July 3, 1945. J. D. WALKER 2,379,615

SEWAGE SCREENING APPARATUS

Filed Dec. 4, 1943 2 Sheets-Sheet 1

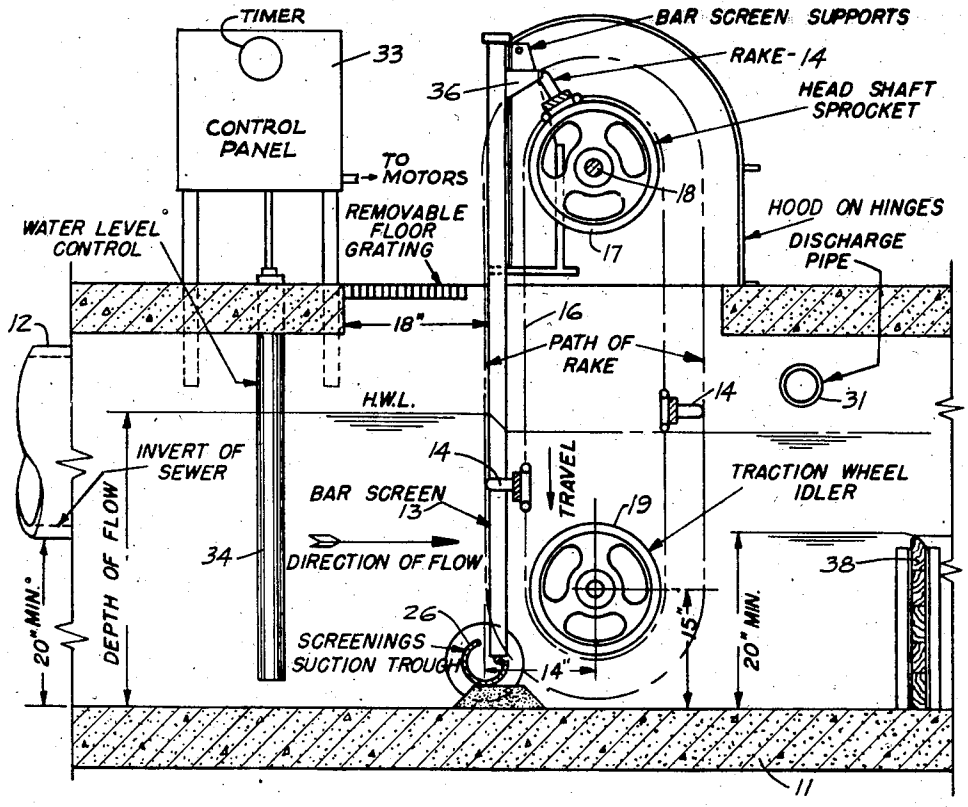

Fig. 1

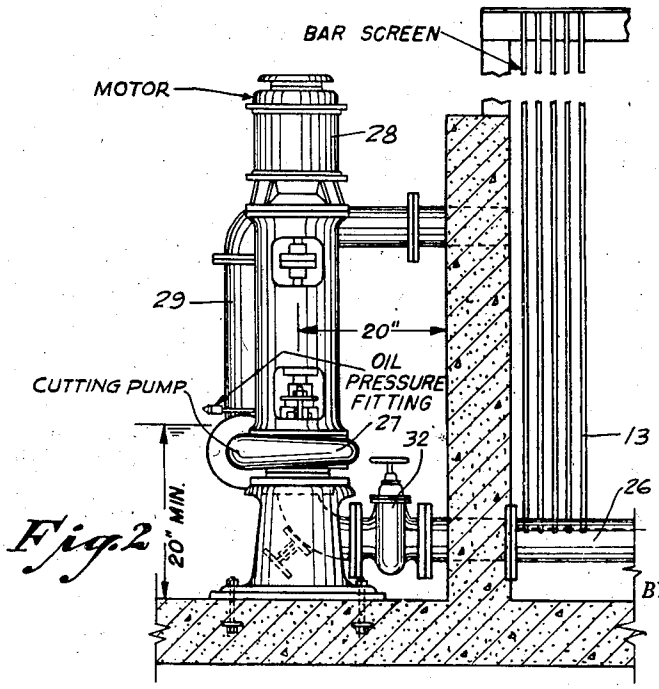

Fig. 2

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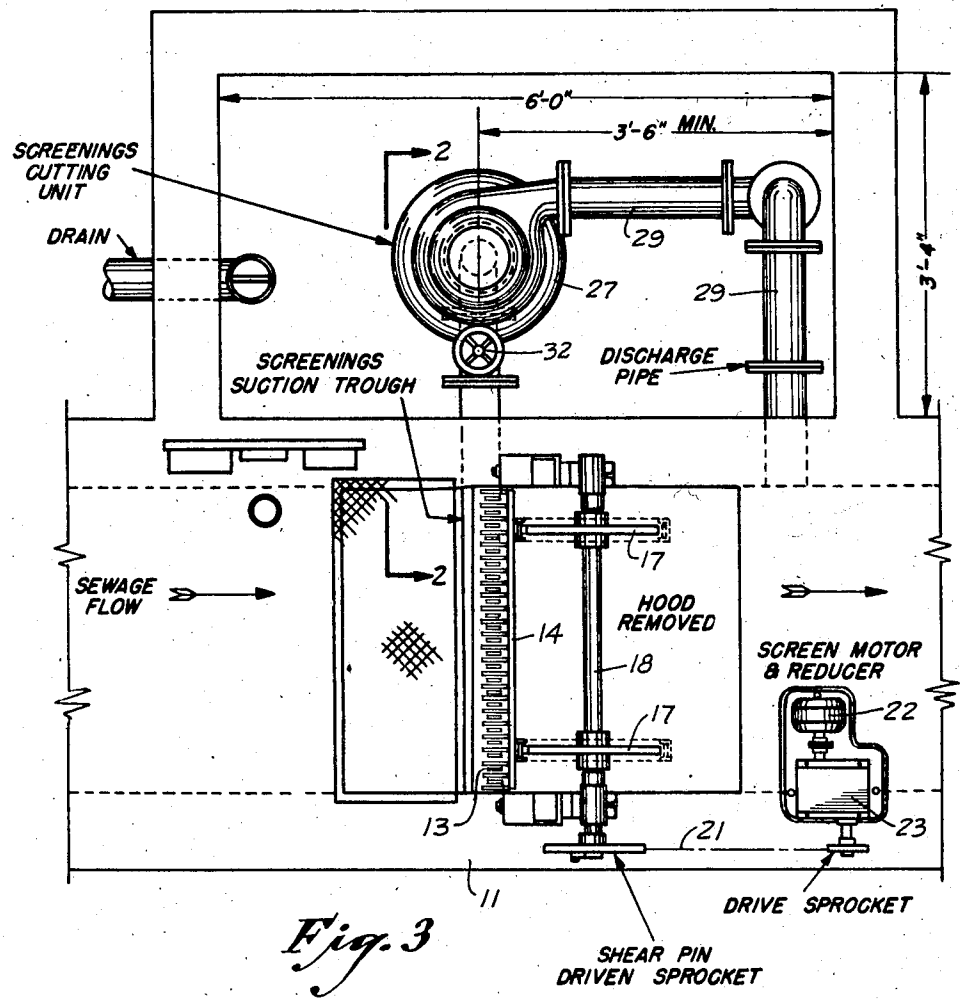

Fig. 3

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2,379,615

UNITED STATES PATENT OFFICE

2,379,615

SEWAGE SCREENING APPARATUS

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Application December 4, 1943, Serial No. 512,908

8 Claims. (Cl. 210—176)

The screening of sewage has long presented an obstinate problem in handling the screenings. They must be cleared from the screen more or less constantly or at fairly frequent intervals so that the screen will not become too obstructed and the flow of sewage therethrough unduly retarded. However, it is obviously undesirable to have the screenings left exposed and it is also undesirable to require that the screenings frequently be gathered up by an attendant. Even after the screenings have been gathered up, they present a disposal problem since they are of a character which should be treated by the sewage plant rather than be removed from it. As was first recognized many years ago, the ideal solution is probably to cut up the screenings finely enough so that they can be treated in the remainder of the plant and return them to the sewage stream. In more recent years, considerable effort has been applied to accomplishing this end with greater economy, or in more reliable or more satisfactory manner. According to the present invention, the screenings are raked into a submerged trough and drawn from this trough by cutting and pumping apparatus which cuts the screenings into small pieces and pumps them back into the sewage channel. Raking the screen, of course, provides positive clearing of the screen. Preferably the rake projects through the screen from the downstream side thereof so that the rake itself is kept clean.

Additional advantages and objects of the invention will be apparent from the following description and from the drawings in which:

Fig. 1 is a partially diagrammatic vertical sectional view of one embodiment of this invention taken longitudinally through the sewage channel;

Fig. 2 is a fragmentary vertical sectional view taken approximately on the line 2—2 of Fig. 3; and,

Fig. 3 is a plan view of the structure shown in Figs. 1 and 2.

A preferred form of the invention has been chosen for illustration and description, in compliance with section 4888 of the Revised Statutes, but persons skilled in the art will readily perceive other means for accomplishing the same results.

The invention has been illustrated as installed in a sewage channel 11 supplied by an influent pipe 12 and provided with a suitable outlet which may be beyond the right-hand end of Fig. 1. A bar screen 13 is provided across the channel 11. The screen may be of any suitable proportions although at present, three-eighths inch bars with clearances between them three-fourths inch wide are preferred. The bars are preferably vertical, as this will improve the performance of the downwardly moving rake and there is no advantage in inclination of the screen. The bars may be welded at their upper ends to a cross piece and at their lower ends to the inside of pipe 26 or to a cross piece which in turn may be welded to said pipe.

One or more rakes 14 are carried by chains 16 which are so disposed that on the downward run of the chain, the rakes will extend through the bar screen and project far enough therebeyond to sweep downwardly along the screen any foreign material which is caught thereon.

The chains 16 are carried by sprockets 17 on shaft 18 and by idler sprockets 19. The shaft 18 may be driven by a belt or chain 21 from motor 22 acting through reducing gears 23 (Fig. 3).

The screenings, which are raked close to the bottom of the screen by rakes 14, will drop or be drawn by suction into the suction cleaning trough 26 into which the lower ends of the screen bars extend, as clearly seen in Fig. 1. The suction trough 26 is connected with the inlet side of cutting and pumping apparatus which in the illustrated form comprises a cutting pump 27 which is driven by a motor 28. The cutting pump 27 should be of a non-clog type, that disclosed in Patent No. 2,245,035 being at present preferred. The outlet of the pump 27 is connected to the piping 29 which discharges at 31 into the sewage channel 11. The discharge 31 is preferably above the highest water level in the channel 11 so that the pump may be disconnected if necessary merely by closing valve 32. Furthermore, the positioning of the discharge 31 above the high water level facilitates inspection of the discharge to make sure that the cutting pump is functioning properly and for the purpose of regulating the timing of its operation.

Both the screen motor 22 and the cutting pump motor 28 are automatically controlled. Preferably they operate simultaneously although the screen motor could be operated more often than the pump motor if desired. The control panel 33 may include both time and level actuated means for starting and stopping the motor. Preferably the time control means will start the motors at certain predetermined periods and only this control mechanism will ordinarily be effective. After a predetermined period of operation found by observation to be sufficient for cleaning the screens, cutting up the screenings and discharging them back to the channel 11, the

timing mechanism will shut off the motors. However, if there should be an excessive amount of screenings caught on the screen in a short period, so that flow through the screen was restricted enough to raise the water level beyond a predetermined height, it would be desirable for the rake and cutting pump to be started ahead of time. This can be accomplished by providing a control device **34** which is responsive to the water level on the upstream side of the screen **13**. If the screenings obstruct the flow of water through the lower portions of the screen to an extent that the water level rises above a predetermined point, the hydrostatic pressure on the device **34** will cause actuation of the starting switches in control panel **33** to start the motors.

To ensure proper meshing of the teeth of the rake **14** with the bars of the screen **13**, tooth guide members **36** may be provided, each being welded to the back of one of the bars of the bar screen, and the edges first passed by the teeth being beveled. The water level in the channel **11** may be maintained at a suitable minimum height by means of a weir **38**, or in any other suitable manner. Preferably the level is maintained at least high enough to keep water in the pump **27** so it will be primed at all times. It should be noted that the dimensions shown in the drawings are merely illustrative and can be widely varied, as can the construction as a whole.

Ahead of the pump **27** (or some other pump), there may be provided a grinding or fine cutting device if it is preferred to cut the screenings into smaller pieces than those resulting from the use of cutting pump **27**. The cutting pump, however, is at present preferred unless the amount and size of the screenings are relatively small.

From the foregoing, it is seen that a very simple reliable and efficient screening system is provided in which the screenings are automatically raked from the screen, cut up and returned to the sewage stream for treatment with the remainder of the sewage. All of the parts are either simple to manufacture or are substantially identical with parts already manufactured for other purposes and hence the original cost is quite low. The screenings are raked downwardly into a draw-off trough so that they can be handled hydraulically. Fouling of the rake is automatically avoided by virtue of the fact that the rake projects through the screen from the downstream side thereof.

I claim:

1. Sewage screening apparatus including a sewage channel through which a stream of sewage flows, a bar screen across the channel, a rake positioned on the down-stream side of the screen and extending through the screen, means for moving the rake along the screen, a suction trough having its opening adjacent the lower end of the movement of the rake along the screen, a cutting pump having its intake connected to the suction trough for drawing the screenings together with liquid sewage into the cutting pump, means for returning the discharge from said pump to the sewage channel at a point above the high water level therein, and a valve between the suction trough and the cutting pump.

2. Sewage screening apparatus including a sewage channel through which a stream of sewage flows, a bar screen across the channel, a rake, means for moving the rake along the screen, a suction trough having its opening adjacent the lower end of the movement of the rake along the screen, a cutting pump having its intake connected to the suction trough for drawing the screenings together with liquid sewage into the cutting pump, means for returning the discharge from said pump to the sewage channel at a point above the high water level therein, and a valve between the suction trough and the cutting pump.

3. Sewage screening apparatus including a channel through which sewage flows, a bar screen across the channel, means for raking screenings downwardly along the screen, a suction trough having an opening adjacent the bottom of the screen, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, and conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream.

4. Sewage screening apparatus including a channel through which sewage flows, a bar screen across the channel, means for raking screenings downwardly along the screen, a suction trough having an upwardly opening slot therein extending across the screen adjacent the bottom of the screen, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, and conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream.

5. Sewage screening apparatus including a channel through which sewage flows, a vertical bar screen across the channel, means for raking screenings downwardly along the screen, a suction trough having an upwardly opening slot therein extending across the screen adjacent the bottom of the screen, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, and conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream.

6. Sewage screening apparatus including a channel through which sewage flows, a bar screen across the channel, means for raking screenings downwardly along the screen, a suction trough having an opening adjacent the bottom of the screen, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream, and means for automatically operating the rake and the reducing and pumping means at timed intervals.

7. Sewage screening apparatus including a channel through which sewage flows, a bar screen across the channel, means for raking screenings along the screen, a suction trough having an opening slot therein extending across the screen below the water level and adjacent the end of the raking movement of the raking means, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, and conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream.

8. Sewage screening apparatus including a

channel through which sewage flows, a bar screen across the channel having bars disposed generally in vertical planes downwardly, means for raking screenings along the screen, a suction trough having an opening slot therein extending across the screen below the water level and adjacent the end of the raking movement of the raking means, reducing and pumping means for reducing the screenings to small pieces and for producing flow of the screenings together with liquid sewage, and conduit means leading the screenings from the suction trough through the reducing and pumping means and back to the sewage stream.

JAMES D. WALKER.