

March 3, 1931.

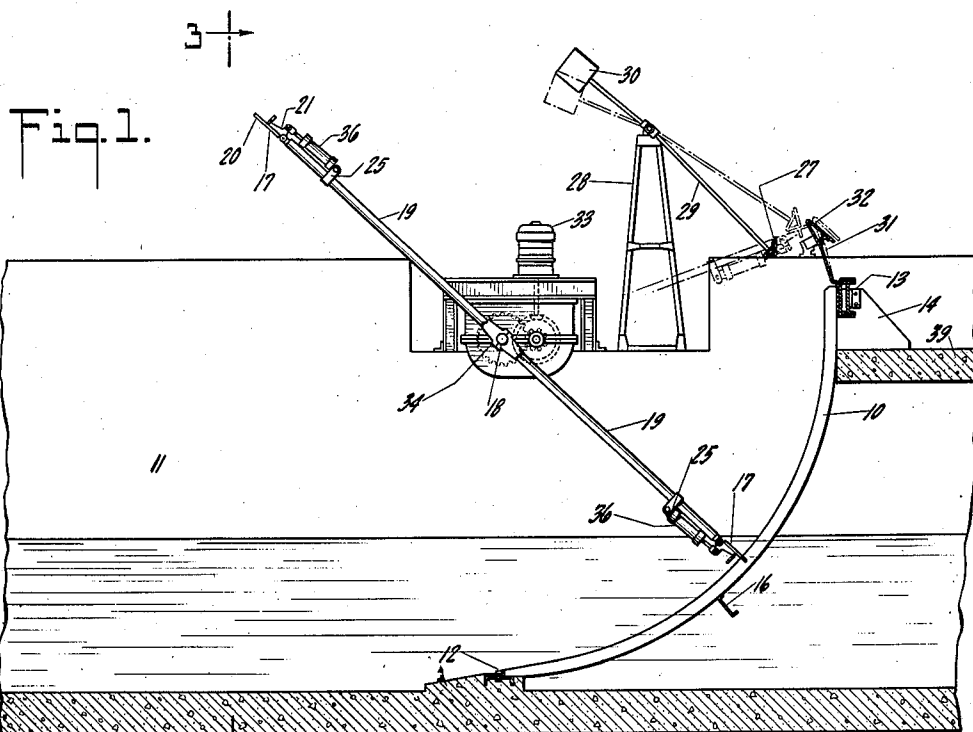
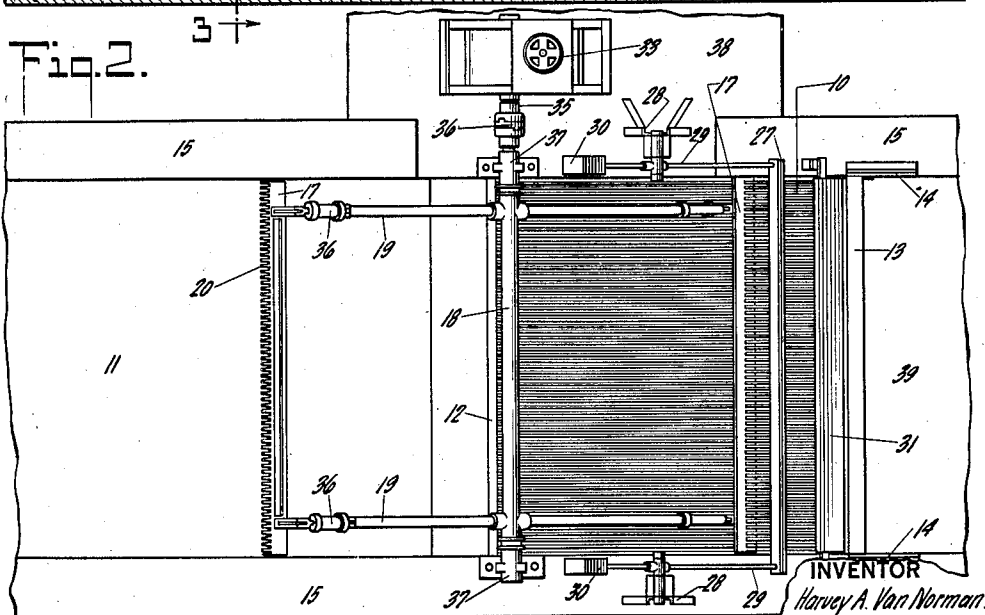
H. A. VAN NORMAN

1,794,504

SELF CLEANING BAR SCREEN

Filed April 7, 1927

2 Sheets-Sheet 1



INVENTOR
Harvey A. Van Norman.

BY
Geo. J. Hyde
His ATTORNEY

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Fig. 3.

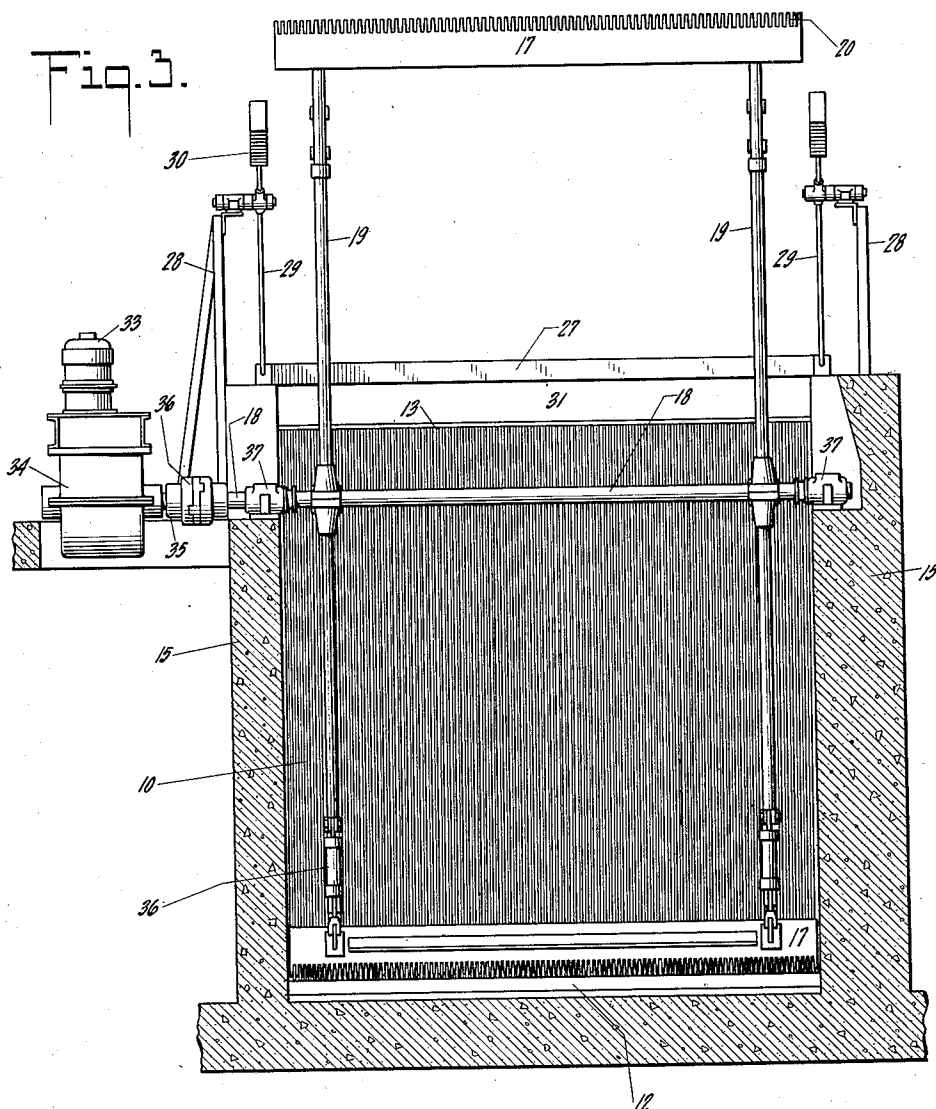
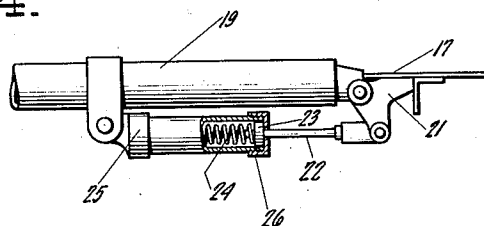


Fig. 4.



INVENTOR

Harvey A. Van Norman.

BY *Geo. G. Hyde*
His ATTORNEY

His ATTORNEY

UNITED STATES PATENT OFFICE

HARVEY A. VAN NORMAN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE DORR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

SELF-CLEANING BAR SCREEN

Application filed April 7, 1927. Serial No. 181,668.

This invention relates to screens, and is particularly directed to improvements in bar screens of the type commonly employed in sewage channels, sometimes known also as animal stops.

Screens of this type are composed of parallel bars extending upwardly from the bottom of the channel, forming a grid which usually slopes from the bottom in the direction of flow of the sewage. Although manual cleaning of these screens is among the most objectionable tasks in a sewage treatment plant, and although numerous mechanical cleaning devices have been proposed, it is still the general practice to clean such bar screens by hand. This is due partly to the fact that prior mechanical cleaning arrangements were excessively expensive, often objectionably complicated and large, and likely to get out of order; and partly to the fact that many of such devices were unsightly, a fundamental objection in modern sewage treatment plants. The general object of this invention is to produce an automatically cleaned bar screen free from the above objections, and which will be simple, strong and reliable. Other objects and advantages will be apparent from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a side elevation of the bar screen with cleaning apparatus installed in a sewage channel, parts being broken away;

Fig. 2 is a plan view thereof;

Fig. 3 is a transverse vertical section on line 3—3 of Fig. 1; and

Fig. 4 is a detail of the scraper mechanism.

The apparatus shown in the drawings employs a scraper mounted to revolve about an axis above the liquid level, engaging curved bars concentric with the axis and forming a grid or bar screen. In the form shown these curved bars 10 are mounted at the bottom of the sewage channel 11 on a frame 12 extending across the bottom of the channel, the upper ends of the bars being held by a frame 13 extending across the channel and carried by supports 14 mounted on the walls 15 of the channel. Frames 12 and 13 serve to keep

the bars in spaced parallel relation, assisted if desired by an intermediate transverse frame member 16 attached to the bars and extending across the tank between the frames 12 and 13 to hold the bars in rigid spaced relation. The scraping apparatus includes scraper plate 17 mounted on shaft 18 by means of rods 19 preferably located near the walls 15. The scraper plate 17 is preferably provided with teeth 20 adapted to pass between the bars 10, while the body of the scraper plate 17 travels along the advance edges of said bars.

Any number of scraper units may be employed, a convenient arrangement being illustrated in the drawings, including two aligned units on opposite sides of shaft 18, thereby providing a balanced construction. As the parts of both units are identical, only one will be described.

In order to prevent breakage of parts in case the scraper plate 17 should encounter unusual resistance, as might occur if an excess of stringy material should wedge between the bars ahead of the scraper plate, it is desirable to provide some means for yieldably mounting the scraper plate to permit it to ride over such an obstruction. One convenient arrangement for this purpose is illustrated, being shown in detail in Figure 4. Each scraper supporting rod 19 carries a bellcrank 21 pivotally mounted on the end of the rod, with the plate 17 mounted on one arm of the crank. The other arm of the bellcrank 21 is pivoted to a rod 22 carrying a collar 23 bearing against spring 24 on bracket 25 mounted on the rod 19. Spring 24 may be covered by housing 26 through the end of which rod 22 passes, collar 23 acting as a stop bearing against the end of the housing to hold the plate 17 in normal position.

Suitable means may be provided for discharging the solids carried upward by scraper plate 17 when the plate passes the upper ends of the bars 10. For this purpose there has been provided scraping apparatus for propelling the solids lodged on the scraper plate 17 outwardly to clean the plate. This may comprise a cleaner bar 27 extending across the channel 11 and pivotally

mounted on supports 28 on the opposite walls 15 by means or rods 29 lying outside of the path of the scraper plate or plates 17 and their supporting framework. Counterbalancing weights 30 may be connected to rods 29 to counterbalance partially the weight of the bar 27, so that it may offer less resistance to the passage of the scraper plate 17.

Means may also be provided above the upper ends of the bars 10 for retaining the solids on the scraper plate 17 during a short further period of travel, partly to permit further drainage, but largely to facilitate squeezing of the solids between said means and the cleaner bar 27 for removal of excess liquid. In the form illustrated this means comprises metal apron 31 extending across the channel and preferably formed of spring sheet metal. The lower edge of the apron 31 is mounted on the frame 13, the lower edge of the active face of the apron being approximately in the path of the outer ends of teeth 20. From this end the apron extends upwardly along the entire length of the scraper plate 17, and preferably is curved slightly inward from the normal path of the ends of teeth 20, presenting a smooth surface which is yieldably pressed against the ends of the teeth 20 by the resilience of the apron. The upper edge of the apron 31 may be bent rearwardly and downwardly to form a slide 32 along which the solids collected by the scraper plate 17 may pass to any suitable collector (not shown).

The apparatus is operated by slow rotation of the shaft 18 in any desired manner, the construction illustrated including a motor 33 connected to a speed reducer 34 whose shaft 35 engages the end of shaft 18 through universal joint 36 beyond one of the bearings 37 for shaft 18 which are mounted on the walls 15. The motor 33 and speed reducer 34 may be carried by a suitable platform 38, and platform 39 may be constructed across the channel 11 behind the upper ends of the rakes for inspection of the mechanism and removal of the solids.

In operation the shaft 18 is rotated at a very slow rate, depending of course upon whether continuous operation or occasional operation of the device is required, also upon the rate of accumulation of solids. It has been found in practice that while the present system of intermittent cleaning is very unsightly and objectionable, mechanical cleaning apparatus is relatively free from such objections, since the amount of solids carried by the scraper plate at each revolution is relatively small, even with extremely slow operation and consequent saving of power. If the scraper plate 17 or teeth 20 encounter an unusual obstruction, plate 17 is permitted to swing rearwardly around the pivots of bellcranks 21, compressing springs 24; and upon passing the obstruction springs

24 return scraper plate 17 to its normal position. When the plate 17 has risen to the upper ends of the bars 10, carrying a load of solids, the ends of teeth 20 encounter the apron 31, which retains the accumulated solids on the plate 17. Upon rising a short distance further the plate 17 comes in contact with the cleaner bar 27, which is arranged to engage the entire length of the scraper plate 17 simultaneously near the inner edge of the plate. As the plate continues to rise the cleaner bar 27 will slide along the plate toward its outer edge, since the pivot point for rods 29 is above and toward the center from the inactive position of the cleaner bar 27. The position of the scraper plate 17, the cleaner bar mechanism and the apron 31 when nearing the ends of the scraping operation is shown in dot and dash lines in Fig. 1.

The cleaner bar 27 finally passes entirely over the teeth 20, removing all of the solids from the upper surface of the scraper plate 17 and said teeth, the solids falling on the slide 32 which deflects them from the base of the apron 31 and the frame 13. The solids are compressed between the cleaner bar 27 and the apron 31, squeezing water out of the solids before their discharge.

After the cleaner bar 27 has passed over the teeth 20 the continued rise of the scraper plate 17 permits the cleaner bar 27 to swing back to inactive position, which may be with its ends resting on the walls 15 as in the construction illustrated.

I claim:

1. A self-cleaning bar screen comprising a screening structure, a scraper member, means for moving the scraper member along the screening structure to collect solids thereon, and a cleaner bar normally located in the path of the scraper member and moved outwardly along and beyond said member by direct engagement with the member for removal of solids therefrom, said cleaner bar being movably supported above the zone of engagement with the scraper member.

2. A self-cleaning bar screen comprising a screening structure, a scraper member, means for moving the scraper member along the structure to collect solids thereon, and a cleaner bar normally located in the path of the scraper member, pivotally mounted above the zone of engagement with the scraper member and arranged to be swung outwardly along and beyond said member by direct engagement therewith to remove solids therefrom.

3. A self-cleaning bar screen comprising a screening structure, a scraper member, means for moving said member along the screening structure to collect solids thereon, a cleaner bar normally located in the path of the scraper member, and a rigid supporting structure for said cleaner bar pivotally

mounted above the zone of engagement with the scraper member and including a counterbalancing weight beyond said pivotal mounting, said bar and structure being positioned for movement of the bar outwardly along and beyond the scraper member by direct engagement therewith for removing solids therefrom.

4. A self-cleaning bar screen comprising a screening structure, a scraper cooperating therewith and movable beyond an end of the structure, and an apron extending from said end along the path of the scraper and yieldably pressed against the scraper for retaining solids thereon.

5. A self-cleaning bar screen comprising a screening structure upwardly directed at one end, a scraper cooperating therewith and movable upwardly beyond said end, and an apron composed of a sheet of spring metal extending upwardly from said end along the path of the scraper adapted to press yieldably against the scraper and retain solids thereon.

6. A self-cleaning bar screen comprising a screening structure, a scraper cooperating therewith and movable beyond an end thereof, an apron extending from said end along the path of the scraper adapted to retain solids thereon, and means for pressing solids on the scraper against the apron to remove moisture therefrom.

7. A self-cleaning bar screen comprising a screening structure, a scraper cooperating therewith and movable beyond an end thereof, an apron extending from said end along the path of the scraper adapted to retain solids thereon, and a cleaner bar movable along the scraper during its passage along the apron for compressing solids against the apron, and further movable along the scraper after the latter has passed the apron for discharging solids from the scraper.

8. A self-cleaning bar screen comprising a scraper member including a rotatable frame and a scraper plate mounted thereon, a plurality of parallel bars forming a screen and concentric with the axis of rotation of the scraper member, an apron extending upwardly from the upper end of said screen along the path of the scraper plate adapted to retain solids thereon, and a scraper bar normally located in the path of the scraper plate and moved outwardly along and beyond said plate by engagement therewith, positioned to move outwardly along the plate initially while the plate is opposite the apron, and further movable outwardly after the scraper plate has passed the apron for discharge of solids from the plate.

In testimony whereof I affix my signature.
HARVEY A. VAN NORMAN.