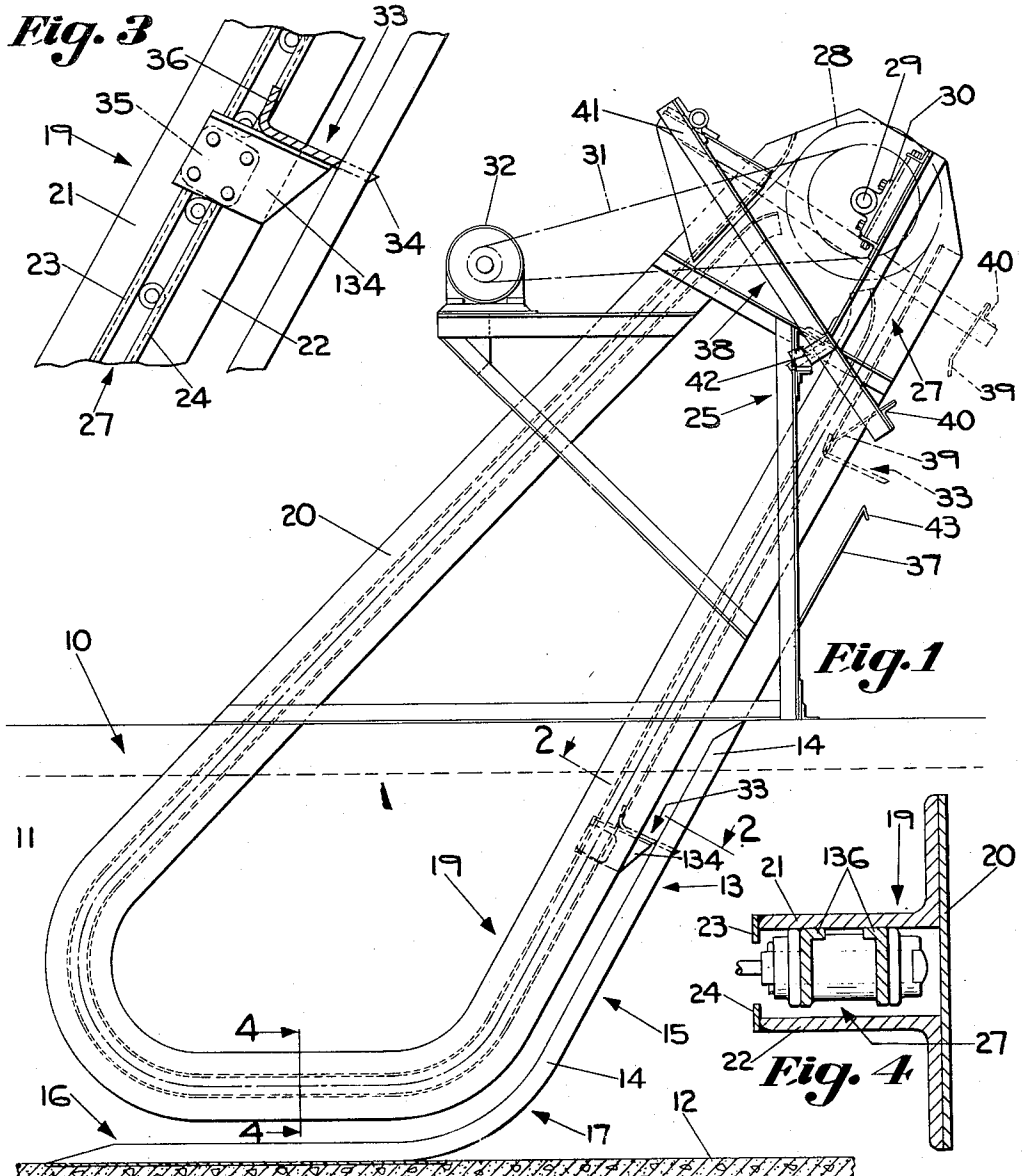
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BAR SCREEN SCRAPER

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## BAR SCREEN SCRAPER

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9 Claims. (Cl. 210—176)

This invention relates to apparatus for removing solid refuse or trash from a stream of water, such as a sewage stream, preliminary to the passing of said water to a sewage treating apparatus.

An object of the invention is to provide for the interleaving of the teeth of a rake or scraper and the screen bars of a screen of the above mentioned type at a position in advance of an area on said screen at which refuse tends to accumulate and to insure the maintenance of this interleaved relation.

Another object of the invention is to provide an improved yet simple rake cleaning mechanism.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawing,

Fig. 1 is a side elevational view of the device comprising my invention;

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is an enlarged detail view and taken on the line 3—3 of Fig. 2 looking in the direction of the arrows; and

Fig. 4 is an enlarged detail sectional view taken on the line 4—4 of Fig. 1 looking in the direction of the arrows.

The invention here involved relates primarily to an improvement in apparatus disclosed and claimed in my prior applications, Serial Nos. 701,548, filed December 8, 1933; 740,159, filed August 16, 1934; and 56,015, filed December 24, 1935.

It is to be understood that in general the device herein disclosed follows the construction disclosed particularly in said application, Serial No. 56,015, but embodies certain improvements.

Referring particularly to Figs. 1 and 2 of the drawing, the device comprises a sewage trough or sluice-way 10 formed by a pair of spaced vertical side walls 11, 11 and a bottom wall 12; said side walls 11, 11 and bottom wall 12 being preferably formed as a monolith of poured concrete.

Extending into the trough 10 is a bar screen 13 which is adapted to screen the sewage of large particles. Said bar screen 13 is formed by a plurality of screen bars 14, placed on edge and forming an upwardly extending inclined rectilinear portion 15 and a horizontal bottom portion 16; said portions 15 and 16 being inter-connected by a smooth concave curved portion 17 which forms a refuse accumulating area. That is, each of the screen bars 14 will be bent, as illustrated in Fig. 1, to have an inclined rectilinear portion and a horizontal portion which are inter-connected by a curved portion. The horizontal bottom portion 16 will be rigidly attached, as by welding, to a wear plate 18 which is anchored to the bottom wall 12 of the trough 10. It will thus be seen that a bar screen 13 has been provided in which a refuse accumulating area is formed at such a position that guide extension means are provided adjacent the up-stream portion of the screen bars 14.

Extending into the fluid stream and adjacent each edge of the screen 13 and positioned thereabove, is a guide member 19. Said guide member 19 will be generally of a distorted U-shaped construction and is formed by a side plate 20 to which is rigidly attached, as by welding, a pair of angle members 21 and 22, each of which carries an inward extending retaining plate seen at 23 and 24, respectively. Said plates 23 and 24 may be welded to the angle members 21 and 22, respectively. The guide members 19 will be supported on the tops of the side walls 11 by a frame 25 formed by appropriate angle members and gusset plates.

The guide members 19 will provide a pair of chain guideways 26, 26 within which travel a pair of continuous draft chains 27, 27. Driving means for said draft chains 27, 27 will be in the form of a pair of spaced sprockets, one of which is seen at 28 carried at the ends of a shaft 29 mounted in bearing boxes 30, 30 carried by the frame 25. The shaft 29 will be rotated through a chain and sprocket mechanism 31 driven from an electric motor 32.

Extending between the continuous draft chains 27, 27 and rigidly attached thereto is a rake 33 provided with elongated teeth 34 which are of sufficient length to extend completely through the screen bars 14. The rake 33 will be mounted upon a pair of angle members 134, 134 and rigidly attached thereto as by welding, which angle members 134, 134 are carried on a pair of brackets 35, 35 rigidly attached to the draft chains 27, 27.

It may be noted that the rake 33 is provided at its top with a forwardly extending flange 36 which is provided to prevent the accumulated refuse from flowing over the top of the rake.

It is to be noted that the guide members 19 are so shaped that their contour follows essentially the contour of the bar screen 13, and thus as the draft chains 27 are driven by the motor 32 they will cause the teeth 34 of the rake 33 to interleave with the horizontal bottom portion 16 of the bar screen 13 at an up-stream position appreciably ahead of the refuse accumulating area of said bar screen 13, which area will be principally adjacent the curved portion 17. This insures the proper interleaving of the rake teeth 34 with the bar screen 17.

Furthermore, adjacent said horizontal portion 16 the tips of the teeth 34 will ride over the wear plate 18 in contact therewith, and when the curved portion 17 of the bar screen 13 is reached said teeth will extend through the screen bars 14.

By referring particularly to Fig. 4 of the drawing it may be noted that, should there be any appreciable tendency for the rake teeth 34 to be forced out of interleaving relation with the screen bars 14, along any position of travel thereof with respect to the screen 13, the top portions of the draft chains 27 will bear against the lower face of the inwardly extending flange of angle members 21, 21. It is also to be noted that in order to provide an increased wearing surface between these two contacting surfaces I provide the links of the chains 27, 27 with inwardly extending wear flanges 136, 136.

As the rake 33 moves out of the fluid channel the tips of the teeth thereof will ride over a chute plate 37 which extends upwardly from the bottom of the screen bars 14 and has a discharge lip 43. While the guide members 19 substantially follow the contour of screen 13, they diverge therefrom slightly as said chute plate 37 is approached, so the rake teeth slide easily thereover carrying the refuse with them.

When the rake 33 has reached a position adjacent the top of the chute plate 37, as illustrated in dotted lines in Fig. 1, the accumulated refuse will be scraped therefrom by a scraper mechanism 38. Said scraper mechanism 38 may comprise a scraper plate 39 carried by a transversely extending angle member 40 which is carried on the free ends of a pair of spaced arms, one of which is seen at 41, which are pivotally mounted upon the frame 25 at a position above the upper run of the draft chains 27, 27, said pivotal axis being on the opposite side of the lower run of said draft chains 27, 27 from that from which the rake 33 projects. Rubber bumpers 42 cooperate with arms 41 to cushion the drop of said scraper mechanism 38.

It will be evident that as the rake 33 moves upwardly and contacts the scraper mechanism 38, said scraper mechanism will move from the full line position, illustrated in Fig. 1, to the dotted line position illustrated in Fig. 1, thereby to scrape the rake 33 clean of accumulated refuse. Said material may be scraped onto a floor of the building within which the mechanism is housed, or into a grinder, as illustrated in my above mentioned application.

In the operation of the device comprising my invention, the electric motor 32 will be operated either intermittently or continuously to drive the shaft 29, which in turn, drives the draft chains 27 along the guideways 26 of the guide mechanism 19. Said draft chains 27, 27 thereby carry the rake 33 along the path determined by said guide member 19. This path is such that the teeth 34 of said rake 33 become interleaved with the horizontal bottom portion 16 of the bar screen 13 at an upstream position appreciably in advance of the principal refuse accumulating area which will be adjacent the curved portion 17 of said bar screen 13. The tips of the rake teeth 34 will ride over the wear plate 18 adjacent the horizontal portion 16 and will extend through the screen bars 14 as the curved portion 17 of the screen 13 is reached and will remain extending through said screen bars 14 until the rake 33 reaches the top chute plate 37, over which they ride.

It is to be noted that, in common with my prior mentioned applications, there is a complete absence of any rotating, guiding and supporting means for the draft chains within the sewage stream. It is also to be noted that in contradistinction to the disclosures of said prior applications, the rake 33 is not pivotally attached to the draft chains 27. It has been found in some severe cases that it was extremely difficult to hold the pivoted rake in intermeshing relation with the screen bars 14 due to the fact that the refuse rolled up in large masses and forced the rake teeth out of their interleaving relation within the screen bars. In the structure herein disclosed this is impossible because the rake teeth are positively maintained in interleaving relation with the screen bars 14 by the angle members 21 cooperating with said draft chains 27. Where an extreme condition is encountered, as previously mentioned, it may be more desirable to maintain this positive interleaving relation. In such an installation motor 32 will be stalled if the screen becomes clogged beyond the pulling ability of said motor 32 and the circuit breakers, or fuses, of said motor 32 will operate to open its circuit.

As the rake 33 travels along the screen 13, as aforesaid, it will clean it of accumulated refuse, carrying said refuse up over the lip 42 of chute plate 37. When said rake 33 has cleared the chute plate 37, the scraper mechanism 38 will be effective to scrape the rake 33 clean of accumulated refuse, as aforesaid.

It is to be particularly noted that the scraper mechanism 38 is carried by frame 25 and in its operation the plate 39 is carried by rake 33 and pushes accumulated refuse therefrom. That is, scraper mechanism 38 moves the material off of rake 33 along a path which has a component of movement relative to said rake 33 away from the pivotal axis of arms 41. This type of scraper mechanism is very simple, yet very efficient, and has the distinct advantage that it never tends to catch on the rake 33, which tendency is characteristic of scraper mechanism, which pull the refuse from the rake, or in which the material moves along a path which has a component of movement relative to the rake toward the pivotal axis of the said scraper mechanism.

It will thus be evident that a device has been produced which will meet a very severe condition which is sometimes encountered in particular installations where the rate of refuse accumulation is very high, and the refuse is particularly of a type, such as fibrous refuse, which tends to roll up into large masses and force the rake 33 out of its intermeshing relation with the screen 13.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. In a liquid screening apparatus, the combination with a rake, of a screen having screen bars adapted to be interleaved with the rake teeth, said bars having a substantially horizontal portion and a rectilinear inclined portion, endless draft means for said rake, U-shaped guide means for said rake and draft means consisting entirely of a pair of stationary non-rotary guide tracks extending along the edges of said screen and having both horizontal and inclined portions above said screen, each of said guide means being formed of a pair of parallel plates having two spaced arcuate portions around which said draft means slide and being so constructed and arranged that said rake in traveling in its path of movement first interleaves the horizontal portion

of said screen and then the inclined portion thereof, and means for driving said draft means and said rake.

2. In a liquid screening apparatus, the combination with a trough, of a rake, a screen extending into said trough and having screen bars adapted to be interleaved with the rake teeth, said screen bars being inclined to the trough bottom, endless draft means for said rake, guide means for said rake and draft means consisting entirely of stationary non-rotary U-shaped guides one adjacent each edge of the screen and above it, each guide having a horizontal portion and an inclined portion and two arcuate portions along all of which portions draft means slide, said guide portions following generally the contour of the trough bottom and screen, respectively, whereby said rake will first move along said trough bottom and then up said screen in interleaving relation therewith, and means for driving said draft means and said rake.

3. In a liquid screening apparatus, the combination with a trough, of a rake, a screen extending into said trough and having screen bars adapted to be interleaved with the rake teeth, a plate on the bottom of said trough extending upstream from the bottom of said screen, said screen bars having an upwardly inclined screen forming portion and a horizontal non-screening portion positioned above said plate, endless draft means for said rake, guide means for said rake and draft means consisting entirely of stationary non-rotary guides one adjacent each edge of said screen and having an upwardly inclined portion and a horizontal portion and positioned above said screen and said plate, respectively, and so constructed and arranged that said rake in traveling in its path of movement first interleaves the horizontal portion of said screen and then interleaves the inclined portion of said screen, and means for driving said draft means and said rake.

4. In a liquid screening apparatus, the combination with a trough, of a rake, a screen extending into said trough and having screen bars adapted to be interleaved with the rake teeth, a plate on the bottom of said trough extending upstream from the bottom of said screen, said screen bars having an upwardly inclined screen forming portion and a horizontal non-screening portion positioned above said plate, endless draft chains for said rake, guide means for said rake and draft chains positioned adjacent each edge of said screen and above it and said plate and having horizontal and inclined portions which substantially follow the horizontal and inclined portions of said screen bars and being so constructed and arranged that said rake in traveling in its path of movement is directed by said guide means first to interleave the horizontal portion of said screen and then to interleave the inclined portion of said screen, and driving means for said draft chains and rake.

5. In a liquid screening apparatus, the combination with a rake, of a screen having screen bars adapted to be interleaved with the rake teeth, said bars having a substantially horizontal portion and an inclined portion, endless draft chains for said rake, means non-pivotally connecting said rake to said draft chains, guide means for said rake consisting entirely of a pair of stationary non-rotary guide tracks extending along the edges of said screen and having both horizontal and inclined portions connected by a smoothly curved portion and positioned above said screen, and being so constructed and arranged that said rake in traveling in its path of movement first interleaves the horizontal portion of said screen and then the inclined portion thereof, and means for driving said draft means and said rake.

6. In a liquid screening apparatus, the combination with a rake, of a screen having screen bars adapted to interleave with said rake, said bars having a rectilinear inclined portion, a plate at the bottom of said trough extending up stream from the bottom of said screen, endless draft chains for said rake, means non-pivotally connecting said rake to said draft chains, guide means for said rake and draft chains positioned at the edges of said screen and being so constructed and arranged that said rake in traveling in its path of movement first moves over said plate with the rake teeth in contact therewith and then interleaves the inclined portion of said screen.

7. In a liquid screening apparatus, the combination with a main frame including a screen, of a rake for cleaning said screen, endless chain draft means for said rake, guide means for said rake and draft means, cleaning means for said rake including a cleaner frame pivotally mounted on an axis on said main frame and having a wiper positioned to contact said rake and wipe refuse therefrom by moving it away from said draft means, the pivotal axis of said wiper means being on the opposite side of said draft means from said rake when the latter is in position to be cleaned, said cleaning means being so constructed and arranged that said pivotal axis of said cleaner frame is above said rake during the entire rake cleaning operation.

8. In a liquid screening apparatus, the combination with a main frame, of a screen carried thereby having an upwardly inclined portion, a toothed flight for cleaning said screen, endless chain draft means for drawing said flight over said screen, cleaning mechanism for wiping material from said flight near the top of said screen, said cleaning mechanism being pivotally mounted on said main frame and having a wiper adapted to contact and move over said flight, said cleaning mechanism being so constructed and arranged that the pivotal axis thereof is above the flight during the entire movement of the wiper over said flight whereby there is no tendency for the wiper and flight to catch each other.

9. In a liquid screening apparatus, the combination with a trough, of a rake, a screen extending into said trough and having screen bars adapted to be interleaved with the rake teeth, said screen bars being horizontal at their lower portions and merging into upwardly inclined portions, a plate below said horizontal portion of said bars forming a non-screening area, endless flexible draft means for said rake, means for rigidly linking said rake to said draft means, guiding mechanism for said draft means and so constructed and arranged that said rake in traveling in its path of movement shall be directed by a horizontal portion of said guide mechanism spaced above the horizontal portions of said screen bars to positively hold the rake in sliding relation with the screen bars over the horizontal portions thereof to assure positive movement of material along said screen bars, and driving mechanism for said draft chains and the rake secured thereto.

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