July 25, 1933. J. G. ALBERTSON 1,920,158

SEWAGE APPARATUS

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FIG. 2

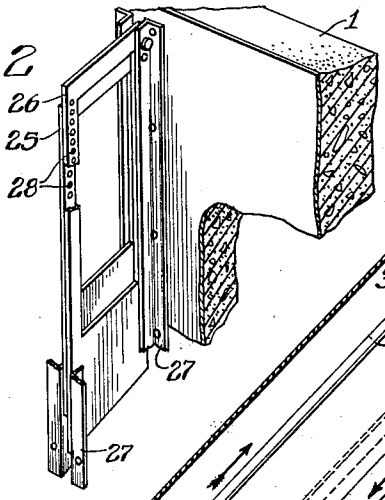


FIG. 1

FIG. 3

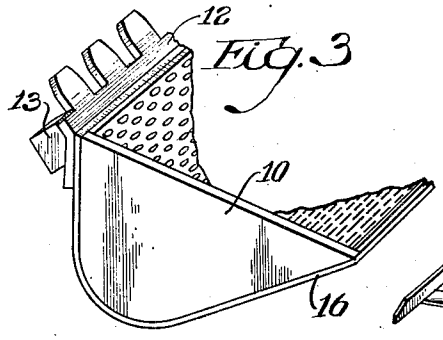
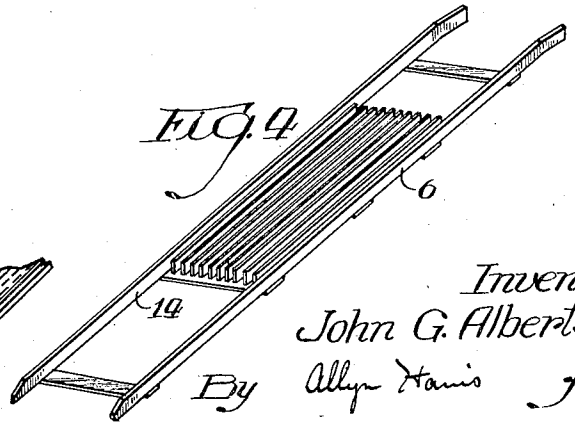


FIG. 4



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Fig. 7

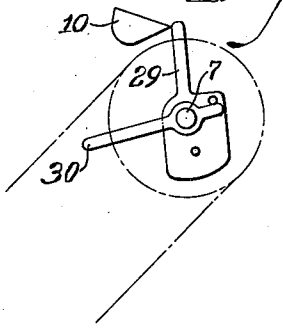


Fig. 8

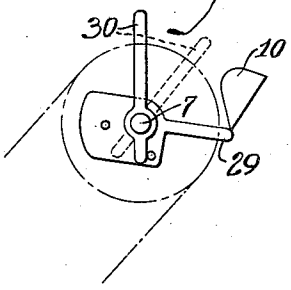


Fig. 5

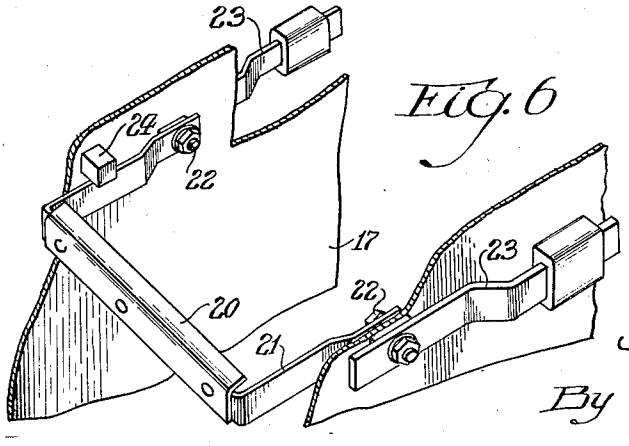


Fig. 6

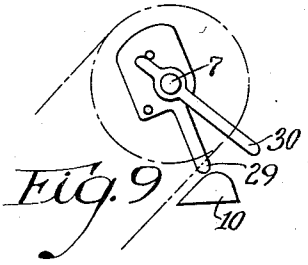


Fig. 9

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Patented July 25, 1933 1,920,158

UNITED STATES PATENT OFFICE

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SEWAGE APPARATUS

Application filed December 18, 1931. Serial No. 581,895.

This invention is concerned with improvements in mechanical equipment employed in sewage treatment plants.

Modern sewage treatment methods involve continuous mechanical cleaning of the screens which remove the larger suspended solids. This has been accomplished in a variety of ways. The present invention presents an improved apparatus for these and other purposes.

The chief object of the invention is to provide an efficient apparatus forming part of a sewage treatment plant for cleaning the screen and removing not only the refuse collected from the screen, but also the grit from the chamber in which the screen is positioned.

Specifically, the invention aims to provide for removal of both suspended and heavy settling solids by provision of a grit chamber for accumulation of the detritus, a screen for accumulation of suspended solids, and mechanism for removing the suspended solids from the screen and the settled solids from the grit chamber and conveying the entire refuse from the chamber in which the apparatus is located.

Other objects of the invention relate to features of construction, particular relationships of parts and functional characteristics, all to be pointed out and described more in detail hereinafter.

Referring to the drawings,

Figure 1 is a view in side elevation, with parts in section, showing an apparatus embodying the present invention.

Figure 2 is a fragmentary perspective view showing the construction of the baffle plate illustrated in Figure 1.

Figure 3 is a fragmentary perspective view of one of the elevator buckets.

Figure 4 is a perspective view of the bar screen.

Figure 5 is a sectional end elevation taken on line 5—5 of Figure 1.

Figure 6 is a perspective view showing the construction and mounting of the wiper element which serves to clean refuse from the screen cleaning teeth carried by the elevator buckets.

Figures 7, 8 and 9 are diagrammatic views illustrating the action of the knocker mechanism for insuring the removal of all refuse from the buckets.

Referring to Figure 1, there is shown a chamber 1 having influent and effluent channels 2 and 3, respectively. The flowline or normal level of sewage in chamber 1 is indicated at 4. Chamber 1 is formed with a depression or pit indicated at 5, into which the detritus may settle. A bar screen 6, of the general type shown in Figure 4, in positioned in the chamber, extending upwardly from the pit to a point beyond the top of the chamber wall, and arranged at a substantial angle to the vertical. Thus, it is quite apparent that in the flow of sewage from channel 2 to channel 3 all suspended solids of substantial size will be intercepted by and deposited upon screen 6, and that the heavier solids will precipitate to the bottom of pit 5. This arrangement was devised to function with the mechanism to be presently described for removing the material intercepted by the bar screen and that deposited in the grit pit.

Arranged in parallel relation to the bar screen is an endless elevating bucket conveyor having its lower end positioned in the pit and its upper end positioned substantially above the top of chamber 1. The head shaft 7 of the conveyor is driven by a sprocket or other suitable means 8 from a reduction gear unit 9. The buckets 10, which may be of the general form shown in Figure 3, are pivotally carried by endless chains trained over sprockets carried by the head shaft 7 and foot shaft 11. Referring to Figure 3, it will be observed that the rear edge of each bucket is provided with a toothed strip 12, the teeth of which are designed to engage in and travel along the slots formed by bars of the screen 6 during the downward travel of the buckets. It will also be noted from Figure 3 that blocks 13 are secured adjacent opposite ends of toothed strips 12. These blocks serve to position the buckets during downward travel, by engagement with the upper surfaces of side bars 14 of the bar screen.

The extremities of bars 14 are suitably tapered to facilitate engagement and disengagement of blocks 13 therewith. On the upper or return run of the conveyor, guide bars 15 are provided. These bars are designed to be engaged by the front inclined surfaces 16 of the buckets and serve to maintain the buckets in upright position throughout the return travel.

The direction of travel of the conveyor is as indicated by the arrows on Figure 1. As the buckets start their downward travel the blocks 13 engage the upper surfaces of side bars 14 of bar screen 6, and as they continue downwardly the teeth of strips 12 engage between the bars of the screen and effectively dislodge all suspended solids deposited thereon and carry same downwardly into the grit pit. The buckets then pick up the material removed from the screen together with the heavier solids deposited in the pit and carry the entire refuse upwardly to and over the head shaft sprockets until the buckets become inverted and discharge their contents into the refuse chute 17. Referring to Figure 5, it will be noted that chute 17 extends laterally and discharges into a sludge pit 18. A closure 19 cooperates with the end of chute 17 to control the discharge into the sludge pit.

The buckets 10, as shown in Figure 3, are suitably perforated to facilitate drainage of fluid from the refuse during the upward travel of the buckets above the flowline.

The teeth carried by the buckets require periodic cleaning, and this is accomplished by a wiper bar 20, shown in Figures 1 and 6. Referring particularly to Figure 6, bar 20 is carried by a U shaped member 21 whose extremities are secured to short shafts 22 which extend through the side walls of chute 17. Secured to the outer ends of said shafts 22 on the outside of chute 17 are weighted actuating arms 23. Stops 24 are secured on the inner walls of chute 17 in position to engage and limit upward movement of member 21. Thus, the wiper bar 20 is yieldingly held in position to successively engage toothed strips 12 and remove any refuse which may cling thereto.

Positioned adjacent the influent channel 2 is a baffle composed of relatively adjustable sections 25 and 26, held in position by suitable guides 27. Adjustment may be effected by means of a suitable pin inserted in any desired pair of apertures 28. The purpose of the baffle is to accelerate or increase the velocity of flow under the baffle to prevent settling of organic matter which might be objectionable in the pit occupied by the lower end of the elevating conveyor.

Referring to Figure 1, it will be observed that the buckets assume an upright position until they start over the head sprockets, at which time they gradually become inverted to discharge refuse into chute 17. In order to insure removal of all refuse from the buckets, there is provided an automatic knocker mechanism which strikes the bottom of each bucket a hard blow after it has traveled a short distance in the downward direction. This mechanism, as shown particularly in Figures 7, 8, and 9, comprises a weighted arm 29 freely mounted on shaft 7, and adjacent thereto a striker arm 30 which is also freely mounted on shaft 7. One end of arm 30 is disposed between a pair of pins extending laterally from the weighted portion of arm 29. The normal positions of these arms are shown in Figure 7, from which it will be observed that as a bucket approaches the vertical plane passing through the axis of shaft 7 it engages the end of arm 29 and, as shown in Figures 8 and 9, maintains such engagement until shortly after it leaves the circumference of the sprocket. Thus, in a complete cycle of the knocker mechanism, arm 29 moves from the Figure 7 position to the Figure 9 position and back to the Figure 7 position. During this cycle one of the pins engages arm 30 and moves same to and slightly beyond the center position as shown in Figure 8, and at this point the arm 30 falls by gravity, striking a blow on the bottom of the bucket. The movement of arm 30, after the striking of the blow, is limited by the other pin on arm 29, which pin also serves to restore arm 30 to normal position as arm 29 moves back to initial position. Each successive bucket operates arm 29 in this manner and receives a blow from arm 30. As shown in Figure 5, two such knocker mechanisms are provided on shaft 7, one adjacent each of the sprockets.

Reviewing the operation, sewage enters chamber 1 through influent channel 2. Sand, grit and other heavy material are deposited on the bottom of pit 5. The larger floating or suspended solids are retained on the bar screen 6. The toothed member 12 traveling downward will remove the accumulated material from screen 6 and carry it to the bottom of pit 5. The material accumulated in this pit will be stirred up by the member 12, the lighter materials being again carried in suspension and either passed through screen 6 or retained on it. The heavier materials such as sand and grit are picked up by the buckets and carrier over the head sprockets and finally discharged into chute 17. This operation, of course, is continuous and, with the aid of the knocker and wiper mechanisms above described, is maintained efficiently.

I claim:

1. Apparatus of the character described comprising a sewage chamber having a bottom wall and a grit collecting pit positioned below the level of said bottom wall, influent

and effluent channels for said chamber, baffle means positioned in the pit portion of said chamber for varying the velocity of the sewage to regulate the type of grit deposited in the pit, said means comprising a plurality of relatively movable members one of which is adjustably spaced from a wall of the pit and another of which is adjustable with respect to the sewage level, and means for removing the grit deposited in the pit.

2. Apparatus of the character described comprising a sewage chamber having a bottom wall and a grit collecting pit positioned below the level of said bottom wall, influent and effluent channels for said chamber, baffle means positioned in the pit portion of said chamber for varying the velocity of the sewage to regulate the type of grit deposited in the pit, said means comprising a plurality of relatively movable cooperating plates one of which has an edge portion adjustably spaced from a wall of the pit and another of which has an edge portion adjustable with respect to the sewage level, and means for removing the grit deposited in the pit.

3. Apparatus of the character described comprising a sewage chamber having opposed influent and effluent channels, a bottom wall portion adjacent the effluent channel, and a pit adjacent the influent channel positioned below the level of said bottom wall portion and adapted to have grit settle therein from the sewage passing through the chamber, a screen having an active area extending from the level of the bottom wall portion to a point above the maximum sewage level for the chamber for removing floating solids from the sewage, and a conveyor for removing the grit settled in the pit and having means for cleaning the accumulated solids from the screen.

4. Apparatus of the character described comprising a sewage chamber having an influent channel, an effluent channel, and a pit located below said channels for receiving grit which settles therein from the sewage flowing through the chamber; a screen for removing floating solids from the sewage located in the chamber above the pit, and means for cleaning the accumulated solids from the screen and the grit from said pit, said means including a perforated bucket for cleaning the pit and a toothed member carried by the bucket for cleaning the screen.

5. Apparatus of the character described comprising a sewage chamber having an influent channel, an effluent channel, and a pit for receiving grit settling therein from the sewage passing through the chamber; a screen for separating floating solids from the sewage, and an endless conveyor device for removing the accumulated matter from both the screen and the pit, said device being arranged in parallelism with the screen with its lower end positioned adjacent the bottom of the pit and being driven in a direction to cause the lower run to travel downwardly over the screen.

6. Apparatus of the character described comprising a sewage chamber having opposed influent and effluent channels, a bottom wall portion adjacent the effluent channel, and a pit adjacent the influent channel positioned below the level of said bottom wall portion and adapted to have grit settle therein from the sewage passing through the chamber, said pit having opposed sloping walls, a screen for removing floating solids from the sewage, and a conveyor for removing the grit settled in the pit and having means for cleaning the accumulated solids from the screen.

7. Apparatus of the character described comprising a sewage chamber having a bottom wall and a grit collecting pit positioned below the level of said bottom wall, influent and effluent channels for said chamber, a screen for removing floating solids from the sewage located in the chamber removed from the pit, baffle means positioned in the pit portion of said chamber for varying the velocity of the sewage to regulate the type of grit deposited in the pit, said means comprising a plurality of relatively movable members one of which is adjustably spaced from a wall of the pit and another of which is adjustable with respect to the sewage level, and means for cleaning the accumulated solids from the screen and the grit from the pit, said means including a bucket for cleaning the pit and a toothed member for cleaning the screen.

8. Apparatus of the character described comprising a sewage chamber having an influent channel, an effluent channel, and a pit located below said channels for receiving grit which settles therein from the sewage flowing through the chamber; a screen for removing floating solids from the sewage located in the chamber removed from the pit, baffle means positioned in the pit portion of said chamber for varying the velocity of the sewage to regulate the type of grit deposited in the pit, said means comprising a plurality or relatively movable cooperating plates one of which has an edge portion adjustably spaced from a wall of the pit and another of which has an edge portion adjustable with respect to the sewage level, and means for cleaning the accumulated solids from the screen and the grit from the pit, said means including a bucket for cleaning the pit and a toothed member for cleaning the screen.

9. Apparatus of the character described comprising a sewage chamber having an influent channel, an effluent channel, and a pit located below said channels for receiving grit which settles therein from the sewage flowing through the chamber; a screen for

removing floating solids from the sewage located in the chamber removed from the pit, baffle means comprising a plurality of relatively movable members one of which is adjustably spaced from a wall of the pit to vary the velocity of sewage flowing through said space and the other of which is adjustable with respect to the sewage level to regulate the depth of flow over the same, and means for cleaning the accumulated solids from the screen and the grit from said pit, said means for cleaning the pit being inoperative to receive grit while the screen is being cleaned.

10. Apparatus of the character described comprising a sewage chamber having an influent channel, an effluent channel, and a pit located below said channels for receiving grit which settles therein from the sewage flowing through the chamber; a screen for removing floating solids from the sewage located in the chamber removed from the pit, baffle means comprising a plurality of relatively movable members one of which is adjustably spaced from a wall of the pit to vary the velocity of sewage flowing through said space and the other of which is adjustable with respect to the sewage level to regulate the depth of flow over the same, and an endless conveyor device for removing the accumulated matter from both the screen and the pit, said device being arranged in parallelism with the screen with its lower end positioned adjacent the bottom of the pit and being driven in a direction to cause the lower run to travel downwardly over the screen.

11. Apparatus of the character described comprising a sewage chamber having opposed influent and effluent channels, a bottom wall portion adjacent the effluent channel, and a pit adjacent the influent channel positioned below the level of said bottom wall portion and adapted to have grit settle therein from the sewage passing through the chamber, a screen for removing floating solids from the sewage, and a bucket conveyor for removing the grit settled in the pit and having teeth carried by the bucket for cleaning the accumulated solids from the screen.

12. Apparatus of the character described comprising a sewage chamber having an influent channel and an effluent channel, a screen for separating floating solids from the sewage, and an endless cleaner device for removing the accumulated matter from the screen, said device being arranged on the inlet side of and in parallelism with the screen with its lower end positioned adjacent the bottom of the chamber and having a screen scraping element driven in a direction to travel from the top to the bottom of the device while cleaning the screen and then upwardly to carry the material removed from the screen outwardly of the chamber to be discharged adjacent the top of the device.

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