantages.

With further reference to Figures 6 and 7, the bottom plate 120 is provided for the purpose of preventing turbulent and other currents which the baffle 118 may not suppress from interfering with the collection of floatage. Specifically, such currents can reduce the proportion of floatage that enters the well, and they can carry floatage out of the well through the baffle. Also, the baffle 118 and the bottom plate 120, which in effect is a further baffle diminish turbulence within the well with the result that a high degree of gravity separation between collected floatage and water takes place in the well.

The plate 120 can be either impervious to water, e.g. of sheet metal, or pervious so long as it blocks currents. The plate preferably spans the craft width between its twin hulls 126 and 128, and extends at least along the length of the well bottom. Further, it is considered preferable to extend the plate to the stern of the craft, as illustrated. It may be desirable to provide the plate 120 with a forward extension 120a in the manner shown in phantom in Figure 6.

The illustrated plate 120 is planar from the front of the well 116 to the craft stern, 130

and extends parallel to the water line 130 so as to be uniformly spaced below the flat bottom of the baffle 118. This construction provides a passage 132 between the plate and baffle of essentially uniform vertical cross section. Alternative constructions can however, be used. One alternative is to arrange the plate and the craft surface above it in a manner to diverge from each other along the craft length. This forms the passage 132 with progressively increasing height along the craft length and may enhance the entry of floatage into the well, rather than being carried all the way along the passage. The minimum spacing of the forward edge of the plate 120 below the transport and baffle is selected to allow at least substantially all floatage engaged below the transport to enter the passage 132. Generally the spacing is otherwise kept to a minimum and the plate at least is above the lower edge of the hulls 126 and 128. By way of illustrative guideline, the spacing typically is between four inches and twelve inches in a craft of up to the order of 40 feet in length. To recover and transport floatage of different kinds and under different weather and water conditions, it may be desirable to mount the plate 120 for selective movement, i.e. to raise or lower the plate, to draw it close to the baffle to effectively close the well bottom, and to change the angle of the plate relative to the craft 110.

The provision of the plate 120 further isolates the collection well 116 from currents that tend to interfere with the collection and retention of floatage. Specifically, the plate blocks currents directed sideways relative to the forward movement of the craft, such as can arise during manoeuvring. The plate also is effective against currents that arise from forward motion of the craft 110, and from rolling and pitching of the craft in heavy seas. It is particularly desirable to isolate the well from heavy seas in this manner because, in contrast to prior floatage recovery equipment, the present invention can be used in heavy seas. This is because the invention recovers floatage by first submerging it, and this substantially isolates the floatage being collected from surface waves.

WHAT WE CLAIM IS:—

1. A method for collecting floatage from a body of liquid, said method comprising the steps of submerging the floatage under a downwardly inclined conveyor having a forward end above the surface of said body of liquid and having a back end below said liquid surface and which advances from said forward end to said back end, thereby to draw floatage from the liquid surface downward under said conveyor toward said back end, releasing the submerged floatage from under said conveyor at said back end into

said liquid, and collecting said released floatage within an upwardly extending open-bottomed enclosure as the released floatage buoyantly rises.

2. A method as claimed in claim 1 comprising the further step of impeding the flow of currents of said liquid into said enclosure through said open bottom.

3. A method as claimed in claim 1 comprising the further steps of baffling said open bottom to impede the flow of currents of said liquid therethrough, and isolating said enclosure bottom from currents of said liquid that are directed horizontally and transversely to the direction of advance of the conveyor.

4. Apparatus for collecting floatage from a body of liquid comprising a downwardly inclined conveyor having a forward end adapted to be disposed above the surface of said liquid and a back end adapted to be disposed below said liquid surface, means for advancing said conveyor from the forward end to the back end whereby to draw floatage from the liquid surface downward under said conveyor toward said back end, and an open-bottomed upwardly-extending enclosure positioned to receive and collect buoyantly-rising floatage released from under the back end of the conveyor into the liquid.

5. Apparatus as claimed in claim 4, wherein the conveyor is disposed between guide walls adapted to retain the floatage under the conveyor.

6. Apparatus as claimed in claim 5, wherein the floatage-drawing part of the conveyor is inclined to the horizontal at between ten degrees and thirty-five degrees.

7. Apparatus as claimed in claim 5 or 6, wherein a part of the conveyor extends upwards and forms a wall of the enclosure.

8. Apparatus as claimed in claim 5, 6 or 7, wherein an upwardly-extended return part of the conveyor is provided with a cleaning device within the enclosure.

9. Apparatus as claimed in any of claims 5 to 8, wherein a return part of the conveyor in operation is disposed above the liquid surface.

10. Apparatus as claimed in any of claims 4 to 9, in which the open bottom of the enclosure is provided with a floatage-passing baffle for impeding turbulent flow of liquid therethrough.

11. Apparatus as claimed in claim 10 when dependent from claim 5, wherein said baffle has a lower substantially horizontal face disposed at the level of the back end of the conveyor.

12. Apparatus as claimed in any of claims 4 to 11, wherein said enclosure has a funnel like configuration with the smallest horizontal cross-sectional area thereof being at the top thereof.

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and extends parallel to the water line 130 so as to be uniformly spaced below the flat bottom of the baffle 118. This construction provides a passage 132 between the plate and baffle of essentially uniform vertical cross section. Alternative constructions can however, be used. One alternative is to arrange the plate and the craft surface above it in a manner to diverge from each other along the craft length. This forms the passage 132 with progressively increasing height along the craft length and may enhance the entry of floatage into the well, rather than being carried all the way along the passage. The minimum spacing of the forward edge of the plate 120 below the transport and baffle is selected to allow at least substantially all floatage engaged below the transport to enter the passage 132. Generally the spacing is otherwise kept to a minimum and the plate at least is above the lower edge of the hulls 126 and 128. By way of illustrative guideline, the spacing typically is between four inches and twelve inches in a craft of up to the order of 40 feet in length. To recover and transport floatage of different kinds and under different weather and water conditions, it may be desirable to mount the plate 120 for selective movement, i.e. to raise or lower the plate, to draw it close to the baffle to effectively close the well bottom, and to change the angle of the plate relative to the craft 110.

The provision of the plate 120 further isolates the collection well 116 from currents that tend to interfere with the collection and retention of floatage. Specifically, the plate blocks currents directed sideways relative to the forward movement of the craft, such as can arise during manoeuvring. The plate also is effective against currents that arise from forward motion of the craft 110, and from rolling and pitching of the craft in heavy seas. It is particularly desirable to isolate the well from heavy seas in this manner because, in contrast to prior floatage recovery equipment, the present invention can be used in heavy seas. This is because the invention recovers floatage by first submerging it, and this substantially isolates the floatage being collected from surface waves.

WHAT WE CLAIM IS:—

1. A method for collecting floatage from a body of liquid, said method comprising the steps of submerging the floatage under a downwardly inclined conveyor having a forward end above the surface of said body of liquid and having a back end below said liquid surface and which advances from said forward end to said back end, thereby to draw floatage from the liquid surface downward under said conveyor toward said back end, releasing the submerged floatage from under said conveyor at said back end into

said liquid, and collecting said released floatage within an upwardly extending open-bottomed enclosure as the released floatage buoyantly rises.

2. A method as claimed in claim 1 comprising the further step of impeding the flow of currents of said liquid into said enclosure through said open bottom.

3. A method as claimed in claim 1 comprising the further steps of baffling said open bottom to impede the flow of currents of said liquid therethrough, and isolating said enclosure bottom from currents of said liquid that are directed horizontally and transversely to the direction of advance of the conveyor.

4. Apparatus for collecting floatage from a body of liquid comprising a downwardly inclined conveyor having a forward end adapted to be disposed above the surface of said liquid and a back end adapted to be disposed below said liquid surface, means for advancing said conveyor from the forward end to the back end whereby to draw floatage from the liquid surface downward under said conveyor toward said back end, and an open-bottomed upwardly-extending enclosure positioned to receive and collect buoyantly-rising floatage released from under the back end of the conveyor into the liquid.

5. Apparatus as claimed in claim 4, wherein the conveyor is disposed between guide walls adapted to retain the floatage under the conveyor.

6. Apparatus as claimed in claim 5, wherein the floatage-drawing part of the conveyor is inclined to the horizontal at between ten degrees and thirty-five degrees.

7. Apparatus as claimed in claim 5 or 6, wherein a part of the conveyor extends upwards and forms a wall of the enclosure.

8. Apparatus as claimed in claim 5, 6 or 7, wherein an upwardly-extended return part of the conveyor is provided with a cleaning device within the enclosure.

9. Apparatus as claimed in any of claims 5 to 8, wherein a return part of the conveyor in operation is disposed above the liquid surface.

10. Apparatus as claimed in any of claims 4 to 9, in which the open bottom of the enclosure is provided with a floatage-passing baffle for impeding turbulent flow of liquid therethrough.

11. Apparatus as claimed in claim 10 when dependent from claim 5, wherein said baffle has a lower substantially horizontal face disposed at the level of the back end of the conveyor.

12. Apparatus as claimed in any of claims 4 to 11, wherein said enclosure has a funnel like configuration with the smallest horizontal cross-sectional area thereof being at the top thereof.



13. Apparatus as claimed in any of claims 4 to 12, further comprising pump means communicating with said enclosure for pumping at least flowable floatage out from the enclosure from adjacent the upper surface of liquid therein.
14. Apparatus as claimed in any of claims 4 to 13, further comprising a flow blocking member disposed below and spanning at least across the open bottom of the enclosure, the member being positioned to permit floatage to pass thereabove and to shield said open bottom from currents in the body of the liquid.
15. Apparatus as claimed in claim 14, wherein said flow blocking member is disposed below the level of the back end of the conveyor.
16. Apparatus as claimed in any of claims 4 to 15, wherein enclosure forming walls that extend transverse to the direction of movement of the conveyor do not extend lower than the back end of the conveyor.
17. Apparatus as claimed in claim 5, wherein the conveyor comprises an endless belt which is substantially impervious to the floatage.
18. Apparatus as claimed in claim 5, wherein the conveyor comprises a belt having apertures therein, and a backing surface which is impervious to the floatage and across which the belt moves.
19. Apparatus as claimed in any of claims 4 to 18, when mounted on means for advancing the apparatus through the liquid with the forward end of the conveyor leading.
20. Apparatus for removing floatage from a body of liquid substantially as any one of the embodiments hereinbefore described with reference to, and as shown in, the accompanying drawings.
21. A method for collecting floatage from a body of liquid substantially as hereinbefore described with reference to the accompanying drawings.

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