United States Patent

Tillett et al.

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[54] **SHROUDED DRUM SKIMMER**

[72] Inventors: **Thomas J. Tillett,** Ambler; **Barry Straus,** Lansdale, both of Pa.

[73] Assignee: **FMC Corporation,** San Jose, Calif.

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[52] **U.S. Cl.**.....**210/519,** 210/523, 210/DIG. 21

[51] **Int. Cl.**.....**E02b 15/04,** B01d 21/18

[58] **Field of Search**.....210/396, 319, 520, 523, DIG. 21

[56] **References Cited**

UNITED STATES PATENTS

3,429,446	2/1969	Vorderbrugge	210/396
3,536,199	10/1970	Cornelius	210/DIG. 21
1,860,819	3/1932	Schambeager	210/DIG. 21
3,358,838	12/1967	Kosar et al.	210/DIG. 21

Primary Examiner—John Adee

Attorney—F. W. Anderson and C. E. Tripp

[57] **ABSTRACT**

A drum-type skimmer for separating a surface layer of material from a body of liquid comprising a rotating drum disposed for partial submersion within the liquid and a shroud with a depending baffle positioned radially from and adjacent to the lower portion of the drum to improve the skimming action between the drum and the material to be skimmed.

2 Claims, 2 Drawing Figures

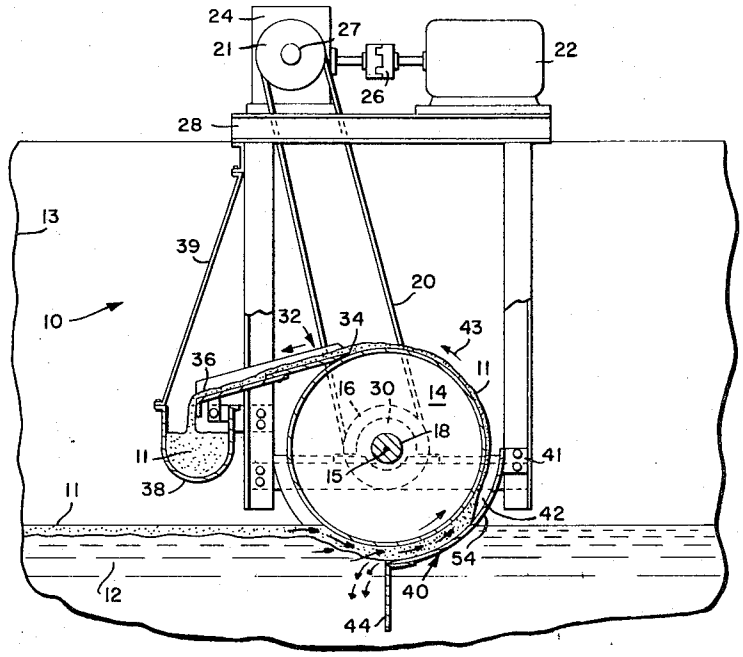
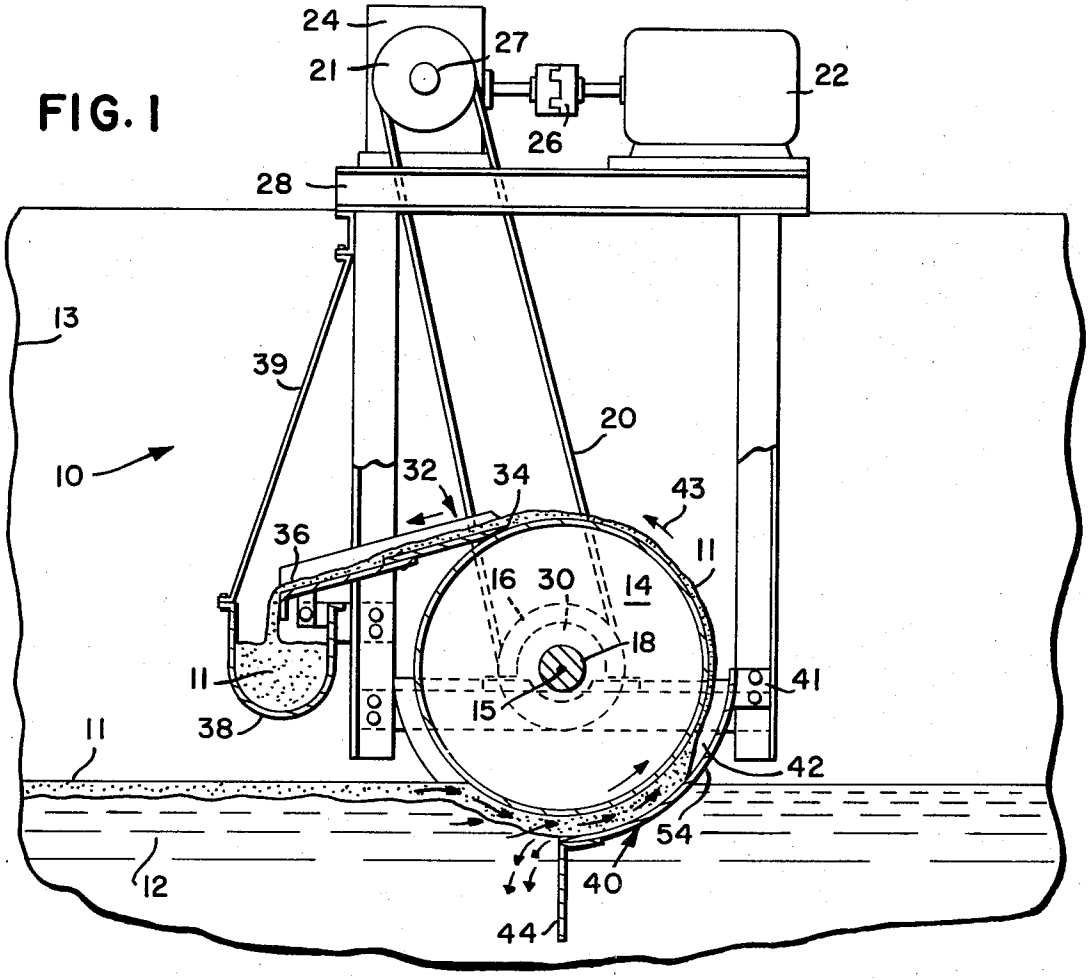


FIG. 1



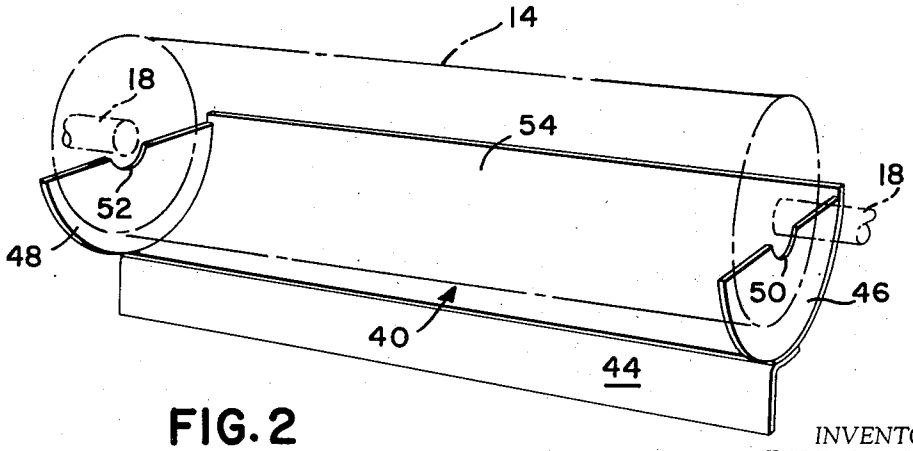


FIG. 2

INVENTORS
THOMAS J. TILLETT
BARRY STRAUS

BY F. W. Anderson
C. E. Tripp

ATTORNEYS

SHROUDED DRUM SKIMMER

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for separating a surface layer material from a liquid. For example, the apparatus may be employed for separating liquids of different polar characteristics, such as for removing oil substances from the top surface of water or the like in waste disposal plants.

More particularly, the apparatus relates to a rotatable drum skimmer adapted to pick up a liquid of a first polar characteristic, such as oil, floating over a second liquid of a second polar characteristic, such as water. Heretofore, there have been various apparatus for skimming utilizing rotating drums for separating oil from another liquid in which the cohesive characteristics between the oil and the drum surface in relation to the cohesive characteristics of the drum surface and a second liquid over which the oil appears are employed. Available structures frequently call for a drum submerged within the mixture beneath the lower level of the oil. The outer surface of the drum is selected to cohere to the oil. Thus, as the drum is rotated, the oil is raised with the drum surface and separated from the other liquid. An oil scrapper blade or other means is positioned above the surface level to remove the oil from the drum surface. The removed oil is then collected in separate container means, such as drums or the like. Prior art structures utilizing these or similar concepts are illustrated and described in U.S. Pat. No. 1,860,819; U.S. Pat. No. 3,358,838 and U.S. Pat. No. 3,259,245.

SUMMARY OF THE INVENTION

The present invention relates to a drum-type skimmer for separating substances of different polar characteristics with greater efficiency. Toward this end, a shroud is disposed radially from the lower portion of a submerged drum so as to increase the cohesive action between the substance to be removed and the surface of the partially submerged drum.

In an exemplary embodiment of the present invention, an arcuate shroud defining approximately a ninety degree arc is secured radially from and adjacent to the lower portion of the peripheral surface of the drum. The shroud is positioned so as to be disposed below the liquid level and to extend above the liquid level. The radial spacing between the shroud and the outer surface of the drum is selected for an effective cohesive action between the liquid to be skimmed and the outer surface of the drum. By means of the shroud, an improved cohesive action is built up between the drum surface and the substance to be skimmed by means of the drum surface.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, diagrammatic side elevational view, partially in section of a sewage disposal plant skimmer apparatus embodying the present invention.

FIG. 2 is a perspective view of a shroud — baffle assembly for the skimmer apparatus shown in FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

Illustrated in FIG. 1 is a drum-type skimming apparatus **10** embodying the present invention. The apparatus **10** is adapted for use in a waste disposal facility for removing hydrophobic substances, such as oil **11**, from water **12** or other liquid material having polar characteristics differing from that of the oil. The apparatus **10** is supported within a large vat **13** containing waste and comprises a drum **14** rotatable about a central axis **15**. The drum **14** is suitably driven by a drive means that includes a driven pulley **16** fixed to a drive shaft **18**. An endless belt **20** is trained around the pulley **16** and is also trained around a pulley **21**. A drive assembly including a drive motor **22** is coupled to a speed reducer **24** through a coupler **26**, which speed reducer **24** rotates a shaft **27** to impart rotation to the driver pulley **21**. The motor **22** and speed reducer **24** are supported upon a support assembly **28** which also supports the shaft **18** for rotation at a bearing block **30**.

Adjacent the upper portion of the drum **14** is an oil scraper assembly **32** for removing oil from the surface of the exposed surface of the drum **14** before the exposed surface of the drum is again submerged in the liquid. The scraper assembly **32** has an edge **34** for abutting the outer peripheral surface of the drum **14**. The scraper **32** forms a trough **36** extending from the edge **34** to an oil conduit **38** or other oil container means. The oil conduit **38** is secured in place to the support assembly **28** by an angle arm **39** and is adapted to provide a channel for the removed oil to an exterior collector, such as oil drums or the like.

The drum **14** in FIGS. **1** and **2** may be viewed as comprising four quadrants. Adjacent to and spaced from the lower portion of the outer periphery of the drum within the fourth quadrant is an arcuate shroud **40** having a longitudinal center line coincident with the axis of the shaft **18** and the axis **15**. The shroud **40** is fixed by a clamp **41** to the support structure **28** and is positioned radially from the surface of the drum **14** within the fourth quadrant to establish a uniform spacing **42** intermediate the outer surface of the drum **14** and the inner surface of the shroud **40** adjacent to the drum **14** on the upward path of the drum beneath the liquid level. The drum **14** rotates in the direction of the arrow **43** (FIG. **1**) and defines an arcuate surface of ninety degrees in the exemplary embodiment. The spacing **42** extends from the lowest point of the drum **14** within the vat **13** to a point above the surface level of the sewage. At the submerged end of the shroud **40** is a baffle **44** extending laterally from the substantially normal to the end of the shroud **40** or radial from the drum **14**. The baffle **44** extends the full longitudinal length of the shroud **42** and serves as a header decreasing the velocity of the liquid relative to that of the drum **14**.

The shroud **40** comprises a pair of semicylindrical laterally extending end plates or discs which are disposed to have a center line coincident with the axis of the shaft **18**. The end discs **46** and **48** are formed with end journaling members **50** and **52**, respectively, adapted to receive the ends of the shaft **18**. Intermediate the end plates **46** and **48** is an arcuate member **54** of substantially one-fourth of a cylinder centrally aligned with the end plates and extending over approximately one-half of the outer edge of the end plates **46** and **48**.

In operation, it has been found that the shroud **40** tends to create an effective layer build-up of the oil **11** against the drum **14** peripheral surface. The oil tends to adhere to the drum surface on the up-swing path of the drum, whereas with prior art structures the oil has been found to lose contact on the up-swing portion of travel. It appears that the shroud precludes the drum from being wetted by the water once the drum passes below the oil strata level in the tank and an oil film is maintained at all times until removed by the scraper blade **34**. Consequently, more oil **11** is delivered to the scraper assembly **32** and the overall oil pumping efficiency is improved.

What I claim is:

1. Apparatus for separating from a liquid substances of differing polar characteristics comprising, in combination; a drum rotatable about an axis of rotation, said drum being partially submerged within the liquid with a portion thereof disposed above the surface level of the liquid; a fixed positioned shroud disposed adjacent to and radially from a portion of the peripheral surface of the drum and spaced therefrom to form a confined passageway between the drum and the shroud, the passageway beginning at a first end of said shroud beneath the surface level of the liquid and ending at a second end of said shroud above the surface level of the liquid, said drum being rotatable in a direction to sweep from said first end of said shroud toward the second end of said shroud, said shroud extending longitudinally relative to said drum and having a central axis disposed parallel with the axis of rotation for said drum, said shroud being symmetrical about its centerline and forming an arcuate member positioned adjacent to the peripheral surface of said drum, whereby the upward path of travel of said drum below the level of the liquid sweeps past said shroud, said shroud further including confronting semi-cylindrical end plates at the opposite ends of said arcuate member, said arcuate member defining an arcuate surface of ninety degrees; and a baffle member extending laterally from said shroud adjacent to the first end thereof, said baffle member extending substantially the full longitudinal length of said shroud, said baffle member further extending from said shroud member in a direction radially away from said drum.

2. Apparatus for skimming off a layer of material such as oil or the like floating on the surface of a heavier body of liquid such as water, said apparatus being of the type comprising a rotating drum partially immersed in the liquid with means above the surface of the liquid for scraping off floating material picked up by the drum; the improvement comprising a shroud fixed adjacent to a portion of the peripheral surface of the drum, said shroud including an arcuate member that is radially spaced from but adjacent to the periphery of the drum to form a confined passageway between the drum and the arcuate member, said arcuate member extending longitudinally of the drum with its central axis parallel to the axis of drum rotation, said arcuate member defining an arcuate surface having an extent of not substantially less than ninety degrees, said arcuate member having a lower end positioned beneath the surface of the liquid and having an upper end positioned above the surface level of the liquid, said confined passageway beginning at the lower end of said arcuate member and ending at the upper end thereof, means for rotating said drum in a direction to sweep said separated material upwardly from the lower end of said arcuate member toward the upper end thereof and through said confined passageway, said drum carrying said separated material above the surface level of the liquid, said shroud including confronting end plates at the opposite ends of said arcuate member which end plates encompass the lower portions of the ends of said drum, said shroud including a baffle member extending substantially the full length of said arcuate member and projecting from adjacent said lower end of the arcuate member in a direction radially away from the drum.

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