H. H. STEPHENS.

SEWAGE TREATING APPARATUS.

APPLICATION FILED JULY 25, 1914.

1,264,990.

Patented May 7, 1918.

2 SHEETS—SHEET 1.

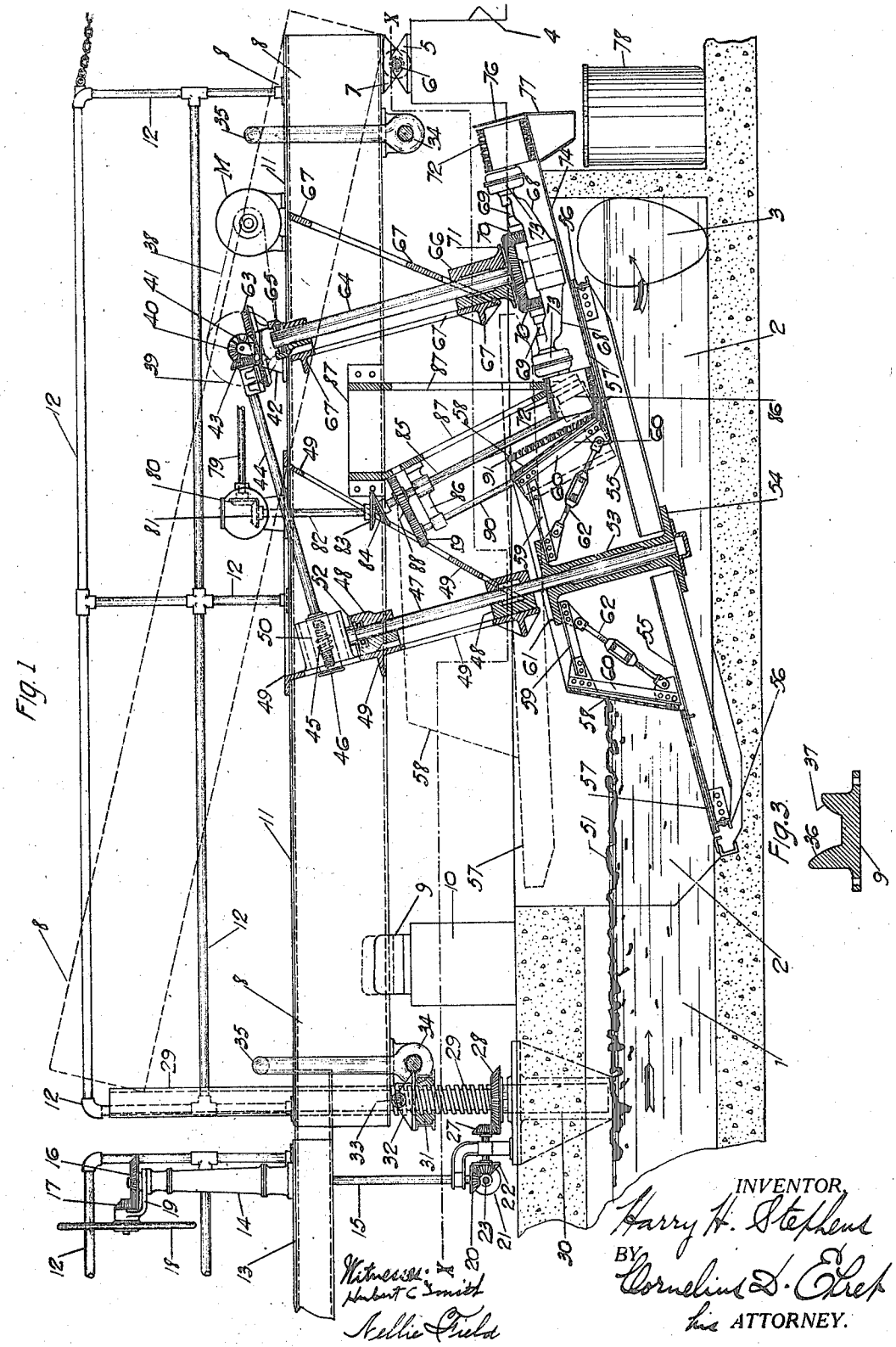

Fig. 1

Fig. 3

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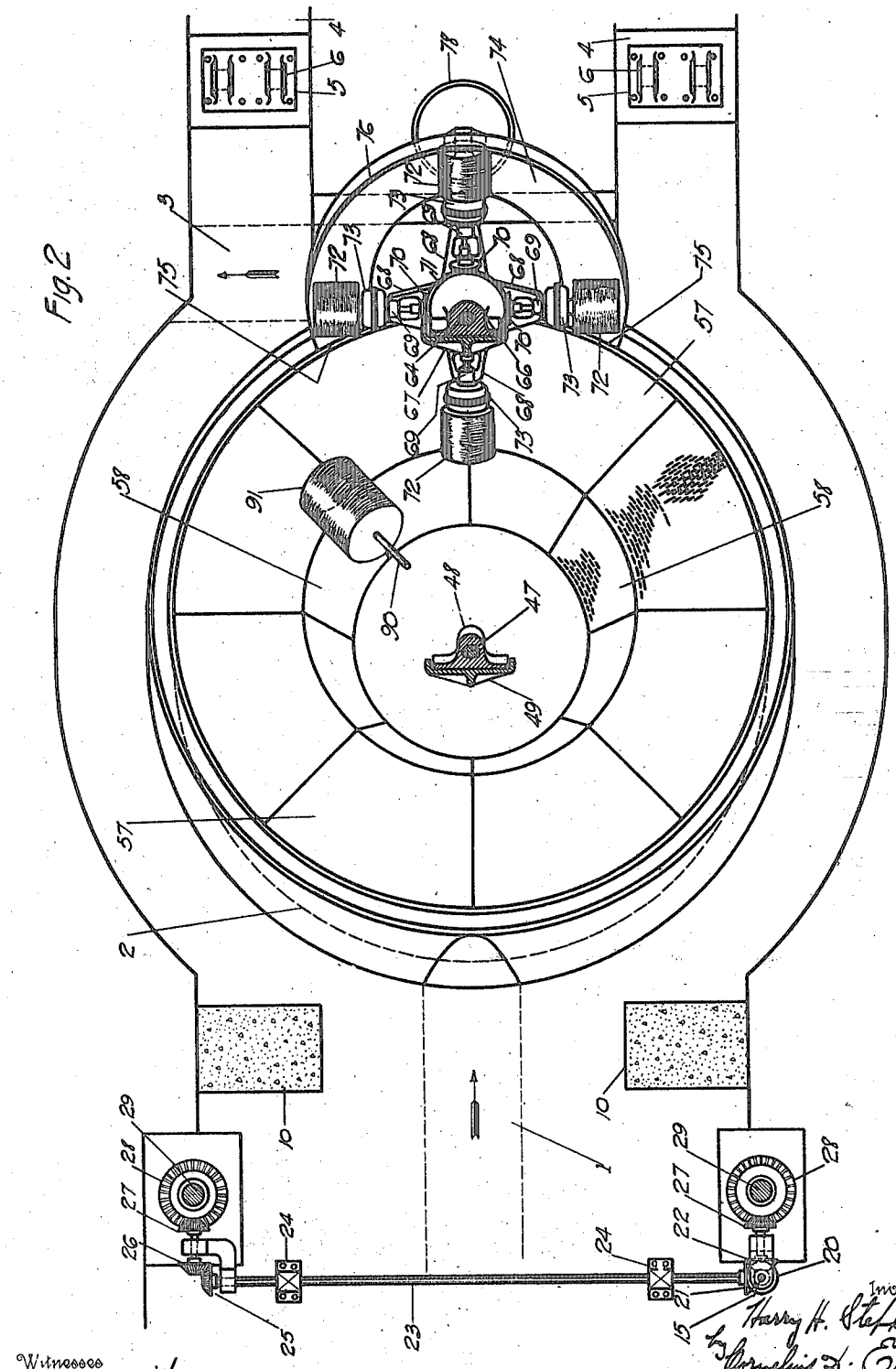
2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

HARRY H. STEPHENS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE SANITATION CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF VIRGINIA.

SEWAGE-TREATING APPARATUS.

1,264,990. Specification of Letters Patent. Patented May 7, 1918.

Application filed July 25, 1914. Serial No. 853,223.

To all whom it may concern:

Be it known that I, HARRY H. STEPHENS, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Sewage-Treating Apparatus, of which the following is a specification.

My invention relates to sewage treatment apparatus, and more particularly to apparatus for screening from the sewage its sludge or solid or semi-solid content, though it will be understood that this apparatus may be used for any other like or analogous purpose.

It is the object of my invention to provide apparatus of the character referred to in which all of the bearings and driving mechanism are disposed outside of the liquid or sewage operated upon; and it is a further object of my invention to so dispose the parts of the apparatus that they may easily be withdrawn from and replaced in operating position.

To these ends I have devised the apparatus of the character hereinafter described.

For an illustration of one of the forms my invention may take reference is to be had to the accompanying drawings, in which:

Figure 1 is a vertical sectional view, some parts in elevation, through my apparatus.

Fig. 2 is a horizontal sectional view, some parts in plan, taken on the line X—X of Fig. 1.

Fig. 3 is a sectional view through one of the guide members.

The inflow sewer 1 conducts the raw sewage or other liquid to receptacle or tank 2 in which it encounters the rotary screen, and the liquid passing through the screen is conveyed away through the outflow sewer 3. These parts may be constructed of concrete, masonry or any other suitable material.

On the piers or pillars 4 are bearing castings 5 carrying suitable pivot pins 6 embraced by open notches in the castings 7 carried by two I-beams, channels or other members 8 which at their other ends are adapted to rest in the guide members 9 carried on the piers or pillars 10. Carried by the members 8 is a suitable bridge or floor 11 on either or both sides of which may be provided a hand railing 12.

The bridge 11 is substantially on a level with the floor or platform 13 upon which is disposed a post 14 within which is the rotatable shaft 15 carrying on its upper end a bevel gear 16 driven by the bevel pinion 17 rotated by the hand wheel 18. The bearings for the hand wheel 18 and gear 17 are carried by a bracket 19 carried by the post 14. On its lower end the shaft 15 carries a bevel gear 20 for driving the bevel gears 21 and 22, the gear 21 driving the shaft 23, having bearings 24, 24 and secured at its other end is a bevel gear 25 adapted to drive the bevel gear 26. The bevel gears 22 and 26 drive bevel gears 27, 27 which drive the bevel gears 28, 28 secured upon the vertically extending jack screws 29, 29 which have vertical bearings 30. On each jack screw 29 is a nut 31 carrying a member 32 on which is pivoted roller 33 on which the member 8 rests. By rotating the hand wheel 18 the jack screws 20 will be rotated and therefore raise or lower the members 8 about their pivots 6, the members 8 being by these means capable of elevation to the position indicated by dotted lines in Fig. 1 for withdrawing the screen and associated apparatus to a position above the level of the sewage or liquid operated upon.

Engaging the pins 34, 34 upon the members 8 are hooks or shackles 35, 35 by which the entire apparatus may be lifted, as by means of a crane.

When the members 8 are lowered, their lower edges or parts are guided by the surfaces 36 or 37 on the guide members 9 to with nicety locate the members 8 and the attached parts when completely lowered and resting upon the members 9.

A motor M, such as an electric motor, or motor of any other suitable type, may be disposed upon the deck or floor 11. By belt 38, or other suitable means, the motor M drives the pulley 39 which in turn drives the bevel gear 40 having bearings 41 carried in the bearing blocks 42 carried on the deck 11. The bevel gear 40 drives the bevel gear 43 secured upon shaft 44 which at its other end carries a worm 45 which drives the worm gear 46 secured upon the shaft 47 having the bearings 48, 48 carried by the casting frame 49 supported by and extending through an aperture in the deck 11; and the bearing 50 for the shaft 44 is also carried by member 49. It will be noted that the

lower bearing 48 for the shaft 47 is above the level 51 of the sewage or liquid. The upper bearing 48 has a thrust ball bearing 52. At the lower end of the shaft is secured a hub 53 to whose lower flange 54 are secured the radial members or spokes 55, which may be small I-beams or channels carrying at their outer ends the circular wheel rim 56, here shown of channel section. Upon the members 55 and 56 is secured the perforated screen 57 which is inclined with respect to the level of the liquid or sewage, due to the inclination of the shaft 47 as shown. A further screen member 58, in the form of a truncated cone is supported on the members 59 and 60 carried by the upper flange 61 on the hub 53. Suitable adjustable tension rods 62 serve to brace the conical screen.

From the pulley 39 or gear 40 is driven a bevel gear 63 which is secured upon the shaft 64 which has an upper ball bearing 65 and a lower bearing 66, these bearings being carried by a cast member 67 carried by and extending through an aperture in the deck 11. At its lower end there is secured to the shaft 64 the spider of arms 68, there being four such arms illustrated, and each carrying a bearing 69 for bevel gears 70 which mesh with the stationary bevel gear 71 secured to the bearing 66. On the outer ends of the shafts to which the bevel gears 70 are secured are secured gears which mesh with other gears upon the shafts carrying the rotary brushes 72, the last mentioned gears for each brush 72 being housed in casings 73. The shafts of the brushes 72 are at a distance from the shafts on which the gears 70 are secured, the effect being a caster-like pivoting of the brushes upon such shafts of gears 70, the shafts driven by gears 70, however, rotating the brushes 72.

In the plane of the screen 57 is disposed the metallic or other platform 74 which extends close to the screen 57, the member 74 terminating at 75, 75, Fig. 2. And on the outer edge of the member 74 is the upwardly extending flange 76, and a chute 77 is provided on the member 74; and below the chute 77 may be disposed a receptacle 78, or any other means for receiving the separated sludge or solids.

Driven by the pulley 39 or gear 40 is the shaft 79 having secured at its one end the bevel gear 80 meshing with and driving the bevel gear 81 secured upon the vertical shaft 82 and having secured at its lower end a bevel gear 83 driving the bevel gear 84 rotatable upon the stationary inclined shaft 85 which is carried in brackets 86, 86 upon the case member 87 carried by one of the members 8. Rotatable upon the shaft 85 and driven by the gear 84 is the gear 88 which drives the gear 89 secured upon the shaft 90 having a bearing in the bracket 86. On the shaft 90 is a brush 91 which engages the conical screen 58.

The operation is as follows:

When the motor M is running the shaft 47 is rotated thus rotating the screens 57 and 58, and the incoming sewage impinges upon these rotating screens, the sludge or solids being retained upon these screens, and the strained liquid passing through the screens and out through the sewer 3. The brush 91 is rotated by the motor M and brushes the sludge and matter from the conical screen 58, the same coming into the path of the brushes 72 which are rotated by the motor M through the shaft 64, these brushes 72 rotating upon their immediate axes and also about the center of the shaft 64, thus brushing the sludge from screens 57 and 58 on to the member 74, the sludge eventually passing out through the chute 77 into the receptacle 78 whereupon the cleaned portions of screens 57 and 58 again reënter the liquid or sewage, and the process is continuously repeated.

It will be noted that all the bearings and driving mechanism for the apparatus described are outside of the liquid or sewage.

The entire apparatus described may be removed to the dotted line positions indicated in Fig. 1 by operating the hand wheel 18 as previously described to tilt the members 8 upwardly upon their pivots 6. Or the entire apparatus may be removed by crane or otherwise as hereinbefore described.

The removal of the screen from the liquid permits easy access to all parts for cleaning, repair, etc., and there is the further advantage that by so removing the screen the usual by-pass for storm water or other excess of liquid may be dispensed with, and all the sewage or other liquid and storm water may pass unrestrictedly through the tank 2 and outlet 3; and when the screen is operating on sewage, it may be so removed during the so-called night flow period when the sludge, etc. is of small quantity.

What I claim is:

1. In apparatus of the character described, the combination with a tank, of a rotary screen comprising flat and conical elements, scrubbing means engaging said flat element, rotary scrubbing means engaging the conical element, and driving means for said screen and said scrubbing means, said scrubbing means being driven independently of each other.

2. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support and having its lower end free from said tank, an inclined screen secured upon and rotated and supported solely by said shaft, all the bearings for said shaft being disposed above the level of the liquid in said tank.

3. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, the bearings for said shaft being disposed above the level of the liquid in said tank, a pivot for said support, and means for moving said support upon said pivot for lifting said screen clear of the liquid in said tank.

4. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried solely by said support and having its lower end free from said tank, an inclined screen secured upon and rotated by said shaft and carried solely by said support through said shaft, bearings for said shaft disposed above the level of the liquid in said tank, said shaft and screen overhung beyond said bearings.

5. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary overhung shaft carried solely by said support and having its lower end free from said tank, an inclined screen secured upon and rotated and supported solely by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, and a motor on said support for driving said shaft.

6. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried solely by said support and having its lower end free of said tank, an inclined screen secured upon and rotated and supported solely by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, and means for scrubbing said screen carried by said support.

7. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried solely by said support and having its lower end free of said tank, an inclined screen secured upon and rotated by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, means for scrubbing said screen carried by said support independent of said tank, and a motor on said support for driving said shaft and said scrubbing means.

8. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, and a pivot for said support.

9. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, a motor on said support for driving said shaft, and a pivot for said support.

10. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, means for scrubbing said screen carried by said support, and a pivot for said support.

11. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, bearings for said shaft disposed above the level of the liquid in said tank, means for scrubbing said screen carried by said support, a motor on said support for driving said shaft and said scrubbing means, and a pivot for said support.

12. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried solely by said support and having its lower end free of said tank, the lowermost bearing for said shaft disposed above the level of the liquid in said tank, an inclined screen secured to and rotated by said shaft and extending into said liquid, a second rotary shaft carried solely by said support, a plurality of arms secured to and rotated by said shaft, and a plurality of rotary screen scrubbers carried by said arm.

13. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried solely by said support, the lowermost bearing for said shaft disposed above the level of the liquid in said tank, an inclined screen secured to and rotated by said shaft and extending into said liquid, a second rotary shaft carried solely by said support, a plurality of arms secured to and rotated by said shaft, a plurality of rotary screen scrubbers carried by said arms, and a motor carried by said support for driving said shafts.

14. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said tank, the lowermost bearing for said shaft disposed above the level of the liquid in said tank, an inclined screen secured to and rotated by said shaft, a second rotary shaft carried by said support, a plurality of arms secured to and rotated by said shaft, a plurality of rotary screen scrubbers carried by said arms, a motor carried by said support for driving said shafts, and a pivot upon which said sup-

port is movable to withdraw said screen from the liquid.

15. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, the bearings for said shaft being disposed above the level of the liquid in said tank, a pivot for said support, means for moving said support upon said pivot for lifting said screen clear of the liquid in said tank, and means for guiding said support

16. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a rotary shaft carried by said support, an inclined screen secured upon and rotated by said shaft, the bearings for said shaft being disposed above the level of the liquid in said tank, a pivot for said support, means for moving said support upon said pivot for lifting said screen clear of the liquid in said tank, a platform adjacent said support, and means on said platform for moving said support on said pivot.

17. In apparatus of the character described, the combination with a tank, of a movable support disposed above said tank, a rotary shaft, bearings for said shaft carried by said support, the lowermost of said bearings disposed above the level of the liquid in said tank, and an inclined screen movable with said support and secured to and rotated by said shaft and extending into said liquid.

18. In apparatus of the character described, the combination with a tank, of a movable support disposed above said tank, a rotary shaft carried by said support and extending downwardly, and a rotary screen fixed upon said shaft and extending into the liquid in said tank.

19. In apparatus of the character described, the combination with a tank, of a support disposed above said tank, a shaft carried by said support and having its lower end extending into said tank, a screen secured upon the lower free end of said shaft and rotated thereby and extending into the liquid in said tank, said shaft and screen supported independently of said tank and solely by said support.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

HARRY H. STEPHENS.

Witnesses:
NELLIE FIELD,
ELEANOR T. MCCALL.