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Weiss et al.

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[54] POWER-OPERATED EXTENSIBLE SKIMMING BLADE

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[52] **U.S. Cl.** **210/527**

[51] **Int. Cl.** **B01d 21/04**

[58] **Field of Search** 210/525, 527

[56] **References Cited**

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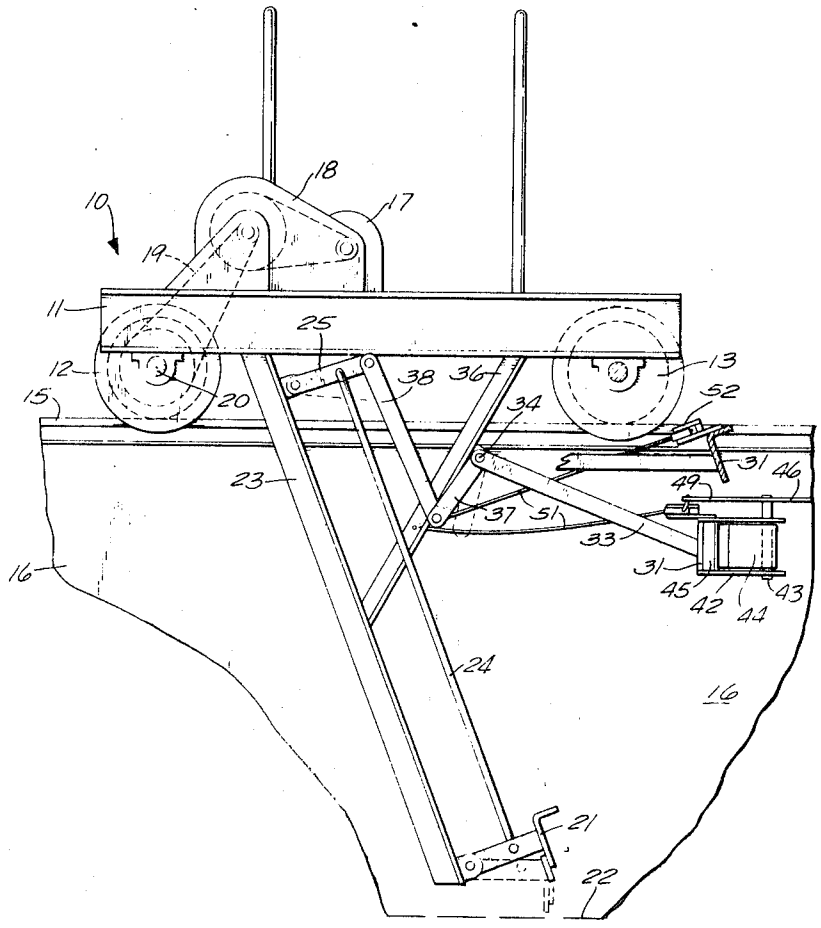
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[57] **ABSTRACT**

A reciprocating bridge with scraper and skimmer blades operates in a tank requiring skimming to the uneven sidewalls of the tank. Each end of the scraper is provided with a pivoted blade which is retracted when the blade is elevated. The blade is extended by a spring when the blade is lowered and the spring holds the blade against the sidewall of the tank at all times but with no unrequired force.

4 Claims, 3 Drawing Figures



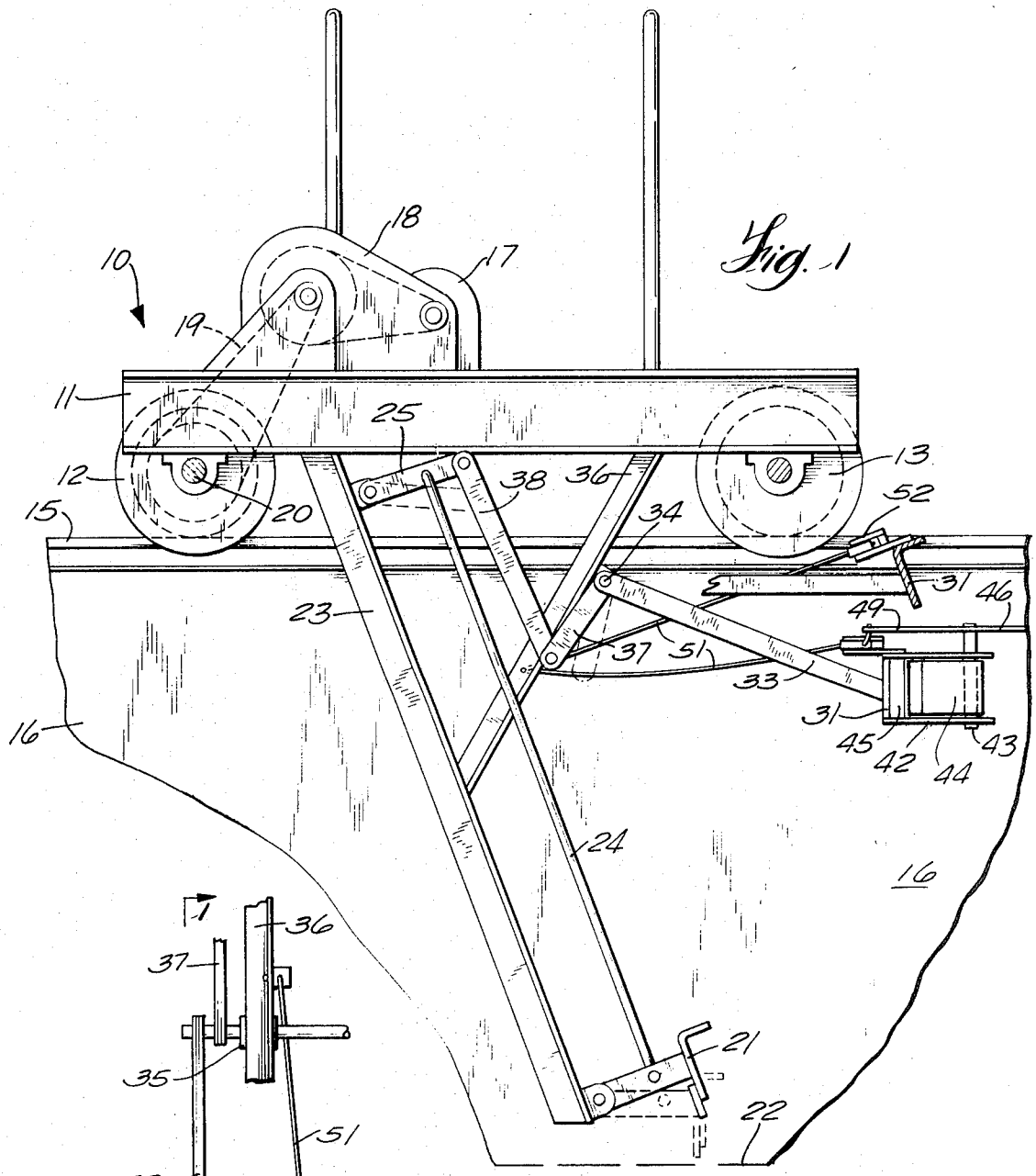


Fig. 1

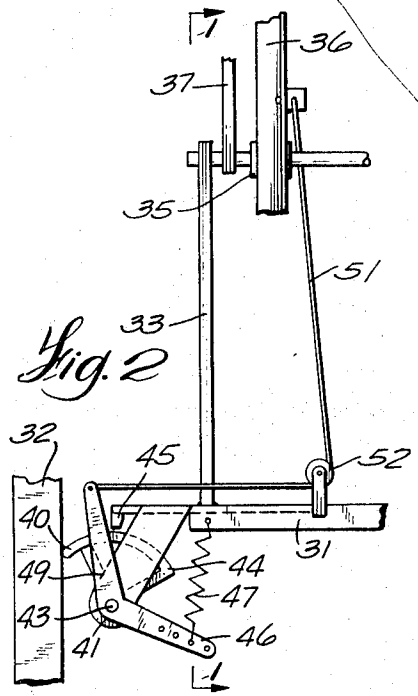


Fig. 2

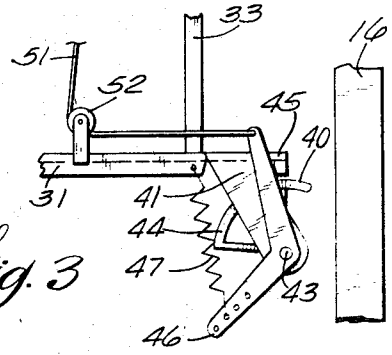


Fig. 3

POWER-OPERATED EXTENSIBLE SKIMMING BLADE

BACKGROUND OF THE INVENTION

Skimmer blades which are carried by and between chains have been fitted at their ends with wipers which rub the sidewalls of the separation tank. Such wipers wear out rapidly and require regular maintenance. They require only some resilient means to hold them outwardly and do not require retraction because they move with the chains in the same relative direction at all times. A reciprocating bridge carrying a single skimming blade is most often used with large rectangular tanks of concrete construction very often having sidewalls which are only roughly, or approximately, straight.

Such a bridge lifts the skimming blade at the end of the skimming run and for the return run may have to clear some projections such as some structural parts of the tank.

SUMMARY OF THE INVENTION

The extension at each end of a skimming blade is pivoted on a vertical axis ahead of the extremity of the blade. A part of the blade adjoins a cylindrical part of the extension to form a seal. A spring and cable are connected to the extension and the carriage so that the raising and lowering of the skimmer blade respectively retracts and extends the scraper blades.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows in side elevation and partially in section, a travelling bridge and the lower structure which carries a scraper blade in the raised position. The end view of the skimming blade in the lower position is shown and a section of the blade is shown also in the upper position. This additional upper position is taken approximately on Section 1—1 of FIG. 2.

FIG. 2 is a plan view of the end of the skimming blade and includes part of the supporting structure.

FIG. 3 is a plan view of the other end of the skimming blade in the elevated position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The bridge **10** includes the frame **11** having wheels at each end which roll on parallel rails fixed to and extend along the top of each side of the rectangular tank. The flanged wheels **12** and **13** supporting one end of the bridge and the one rail **15** fixed to the top of the wall **16** forming one side of the tank are shown in FIG. 1. Wheel **12** and the corresponding other wheel at the other end of the bridge are driven by the motor **17** through the reduction gear unit **18** and chain drive **19** which turns shaft **20** on which the wheels are mounted. In the forward direction of travel which is to the left as shown, the sludge scraper **21** is in the lower position shown in broken lines to move the settled material over the floor **22** of the tank toward a collecting hopper, not shown. Scraper **21** is pivotally carried at the lower end of the frame **23** extending downwardly from bridge **10** and is connected by rod **24** to the control lever **25** which also operates the skimmer blade **31**.

Blade **31** extends between the sidewalls **32** and **16** of the tank, respectively shown in FIGS. 2 and 3 and is carried by the arms **33** to which the blade is attached.

Arms **33** are fixed to shaft **34** which is pivotally supported by spaced bearings including the bearing **35** carried by brace **36**. The lever **37** extending from shaft **34** is adjustably connected by link **38** with lever **25** so that when the sludge scraper **21** is in the lower position, the skimming blade **31** is supported above the water level of the tank.

As bridge **10** reaches one end of the tank, its travel reverses and the bridge then moves in the return, or skimming direction. During such reversal, power-operated means, not shown, lifts sludge scraper **21** to its upper position and lowers the skimming blade **31** by rotating shaft **34**.

According to the present invention, each end of the skimming blade is provided with an assembly including an extensible scraper blade **40** which forms an extension of the skimming blade to scrape the sidewalls of the tank. Each assembly is identical except that they are right and left handed and the same reference numbers are applied to the same parts.

The upper and lower brackets **41** and **42** are secured to the upper and lower edges of the blade **31** and extend forwardly thereof to carry the vertical shaft **43**. Scraper blade **40** extends from the member **44** mounted on shaft **43** between brackets **41**. Member **44** and the blade **40** together form a cylindrical surface which maintains a nominal clearance with the block **45** fixed to the end of blade **31**. This clearance amounts to seal in that the oil being pushed by the skimmer blade cannot pass therethrough because of its relatively high viscosity.

The operating levers fixed to the upper end of shaft **43** include the forward spring lever **46** which is connected by the spring **47** to the blade **31**. A series of holes in lever **46** allows for the selective adjustment of the spring.

The other operating lever **49** fixed to the upper end of shaft **43** extends over skimming blade **31** and is operated by the cable **51**. Cable **51** operates over the pulley **52** carried by blade **31** and has its ends connected to lever **49** and to brace **36** at a location below shaft **34** and bearing **35**.

The arrangement of the cable is such that when skimming blade **31** is in its upper position, the cable is in tension and its length is such that spring **47** is expanded and the member **44** is rotated away from the adjacent wall and a substantial clearance is provided between blade **40** and the wall. This clearance allows the blade to pass structural members which may be bolted to the wall of the tank above the water level.

When the bridge approaches the one end of the tank previously referred to, skimming blade **31** is lowered and the effective length of cable **51** is increased so that spring **47** is operative to turn shaft **43** and move scraper blade **40** to engage the wall. This engagement occurs before blade **31** is fully lowered. When the skimming blade is fully lowered, cable **51** is slackened so that some movement of member **44** and blade **40** is allowed.

This movement, within limits, allows the scraper **44** to be held against the adjacent wall as the bridge **10** moves toward the other end of the tank. As has been noted, the walls **16** and **32** of the tank may be only approximately straight and the engagement of the two blades **40** therewith is effective over the entire length of the tank to keep the floating material or oil to be removed from passing around the ends of blade **31**.

As the bridge approaches the other end of the tank, the floating material is pushed into a trough, not shown, from which it is discharged. The trough may be of any suitable arrangement. The most common includes a beach or ramp extending from below the water level to the edge of the trough which is above the water level.

When the floating material has been pushed into such a trough, the bridge **10** stops and the sludge scraper **21** is relowered and the skimming blade **31** is again elevated.

The upward movement of the blade again reduces the effective length of cable **51** and pulls lever **49** to retract the scraper blade **40**. The operation of the scraper blades **40** at both ends of the skimming blade are or can be adjusted to be simultaneous by adjusting the lengths of the two cables.

We claim:

1. In combination with a reciprocating carriage carrying a skimming blade in a lower position first to push material floating between the two parallel walls of a gravity separation tank and thereafter in an upper position for return movement of the skimming blade with the carriage, extensible scraper blades carried at the ends of the skimming blade, means biasing said scraper blades so that they follow and scrape the walls of the tank as the skimming blade moves in its lower position, and a linkage connecting the scraper blade and the carriage to retract the blades as the skimming blade is elevated to provide a clearance between the scraper blades and the walls of the tank in the elevated, return position, said linkage being operable to release the scraper blades as the skimming blade is relowered for skimming.

2. In combination with a skimming blade carried by the reciprocating bridge of a rectangular gravity separation tank, said bridge carrying said skimming blade in a lower position as the bridge travels in one direction and in an upper position above the water level of the tank during the return travel of the bridge; an extensible scraper blade carried by and at each end of the skimming blade and which extend toward the walls of the tank, springs having ends operatively connected to the skimming blade and to said two scraper blades and biasing the latter to engage and follow the walls of the tank, and linkage means connecting said scraper blades and the bridge at locations such that as the skimming blade is raised and approaches its upper position the linkage operating against the springs retracts the scraper blades from the walls of the tank and as the skimming blade is lowered the effective length of the linkage increases and first allows the springs to extend the scraper blades to engage the walls of the tank and thereafter to follow the walls of the tank within limits.

3. In combination with the skimming blade of the reciprocating bridge of a rectangular gravity separation tank, said skimming blade having rearwardly extending support arms pivotally connected at their rear ends to the understructure of the carriage and being elevatable to an upper position above the water level of the tank during the return run of the bridge; an extensible scraper assembly at each end of the skimming blade having a vertical scraper which extends toward the wall of the tank, each said assembly including a bracket attached to the end of the skimming blade, a scraper arm carried by said bracket for pivotal movement about a vertical axis ahead of the end of the skimming blade, a section of said arm having a cylindrical surface concentric with its pivotal axis and adjoining the end of the skimming blade to form therewith an operative seal, a vertical blade carried by said arm and extending toward the wall of the tank, a control lever connected to the arm, a spring having ends connected to said lever and blade assembly and rotationally biasing said arm in one direction, and a cable connecting said lever and the understructure of the carriage at a location such that the cable is slack when the skimming blade is in its lower position and is tightened when the skimming blade is in its upper position, the arrangement being such that as the skimming blade is pivotally raised to its upper position the cable operating against the spring turns the arm and retracts the blade from the wall of the tank and as the skimming blade is lowered the effective length of the cable increases and first allows the spring to pivot the arm and move the scraper blade to engage the wall of the tank and thereafter allows the blade to follow the wall of the tank within the limits of the operative seal.

4. A skimming blade and a reciprocating supporting structure therefor to effect pushing of the floating material in a gravity separation tank to one end for removal therefrom and elevating the blade above the liquid level for return to the other end of the tank, a laterally extensible scraper blade at each end of the skimming blade and means connected thereto and to the supporting structure such that the elevation of the blade effects lateral withdrawal of the scraper blades and relowering of the skimming blade laterally reextends the scraper blades to engage the sidewalls of the tank, said means including springs which bias the scraping blades laterally to maintain such engagement while pushing the material.

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