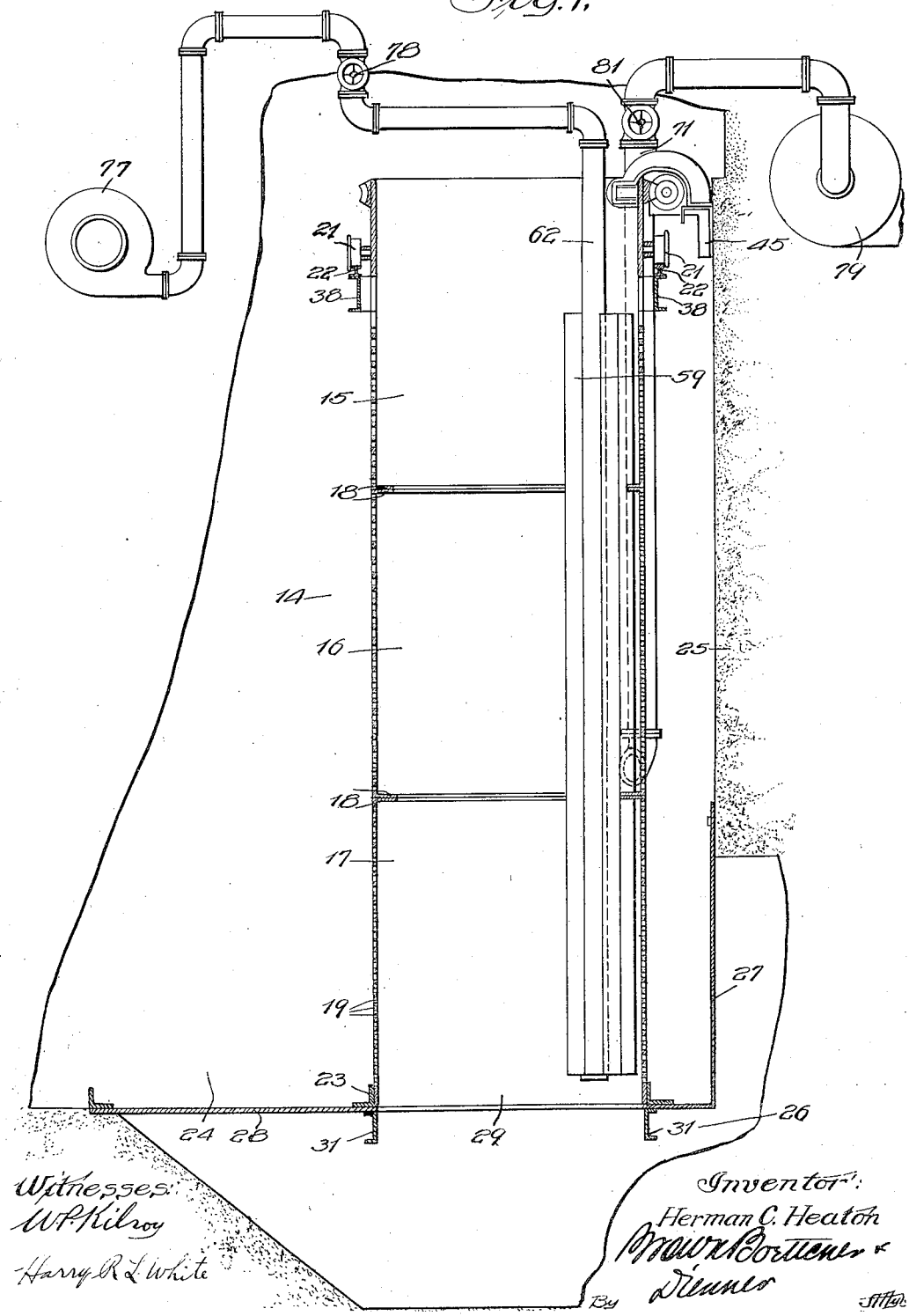
July 6, 1926. 1,591,821

H. C. HEATON

REVOLVING SCREEN

Filed Sept. 13, 1924 4 Sheets-Sheet 1

Fig. 1.



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REVOLVING SCREEN

Filed Sept. 13, 1924 4 Sheets-Sheet 2

Fig. 2.

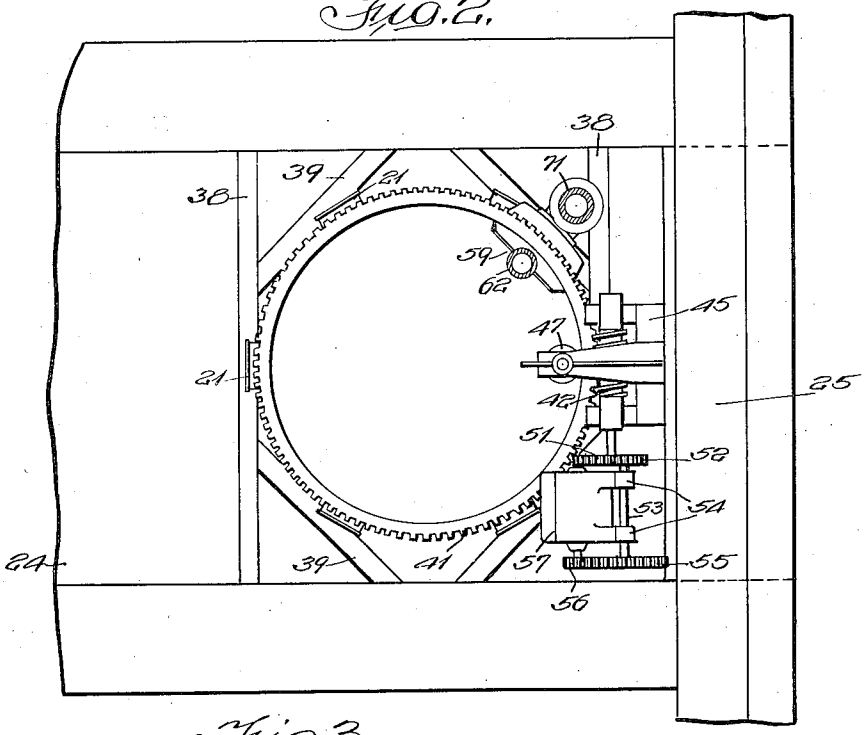


Fig. 3.

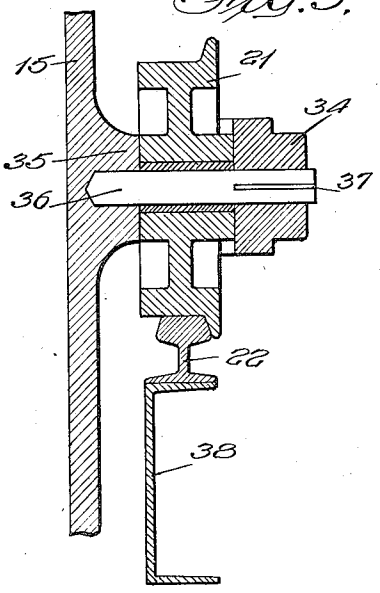
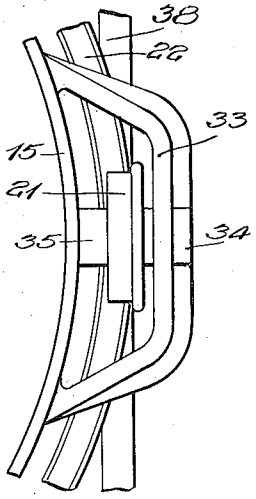


Fig. 4.



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REVOLVING SCREEN

Filed Sept. 13, 1924 4 Sheets-Sheet 3

Fig. 5.

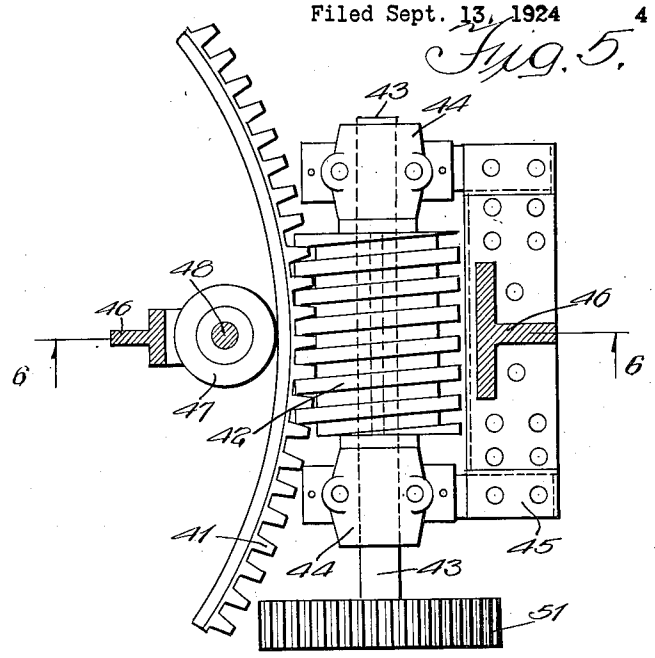


Fig. 6.

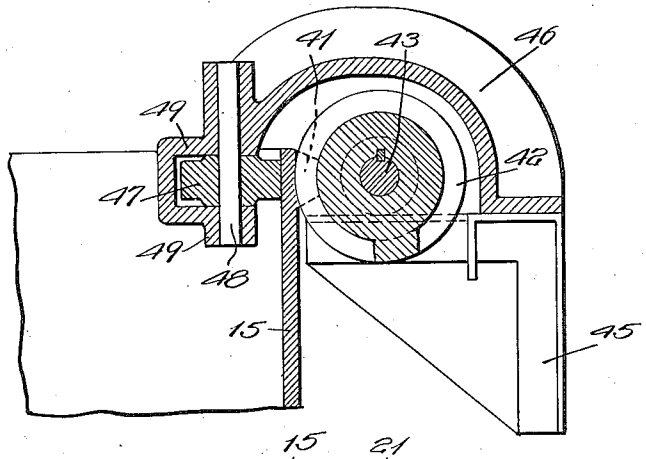
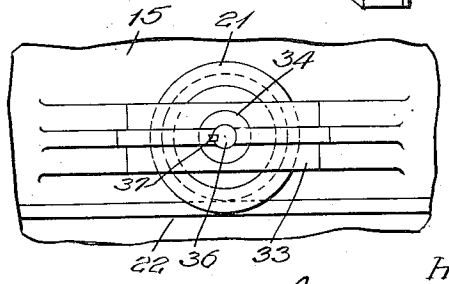


Fig. 7.



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REVOLVING SCREEN

Filed Sept. 13, 1924 4 Sheets-Sheet 4

Fig. 8.

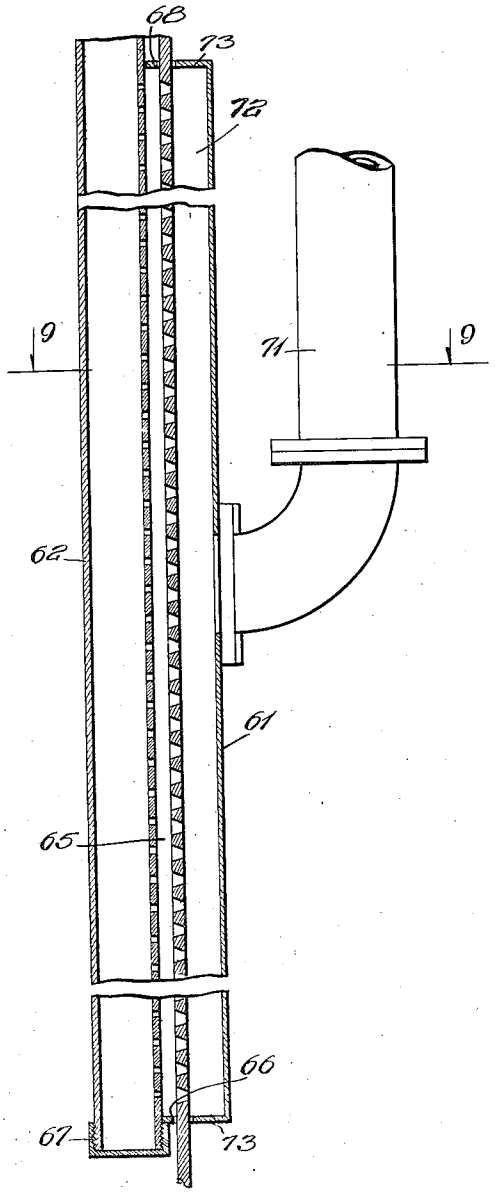


Fig. 9.

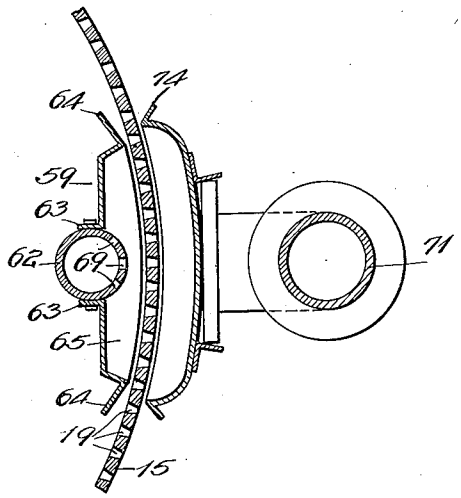
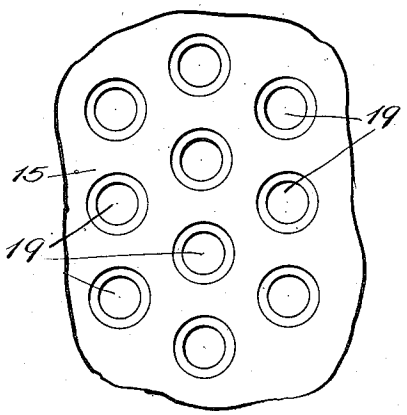


Fig. 10.



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UNITED STATES PATENT OFFICE.

HERMAN C. HEATON, OF CHICAGO, ILLINOIS.

REVOLVING SCREEN.

Application filed September 13, 1924. Serial No. 737,502.

My invention relates to straining screens for pumping stations, power stations, cribs, sewage disposal stations, hydroelectric stations and all water systems where it is desired to strain water (or other liquid) for drinking purposes or ordinary city supply, or to strain boiler feed water or condenser circulating water, or to strain water for power purposes before the same impacts on the turbine or power wheel. The foregoing will illustrate the principal utility for which I have designed my invention, but it will be understood that the invention, or parts thereof, may be embodied in straining screens for straining other liquids in a variety of other situations.

One of the principal objects of the invention is to provide a straining screen of the above character in the form of a rotating cylinder, preferably erect, with the circulation between the outside and inside of this cylindrical screen. This vertical setting of the screen adapts the device to a wide variation of water levels. This vertical disposal also increases the effective straining area of the screen by permitting the water to surround the entire circumference of the screen; and it also facilitates the establishing of an offtake connection with the end of the screen.

A further object of the invention is to provide improved means for cleaning the screen. Refuse adhering to the cylinder and clogging the screen openings is dislodged by a counter-flow of clean water which is circulated through the screen in a direction opposite to the normal flow of the water being strained. This counter-flow of cleaning water is concentrated over a narrow peripheral extent of the cylindrical screen extending longitudinally thereof, by the provision of inner and outer longitudinal baffles lying close to the screen on both sides and embracing a relatively narrow portion thereof. The use of baffles both inside and outside of the cylindrical screen is not essential, but such practice is desirable as the outer baffle permits of a suction being impressed on the cleaning zone of the screen, and the inner baffle permits of a positive pressure being impressed upon the inner side of the same area. The use of the outer baffle and suction connection is also advantageous in that it permits of the refuse and cleaning water being taken away from proximity to the screen and discharged into a suitable waste outlet. These baffles are extended down below the level of the water being strained, and preferably down to the lowermost straining area of the screen, so that the entire straining area of the screen will be continuously cleansed during the rotation of the screen.

Referring now to a preferred embodiment of my invention illustrated in the accompanying drawings:

Fig. 1 is a vertical sectional view through the straining screen as installed;

Fig. 2 is a plan view of the same;

Fig. 3 is a sectional view through one of the flanged wheels which support the screen;

Fig. 4 is a fragmentary plan view illustrating the mounting of the flanged wheels on the upper section of the screen;

Fig. 5 is a horizontal sectional view through the gearing which drives the screen;

Fig. 6 is a transverse sectional view taken approximately on the plane of line 6—6 of Fig. 5;

Fig. 7 is an elevational view of the wheel mounting shown in Figures 3 and 4;

Fig. 8 is a vertical sectional view through the screen, illustrating the arrangement of the baffles or shields which transmit the cleaning water through the screen;

Fig. 9 is a transverse sectional view taken approximately on the plane of the line 9—9 of Fig. 8; and

Fig. 10 is a fragmentary elevational view of the screen apertures, as viewed from the inner side of the screen, showing their tapered form.

Referring first to Fig. 1, it will be observed that the screen, which is designated 14 in its entirety, is built up of a plurality of cylindrical sections, such as the three sections 15, 16 and 17. The abutting ends of these sections are provided with inwardly extending flanges 18 which are bolted or otherwise secured together. These sections have a multitude of strainer holes 19 therein extending around the entire circumference of the cylinder and from the bottom of the cylinder to a point above the highest water level. The screen is suspended from its upper end by a plurality of flanged wheels 21, which track upon a circular rail 22, as I shall presently describe. The lower end of the screen is confined in an annular flange 23, the end of the screen having a slight clearance therein for free rotation. The screen is illustrated as being installed in a large reservoir, runway or the like, the

end of which is represented by the concrete wall 25. The outlet for the screened water from this reservoir or runway 24 is indicated at 26. This outlet is closed off from the area 24 by the plates 27 and 28, so that all water passing to the outlet 26 must pass down through the straining screen 14 and out through the axial outlet 29 thereof. A pair of channels 31 extend across under the plate 28 to reinforce the plate and the ring flange 23 around the axial outlet 29.

Referring now to Figures 3 and 4, it will be observed that the upper section 15 is formed with a plurality of integral bearing brackets 33, which provide an outer bearing hub 34 spaced outwardly from the side of the screen. These outer bearing hubs 34 cooperate with inner bearing hubs 35 projecting from the section 15, for supporting pivot shafts 36, upon which the flanged wheels 21 are mounted. A bearing bracket 33 is illustrated in elevation in Fig. 7. The pivot shaft 36 is held fast in the hub 34 by a key 37, and the wheel 21 revolves on this shaft. There are preferably about six of these supporting wheels spaced about the circumference of the screen section 15, as indicated in Fig. 2, these wheels tracking upon a circular T-rail 22. This circular rail is supported upon a pair of transverse channels 38, supplemented by diagonal channels 39, which form a supporting structure between the side walls of the concrete reservoir 24. Substantially the entire weight of the screen is supported upon these flanged wheels 21.

Referring now to the means for rotating the screen, it will be observed from Figures 5 and 6 that the upper screen section 15 is provided with worm wheel teeth 41, preferably cast integral with the upper end of the section. Meshing with these worm wheel teeth is a worm 42 which is mounted on a shaft 43 having bearing support in the two end pillow blocks 44. These pillow blocks are bolted to a suitable bracket 45 which is anchored to the concrete wall 25 adjacent the upper end of the screen, as shown in Fig. 1. An arched bracket 46 is bolted to the bracket 45, and overhangs the worm 42 for supporting a pressure roller 47 in engagement with the inner circumference of the screen. This roller is journaled upon a shaft 48 supported in hub 49 in the bracket. The roller 47 constitutes a point of reaction which carries any radial thrust or movement imparted to the gear teeth 41 from the worm 42. A large gear 51 on the worm shaft 43 meshes with a pinion 52 on a back-gearing countershaft 53. This countershaft is journaled in suitable bearings 54, and at its other end carries a large gear 55 which meshes with a pinion 56 on the shaft of an electric motor 57. The motor 57 may be supported on an extension of the bracket 45, or upon any other suitable supporting structure. The ratio of the back-gearing 56—55, 52—51 and the worm gearing 42—41 is preferably such that the screen 14 makes approximately two revolutions per minute. The above speed is purely illustrative of one installation which I have completed; it will be obvious that any higher or lower speed may be employed, as desired.

Referring to Figures 8 and 9 wherein I have illustrated the means for circulating the cleaning water through the screen, it will be observed that I have extended a vertical baffle or shield 59 downwardly along the inner side of the screen, and another outer baffle or shield 61 down along the outer side of the screen, directly opposite the shield 59. These two shields embrace only a relatively small part of the screen circumference, leaving the entire remaining portion of the circumference free for its straining function. The shield 59 may be separated into two sections, both bolted to the sides of a delivery pipe 62, as indicated at 63. The lateral edges of the shield or baffle 59 are formed with inwardly turned flanges 64 which provide deflecting surfaces for camming any refuse caught in the screen past the shield or back through the holes 19. The lower end of the chamber 65, defined with the shield 59, is closed at the bottom, as indicated at 66, and the lower end of the delivery pipe 62 is closed by an end cap 67 (see Fig. 8). The upper end of the pressure chamber 65 is also closed, as indicated at 68. It will be understood that the flanged edges 64 are notched out coincident with the abutting flanges 18 which connect adjacent sections of the screen.

The inner wall of the pipe 62 facing the screen is provided with a plurality of rows of apertures 69 which discharge the cleaning water under pressure at various angles into the chamber 65. These apertures discharge cleaning water along the entire length of the chamber 65, both above and below the normal water level in the reservoir 24. The forcible expulsion of this cleaning water impacts in the strainer holes 19 for dislodging refuse therefrom, and also creates a pressure flow from the chamber 65 through these holes for dislodging refuse.

The outer shield 61 is connected at a point substantially midway of its length with a suction pipe 71 which tends to evacuate the suction chamber 72 defined within the shield 61. The top and bottom of the chamber 72 are closed by end extensions 73 on the shield and the lateral edges of the shield are provided with deflecting flanges 74 of similar form and for a similar purpose as the flanges 64. Two angle iron stiffeners 75 may be extended down along the outer side of the shield 61 to reinforce the same.

The pressure or delivery pipe 62 extends to any suitable source of water pressure, such as the city mains, or to especially provided pressure devices, such as the centrifugal pump 77. A valve 78 may be interposed in the pipe line 62. The suction or exhaust pipe line 71 is also connected to any suitable source of suction, such as the intake of a centrifugal pump 79. This suction pipe may also be provided with a controlling valve 81.

It will be apparent that the application of a pressure to the insides of the holes 19 and the application of a suction to the outsides thereof will be very effective for dislodging débris and refuse adhering to the outer wall of the screen or clogged in the holes 19. It will be noticed from Figures 9 and 10 that these strainer holes are given a pronounced taper, with the smaller ends to the outside of the screen, so that any matter which can pass through the outer end of the hole will not become clogged at any intermediate point in the hole. This insures that practically everything adhering to the screen will locate on the outer surface thereof, whereby the countercirculation of cleaning water outwardly through this outer surface will be very efficacious in removing this refuse from the surface. All refuse released is, of course, taken up through the suction pipe 71, being discharged to a suitable sewer or settling reservoir.

I contemplate the use of only the inner shield 59 with its pressure conduit 62 for creating the requisite circulation through the holes for dislodging refuse; or I contemplate the use of only the outer shield 61 with its suction conduit 71 for creating the requisite circulation through the holes; but, for the most efficient operation, I employ both shields and both conduits for establishing pressure and suction upon opposite sides of the holes.

I do not intend to be limited to the particular details herein shown and described.

I claim:

1. In combination, a liquid chamber, a cylindrical straining screen in said chamber, supporting means for suspending said screen from its upper portion, wheels co-operating with said supporting means permitting rotation of said screen, confining means for the lower end of said screen, a pressure element extending longitudinally within said screen for discharging fluid therethrough and an outlet conduit leading from the end of said screen through said confining means.

2. In combination, a water reservoir, a cylindrical straining screen in said reservoir, supporting mechanism suspending said screen from its upper end and constituting the sole support for said screen, said supporting mechanism comprising a rail and angularly spaced wheels whereby said screen is rotatable, power means for revolving said screen continuously, confining means for the lower end of said screen and an outlet leading from the end thereof through said confining means.

3. In combination, a liquid chamber, a tubular straining screen in said chamber, said screen having an outlet leading from one end thereof, means for rotating said screen, and means having a separate pressure source for creating a continuous counterflow of cleaning liquid below the liquid level in said chamber.

4. In combination, a liquid chamber, a tubular straining screen in said chamber, said screen having an outlet leading from one end thereof, means for rotating said screen, a conduit and continuously operable suction means therefor said conduit extending longitudinally of said screen for creating a counterflow of cleaning liquid through said screen along a relatively narrow peripheral portion below the normal liquid level in said chamber.

5. In combination, a liquid chamber, a tubular straining screen in said chamber, means for creating a zone of pressure on one side of said screen, and means for creating a zone of suction opposite to said first zone on the other side of said screen for creating a counterflow of liquid through said screen.

6. In combination, a liquid chamber, a tubular straining screen in said chamber, a first shield on one side of said screen for creating a zone of pressure on this side of the screen, and a second shield opposite to said first shield on the other side of said screen for creating a zone of suction on said latter side.

7. In combination, a liquid chamber, a tubular straining screen in said chamber, an outlet leading from one end of said screen, a shield disposed outside of said screen and extending longitudinally thereof, and means for creating a suction in said shield.

8. In combination, a liquid chamber, a tubular straining screen in said chamber with its axis extending upwardly, an outlet leading from one end of said screen, and means extending longitudinally of said screen including a perforated member and an arcuate shield therefor, extending to adjacent the inner periphery of said screen for creating a counterflow of cleaning liquid therethrough.

9. In combination, a liquid chamber, a tubular straining screen in said chamber, an outlet leading from one end of said screen, a pressure pipe extending longitudinally of said screen along the inner side thereof, said pressure pipe having a plurality of apertures for discharging cleaning liquid through the screen, and cooperating baffle means for confining the discharged cleaning water over a predetermined area of said screen.

10. In combination, a liquid chamber, a tubular straining screen in said chamber, a shield extending longitudinally of said screen and embracing a limited portion of the inner periphery thereof, a second shield extending longitudinally of said screen and embracing a limited portion of the outer periphery thereof substantially opposite said first shield, and conduits connecting with said shields for setting up a circulation through said screen between said shields.

11. In combination, a water reservoir, a cylindrical straining screen in said reservoir, a supporting frame adjacent the upper end of said screen, a circular rail on said frame, wheels carried by the upper portion of said screen tracking on said rail, said wheels constituting the sole supporting means for said screen, power means for rotating said screen continuously, an annulus concentric with the lower end of said screen, an outlet conduit communicating with substantially the entire lower end of said screen through said annulus, a pressure pipe extending longitudinally of said screen along the inner periphery thereof, said pipe having a plurality of discharge apertures therein, a shield supported by said pipe and embracing a portion of the inner periphery of the screen on each side of said pressure pipe, an outer shield extending longitudinally of said screen along the outer circumference, a suction pipe communicating with said outer shield, and sources of pressure and suction communicating with said pressure and suction pipes respectively.

12. In combination, a liquid chamber, a cylindrical screen disposed in the said chamber, an outlet for the said chamber, the liquid in the said chamber having to pass through the screen before reaching the outlet, and suction means operatively disposed at the lower portion of said screen for establishing a flow of cleaning liquid through the screen in an opposite direction to the flow of the liquid in the chamber therethrough.

13. In combination, a water reservoir, a cylindrical straining screen in said reservoir, a supporting frame adjacent the upper end of said screen, a circular rail on said frame, wheels carried by the upper portion of said screen tracking on said rail, means for rotating said screen, an outlet communicating with the lower end of said screen, pressure means associated with the inner periphery of said screen, and suction means associated with the outer periphery of said screen, said pressure means projecting a fluid on the inner periphery of said screen, and said suction means drawing the said fluid through the screen to remove matter from the interstices of the screen.

14. In combination, a water reservoir, a cylindrical straining screen in said reservoir, means for rotating said screen contemporaneously, pressure means associated with the inner periphery of said screen adapted to project a fluid on the inner periphery of the screen, a shield associated with the said pressure means and embracing a portion of the inner periphery on each side of said pressure means, a second shield associated with the outer periphery of said screen, and suction means communicating with the said second shield.

15. In combination, a liquid chamber, a cylindrical screen disposed in a vertical position in the said chamber and supported at its upper end thereby, means for rotating the said screen, an outlet communicating with the lower end of the said screen, the liquid in the said chamber having to pass through the screen to reach the outlet, means associated with the inner periphery of the said screen for projecting fluid onto the inner periphery of the screen, and means for drawing the said fluid through the screen in an opposite direction to the flow of liquid therethrough to remove matter lodged in the interstices of the screen.

16. In combination, a reservoir, a cylindrical straining screen in said reservoir, a supporting frame adjacent the upper end of said screen, a circular rail on said frame, wheels carried by the upper portion of said screen tracking on said rail, gear teeth formed on the periphery of said screen at its upper end, and gear means engaging said gear teeth for revolving the screen.

In witness whereof, I hereunto subscribe my name this 21st day of August, 1924.

HERMAN C. HEATON.