United States Patent [19]

Peterson

[11] **3,741,399**

[45] **June 26, 1973**

[54] **SKIMMER MECHANISM FOR A WASTE FLOTATION CELL**

[75] Inventor: **Ronald L. Peterson,** Richmond, Va.

[73] Assignee: **Westinghouse Electric Corporation,** Pittsburgh, Pa.

[22] Filed: **Mar. 19, 1971**

[21] Appl. No.: **126,190**

[52] **U.S. Cl.** **210/525,** 210/528

[51] **Int. Cl.** **B01d 21/06**

[58] **Field of Search** 210/528, 525

[56] **References Cited**

UNITED STATES PATENTS

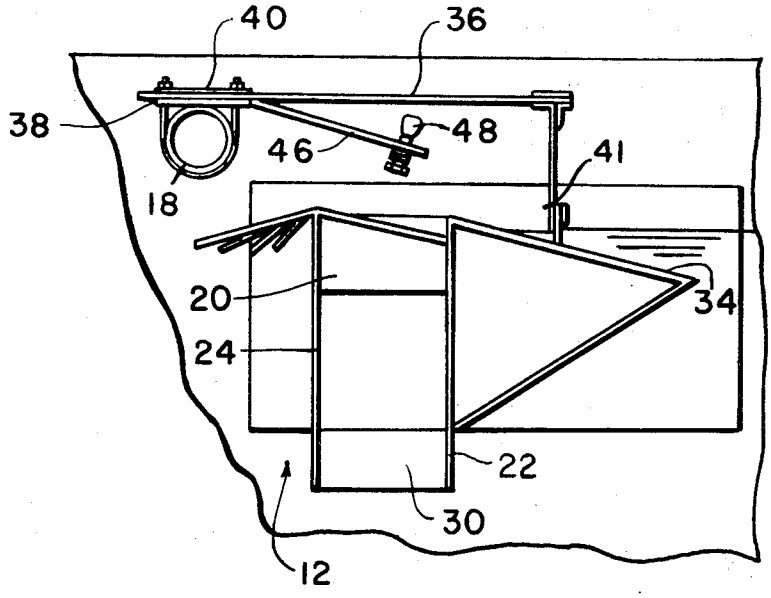
3,465,887 9/1969 Cookney 210/525

Primary Examiner—Samih N. Zaharna
Assistant Examiner—F. F. Calvetti
Attorney—A. T. Stratton, Z. L. Dermer and M. B. L. Hepps

[57] **ABSTRACT**

A skimmer blade is utilized to gather scum from the surface of a tank and convey same up a ramp into a collection trough. The blade is preferably mounted on two flexible members attached to a driven support arm for this purpose. The flexibility, length and cross-section of the blade supporting members can be chosen for proper depth of entry into the floating material and proper contact with the ramp.

5 Claims, 3 Drawing Figures



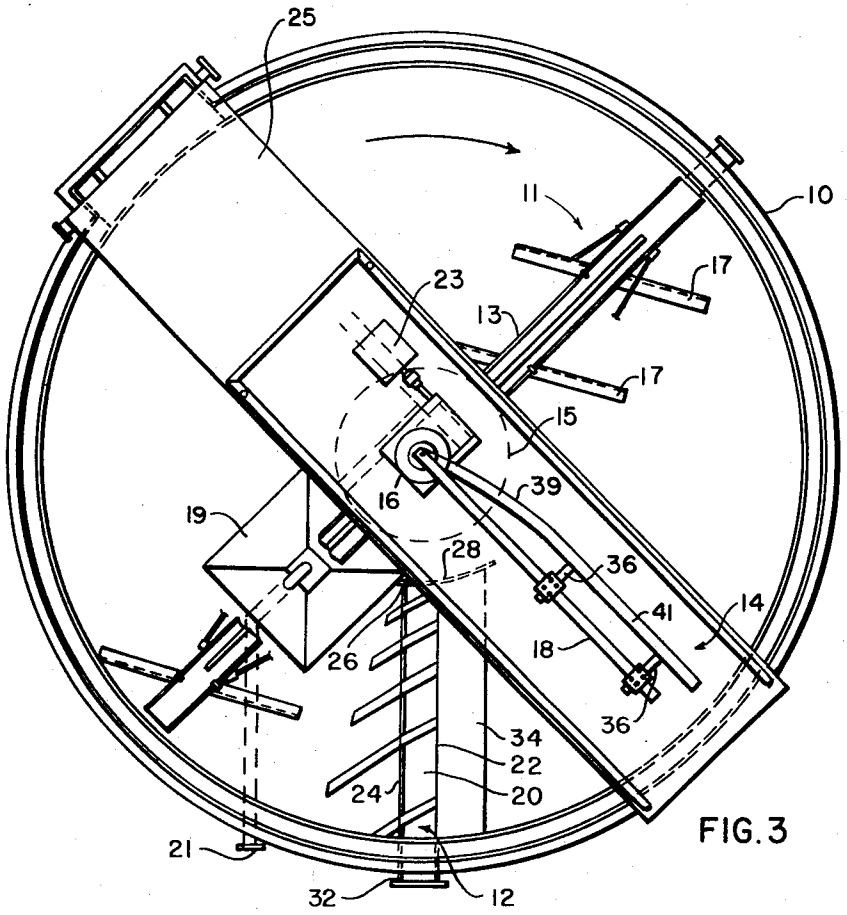


FIG. 3

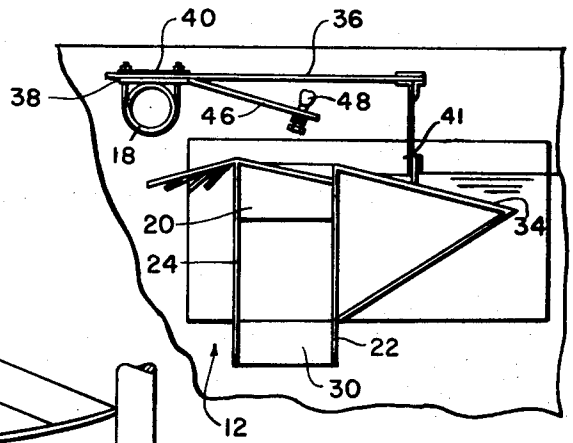


FIG. 2

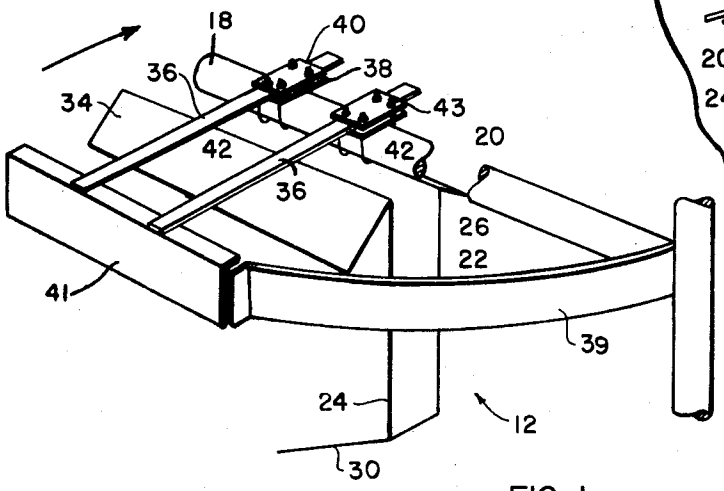


FIG. 1

SKIMMER MECHANISM FOR A WASTE FLOTATION CELL

BACKGROUND OF THE INVENTION

This invention pertains to mechanisms for removing floating particles from the surface of a tank and more particularly to mechanisms which accomplish same by skimming the particles into a collection location.

Processes such as water clarification or sewage flotation used for treatment of domestic or industrial waste require a mechanism to remove floating material from the surface of the treatment tank. In round tanks, this is usually done by a skimmer mechanism consisting of a vertical centrally mounted shaft connected to a horizontal arm on which are mounted skimmer blades. As the vertical shaft rotates, the skimmer blades move around the surface of the tank collecting floating material. The blades then pull the collected material up a ramp into a collection trough.

The skimmer blade assembly must accordingly be designed for proper depth of entry into the floating material and for proper contact with the ramp as the skimmer blade is moved up the ramp and over the trough. Heretofore, this has been accomplished by an assembly including multiple hinges or a hinge and roller mechanism for the supporting arms of the skimmer blade. Because of the geometry of round tanks and the requirement for moving the skimmer blade up and across a trough, the skimmer mechanism must be designed to provide freedom of movement in at least two mutually perpendicular planes, that is, the skimmer blade mounting member must be so constructed as to allow the skimmer blade to be moved vertically upward and downward as the blade traverses the ramp and trough arrangement. Also, inasmuch as forces on the skimmer blade cause same to twist or rotate while moving up the ramp, the mounting member must also be capable of permitting and controlling this motion.

SUMMARY OF THE INVENTION

The relatively complex skimmer support structure generally utilized to permit the required freedom of movement can be simplified in accordance with this invention by the provision of flexible support members.

The movement of the skimmer blade up the ramp and over the skum through can be readily accomplished by the provision of one or more flexible members attaching the skimmer blade to the support arm connected to a driven central shaft which moves the skimmer blade around the flotation tank. By varying the length and cross section of these members, as well as the proper choice of flexibility of the material from which the support members are made and the weight of the skimmer blade, the depth of penetration of the blade into the frothy foam formed on the top of the flotation cell as well as the desired contact with the up ramp of the scum trough can readily be controlled. The flexible support members will allow the skimmer blade to sag down under its own weight into the floating material. While moving up the ramp, these members will flex upwardly allowing the blade to closely contact the ramp throughout its travel. Bars may be provided across the trough and down the return side to support the skimmer as it moves across the rough and to allow the skimmer blade to move smoothly down into the floating material to resume its collection run.

The connection of the flexible support members to the driven support arm can be made adjustable so that the length of the flexible support members can be varied to vary the depth of sag and the freedom of upward and twisting motion of the skimmer blade. Such an adjustment may be desirable, as for example, where the froath is thicker than usual for a period of time.

DESCRIPTION OF THE DRAWINGS

A better understanding of the invention may be had with reference to the accompanying illustrative embodiment of the invention, in which:

FIG. 1 shows an isometric view of the skimmer mechanism in accordance with this invention;

FIG. 2 shows a side view of same; and

FIG. 3 is a plan view of a treatment tank utilizing the skimmer mechanism of FIGS. 1 and 2.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIG. 3, there can be seen a tank **10** including a scum trough **12** and a skimmer mechanism **14**. The tank **10** may include apparatus, for example, for producing a flotation of particles which are carried in a liquid medium. As is well known in the art, minute gas bubbles can be produced proximate the bottom of tank **10** which will attach themselves to the particles in the liquid medium and cause these particles to find their way to the surface of tank **10** in the form of a frothy foam. The bubbles may be produced within a well **15** at the bottom of the tank **10**. The tank **10** depicted includes a scrapper assembly **11** comprising a driven support arm **13** and a plurality of scrapper blades **17**. Any particles which settle to the bottom of the tank **10** are moved inwardly by the blades **17** to a collection drain **19**. The particles are conveyed from the drain **19** through an outlet pipe **21**. The arm **13** is connected to a vertical central shaft **16** driven by a motor **23** mounted on a walkway **25**.

In the embodiment shown, i.e., round tank, the skimmer mechanism **14** for floating particles, may also be mounted on the shaft **16**. A support arm **18** is mounted on the driven central shaft **16** and extends outwardly therefrom and over the scum trough **12**.

The scum trough **12** consists of an open chamber **20** having vertically mounted side walls **22** and **24**, a front wall **26**, which is preferably a portion of a circular wall **28** which partially surrounds the central shaft **16**, and a downward sloping bottom wall **30**. The downward sloping bottom wall **30** causes the particles which settle in the scum trough **12** to migrate towards an outlet line **32**. The scum trough **12** further includes an up ramp **34** along which the froth containing particles can be conveyed from the top of the tank **10** into the scum trough **12**, and cross-members **36** which act to direct a skimmer blade **41** into the foam on the far side of the scum trough **12**. The cross-members **36** preferably has its near end attached to the wall **22** of the trough **12** slightly below the top of the up ramp **34** so that any particles adhering to the blade **41** are shaken free.

In accordance with this invention, the skimmer blade **34** is connected to the support arm **18** by means of one or more flexible members **36**, the flexible members **36** may be suitably attached to the skimmer blade as by welding or bolting. At the end of the flexible members **36** opposite the skimmer blade, the attachment to the support arm **18** is preferably made adjustable so that the length and therefore the depth of entry of the skim-

mer blade into the frothy foam can be adjusted. A suitable means for providing adjustability in the length of the flexible support arms **36** with relation to the support arm **18** may comprise two plates **38** and **40** between which a portion of the flexible members **36** is sandwiched. These plates may have aligned openings **37** through which U-shaped members **42** can protrude, which members **42** are threaded on their outward ends to receive nuts **42.** The nuts **42** can be tightened on the U-shaped members **42** so as to closely support the flexible members **36.** Loosening of the nuts **42** accordingly allows for the length of the flexible members to be adjusted by means of sliding translational movement between the plates **38** and **40.**

A feed-blade **39** can also be mounted on the driven shaft **16** to move the particle filled foam to the outside of the tank **10** and into the path of the skimmer blade **41.**

Accordingly, it can be seen that by proper choice of the material of the flexible members **36,** by an adjustment of their length with respect to the support arm **18,** and by a proper choice of their cross-section, the degree to which the skimmer blade **41** protrudes into the frothy foam can be adjusted, and the skimmer blade **41** is provided with a simple means by which it can move vertically up the ramp **34** while twisting slightly during its travel thereon.

Means such as a plurality of bolt holes (not shown) may further be provided, for example, on the surface of the skimmer blade **41** or on the end of the flexible members **36,** to receive weighted bolts which may act to further adjust the degree of penetration of the skimmer blade **41** into the frothy foam. Moreover, relatively non-flexible arms **46** provided with stops **48** (see FIG. **2**) can be affixed to the support arm **18** to restrict the degree of penetration of the skimmer blade **41** into the foam by restricting the sag of the flexible members **36** where desired. In any case, an inexpensive, highly controllable skimmer support mechanism is provided for removing separated particles from the surface of the tank **10.**

Therefore, I claim:

1. A skimmer mechanism for conveying a particle filled foam up a ramp into a scum trough comprising, in combination, a vertically oriented skimmer blade supportedly suspended with a degree of penetration into the foam on the top of a tank, a driven member, at least one generally horizontally oriented flexible member flexible solely in the vertical direction and affixed at one end to the driven member and at the other end to the skimmer blade, said flexible member providing the only means for vertical movement of the blade and being formed of a predetermined material, length, and cross-section so as to provide for a predetermined depth of penetration into the foam and vertical movement and twisting for conveying same up the ramp of the scum trough.

2. The mechanism of claim **1** including means for affixing the flexible members to the driven member, said means being adjustable such that the length of the flexible members between the skimmer blade and the driven member can be varied.

3. The mechanism of claim **2** including at least two flexible members supporting the skimmer blade, said flexible members being the only means for providing the aforedescribed vertical motion.

4. The mechanism of claim **1** including a curved blade supported on the driven member in the plane of the skimmer blade for conveying foam into the path of the skimmer blade.

5. The mechanism of claim **1** including stop means vertically spaced from said flexible member to limit vertical flexure thereof.

* * * * *