F. CUTTLE.

APPARATUS FOR REMOVING OBJECTS FROM A LIQUID BODY.

APPLICATION FILED MAY 6, 1918. RENEWED SEPT. 22, 1920.

1,412,230.

Patented Apr. 11, 1922.

3 SHEETS—SHEET 1.

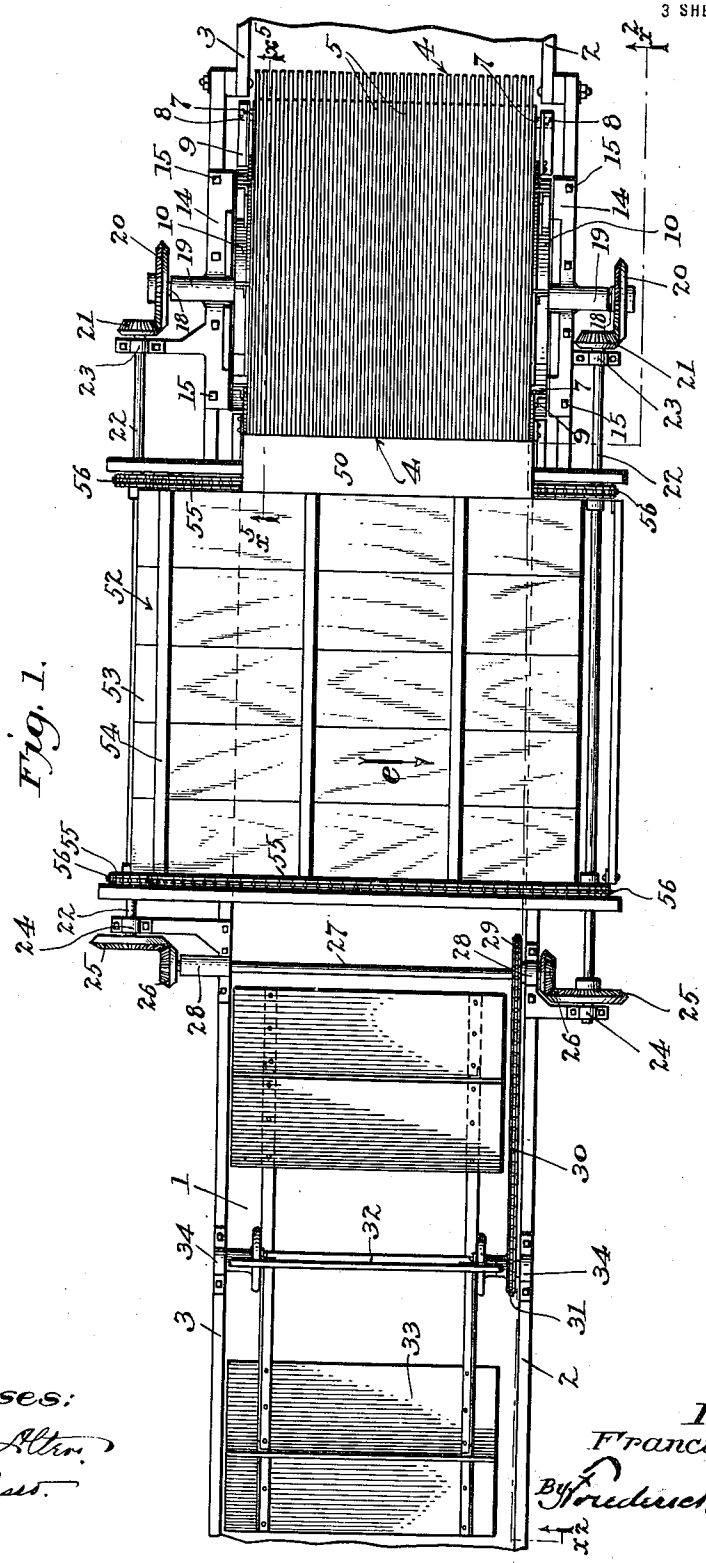


Fig. 1.

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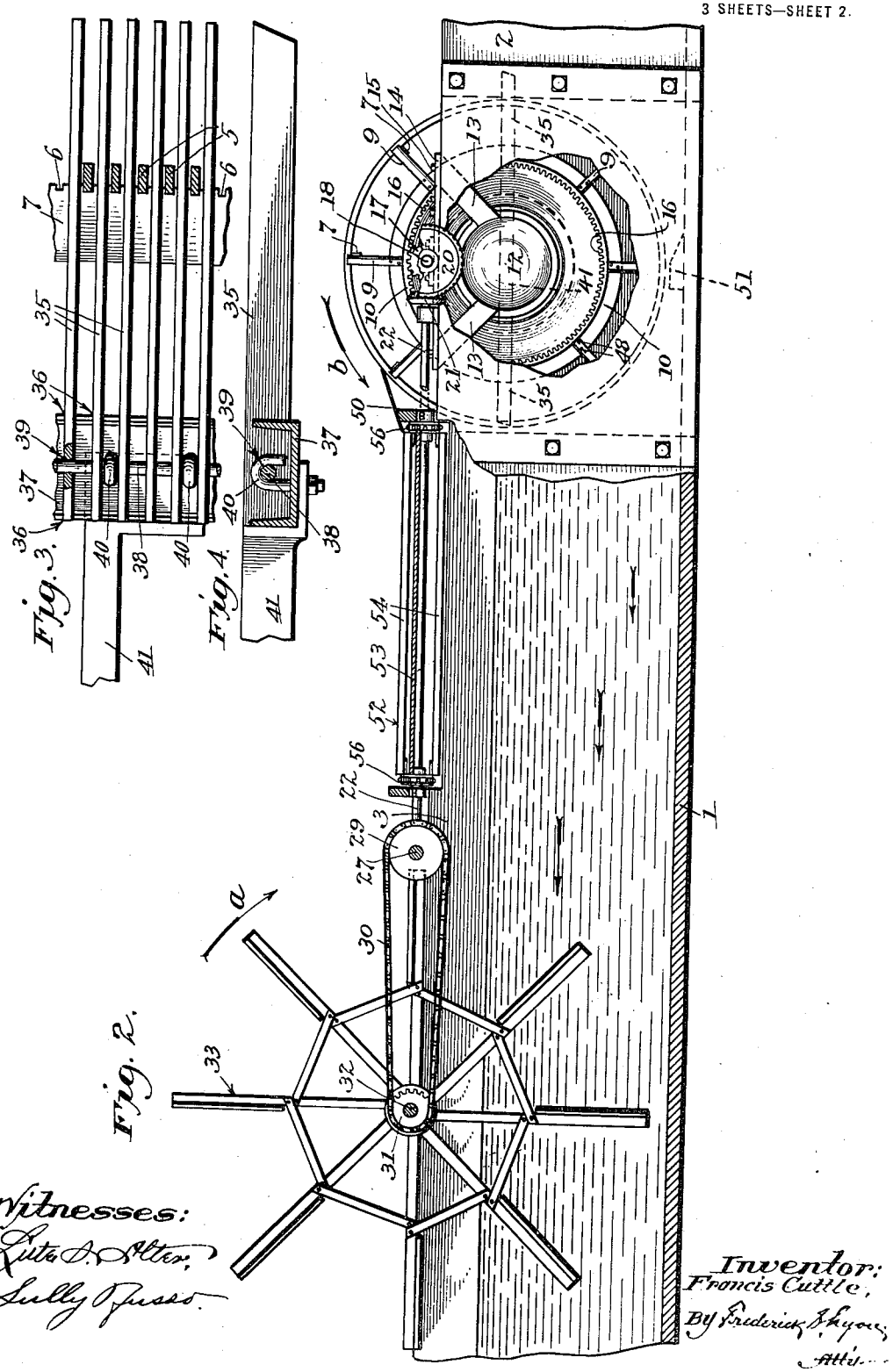


Fig. 3.

Fig. 4.

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 6.

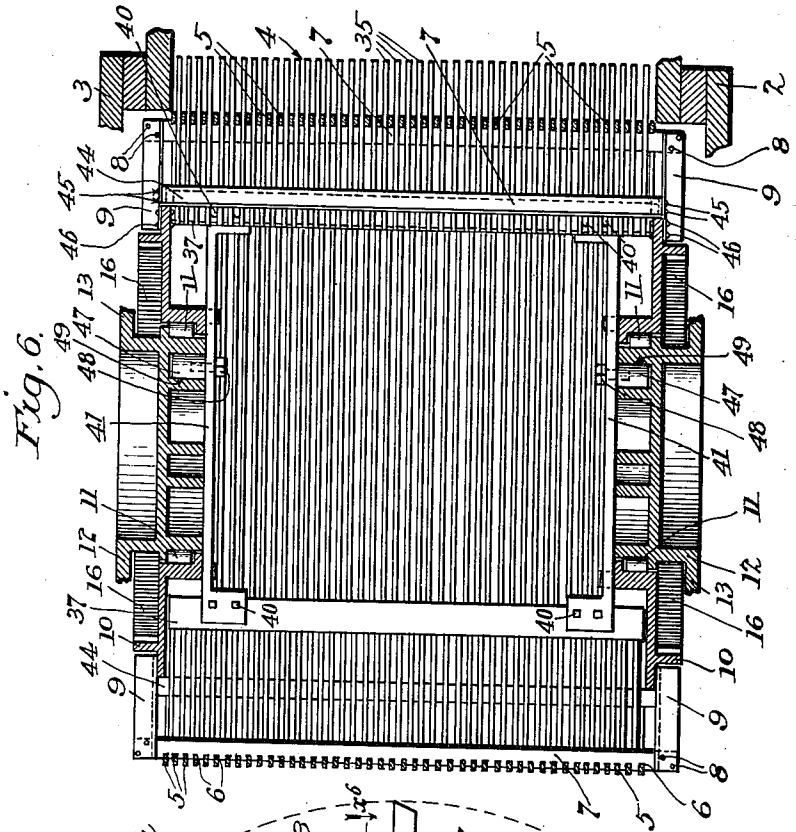
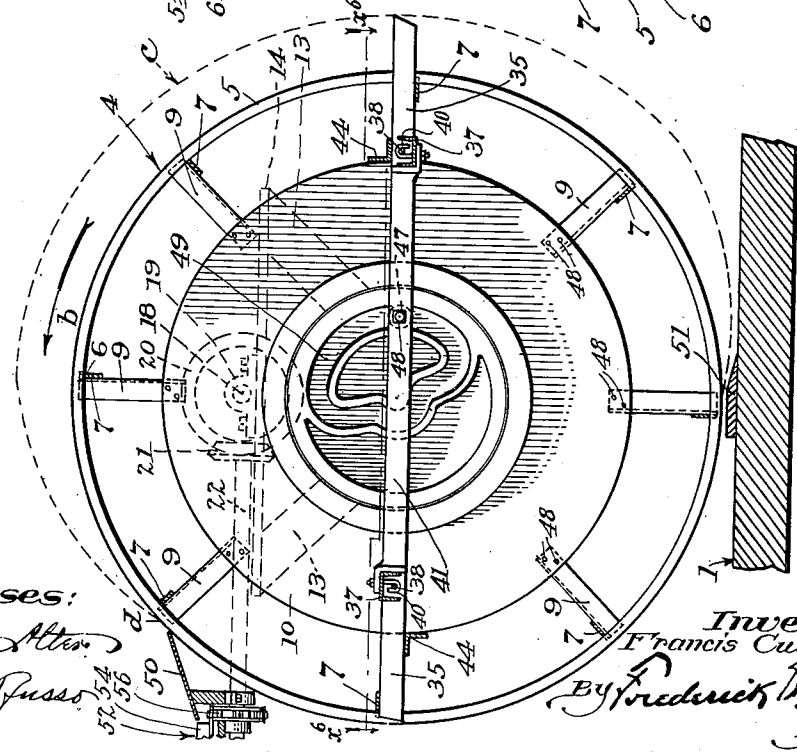


Fig. 5.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR REMOVING OBJECTS FROM A LIQUID BODY.

1,412,230. Specification of Letters Patent. Patented Apr. 11, 1922.

Application filed May 6, 1918, Serial No. 232,866. Renewed September 22, 1920. Serial No. 412,087.

To all whom it may concern:

Be it known that I, FRANCIS CUTTLE, a citizen of the United States, residing at Riverside, in the county of Riverside and State of California, have invented a new and useful Apparatus for Removing Objects from a Liquid Body, of which the following is a specification.

In general the invention relates to an apparatus for lifting objects out of a liquid body and it is illustrated in the drawings as it would be embodied to prevent the passage of fish from one portion of a stream to another or from a natural stream to an irrigation channel, and also for removing debris from the stream in which it is placed.

It is to be understood that certain features of the invention can be embodied in an apparatus capable of being operated to remove objects such as, for example, oranges or other fruit from a liquid body in which they may be floating, that is to say, for example, certain features of the invention may be incorporated in a fruit washer.

An important object of the invention is the closing of the stream to the passage of fish and debris and also the removal of the latter.

An object of the invention is to provide a device of this character of comparatively simple construction and one which is efficient in operation and not liable to get out of order.

Another object is to provide in a machine of this class for great durability and comparatively little wear so that it may be operated continuously for long periods of time with little or no attention being given it.

Other objects and advantages will appear in the subjoined detail description.

The accompanying drawings illustrate the invention:

Figure 1 is a plan view of the invention.

Fig. 2 is an elevation partly in section on line indicated by z^2—x^2, Fig. 1.

Fig. 3 is an enlarged fragmental detail of the revolving drum and teeth in raking position.

Fig. 4 is a front elevation of Fig. 3.

Fig. 5 is an enlarged sectional elevation on line indicated by x^5—x^5, Fig. 1.

Fig. 6 is a plan section on the irregular line indicated by x^6—x^6, Fig. 5.

The liquid container may be for example a natural stream channel or may be artificially formed as indicated in the drawings in which the bottom of the container is indicated at 1 and the sides at 2, 3. A rotary or revolving drum 4 is provided in the container. The drum may be made of any suitable material and, if intended to permit liquid to flow therethrough, as when it functions as a screen to prevent the passage of fish up-stream, the drum may be in the form of a screen, and, in the instance shown in the drawings, the drum is constructed as follows: A series of spaced bars in the form of rings 5 forming a permeable drum are seated in notches 6 of cross bars 7 which are fastened at their ends by rivets 8, or equivalents, to arms 9 projecting from a hub 10 which is journaled at each end by nonfriction bearings 11 on brackets 12. The brackets 12 are provided with upwardly diverging arms 13 and the arms of each bracket are connected with one another by a flange 14 which may be fastened by lag bolts 15, or equivalents, to the upper edge of the container sides 3. Thus the brackets 12 are held stationary while the hubs 10 are free to rotate on the brackets.

The hub 10 is provided with an internal spur gear 16 meshing with a spur pinion 17 mounted on a shaft 18 which extends transversely of the container and which is journaled in bearings 19 that may be mounted on or constitute portions of the bracket flanges 14. This shaft 18 is driven by suitable means and, in the instance shown in the drawings, is provided at its opposite ends with bevel gear wheels 20 meshing with other bevel gear wheels 21 on shafts 22 which extend at right angles to the shaft 18 and longitudinally with respect to the container. The shafts 22 are journaled in bearings 23, 24 on the sides 2 and 3 and are provided with bevel gears 25 meshing with other bevel gears 26 on a countershaft 27 which extends transversely of the channel and which is journaled in bearings 28 mounted on upper edges of the container sides 2 and 3.

The shaft 27 is driven through the agency of a sprocket wheel 29 engaged by a sprocket chain 30 which meshes with a sprocket wheel 31 on the shaft 32 of a paddle wheel indicated in general by the character 33, said shaft being journaled in bearings 34 mounted on the upper edges of the container sides 2 and 3. This paddle wheel 33 is driven by the water flowing through the

container and it is clear from the foregoing description of the driving connections that if the stream of water be flowing to the left in Fig. 2 the paddle wheel will be caused to rotate clockwise as indicated by the arrow *a* and that such rotation will cause counterclockwise rotation of the rotary screen as indicated by the arrow *b*.

The invention in its broader aspects is not limited to the use of the particular driving connections described above since the screen may be driven by other means, if desired.

Movably mounted on the revolving drum so as to be rotated by rotation thereof are rake teeth 35. The inner end portions of the teeth 35 are seated in notches 36 of supporting bars 37 which, in the instance shown, are in the form of channels, the notches being in both flanges thereof. The teeth 35 are clamped to the bars 37 by rods 38 which pass through perforations 39 in the teeth, there being hook-shaped bolts 40 hooked over the rods 38 and extending through the channels 37 to bolt the rods 38 to the channels. These bolts 40 also fasten the channels 37 to reciprocative members in the form of bars 41, said bars being positioned near the opposite ends of the channels 37. The teeth 35 and reciprocating bars 41 are of such lengths that when the outer ends of the teeth 35 at one side of the drum are flush with the peripheries of the screen bars 5 the outer ends of the teeth at the opposite side of the drum will protrude in raking position beyond the periphery of the drum as clearly shown in Fig. 5. The teeth 35 need not necessarily be interposed between each two adjacent screen bars 5, as is readily understood, but such construction is preferred and is shown in Fig. 6 of the drawings. Suitable guides are provided for the teeth 35 and in the instance shown said guides comprise outer bars which may be two of the bars 7, said guides also comprising inner bars 44 fastened by rivets 45, or equivalents, to the arms 9 and also fastened by rivets 46, or equivalents, to the hub 10.

Means are provided to shift the reciprocative bars 41 endwise so as to alternately move the teeth 35 out and in, the teeth at either side being moved outward while those at the other side are being moved inward. This movement of the teeth is accomplished while the drum is rotating and rotation of the drum, in this instance, causes said movement. Movement of the bars 41 may be produced by various means without limiting the invention in its broader phases and, in the instance shown in the drawings, the construction relied upon to effect the movement is as follows: The bars 41 are provided on their outer faces with rollers 47 which are journaled on studs 48 projecting from the outer faces of the bars 41. The rollers 47 are engaged by stationary cam-ways 49 which are formed in the inner faces of the brackets 12. Thus the cam-ways 49 are stationarily mounted so that upon rotation of the revolving drum the rollers 47 will track in the cam-ways and cause appropriate reciprocation of the bars 41 and consequently of the teeth 35. In Fig. 5 the dotted line *c* indicates the approximate path of travel of the outer ends of the teeth 35 during that portion of the rotation of the drum in which the teeth 35 project beyond the periphery of said drum. The cam-ways 49 are of such shape as to effect this movement of the teeth 35. At the point *d* which represents the end of the instroke of the teeth 35 there is provided a downwardly and outwardly sloping chute 50, the inner end of said chute being as close as possible to the peripheries of the screen bars 5 so that debris may be practically scraped from the periphery of the drum as it rotates.

The revolving drum is placed as close to the bottom 1 of the channel as it is possible to do without the teeth 35 striking said bottom but, since the teeth are forced downward somewhat below the level of the lower side of the drum periphery, it is advantageous to place a filler strip 51 transversely of the bottom so as to substantially fill in the space between the periphery of the drum and the bottom of the channel excepting for slight clearance between the strip and the periphery of the drum, thus to prevent fish from passing beneath the revolving drum.

The outer end of the chute 50 discharges into a conveyer 52 extending transversely of the channel. In the instance shown in the drawings the conveyer is in the form of an ordinary scraper conveyer having a material-supporting surface 53 and flights 54 to move over said surface so as to impel material along the surface and discharge it at one end of the conveyer to one side of the container. The flights 54 are connected at their ends to the endless conveyer chains 55 which are each rove around sprocket wheels 56 mounted on the shafts 22. It is obvious that rotation of the shafts 22, as hereinbefore provided for, causes movement of the conveyer flights 54 in the direction of the arrow *e*, Fig. 1.

In practical operation the paddle wheel 33 will rotate in the direction of the arrow *a*, Fig. 2, so as to revolve the drum in the direction of the arrow *b*, Figs. 2 and 5. Rotation of the drum will carry the teeth 35 around with it thus moving the rollers 47 in the cam-ways 49. Assuming that the drum parts are in the positions shown in Fig. 5, it is clear that the teeth 35 at the right side of the drum will be held protruding from the periphery of the drum to a maximum degree until said teeth reach the highest level of their motion and that

said teeth will then be gradually retracted so as to pass beneath the inner edge of the chute 50. During this movement of these teeth, the retracted teeth at the opposite side of the screen will be moved downward while in their retracted positions and will then be forced outward so as to project beyond the periphery of the drum, this last movement taking place coincident with the inward movement of the teeth at the opposite side. The debris coming down stream and striking the screen will be caught by the rotating teeth 35 and raked upward and rearward onto the chute 50 which will act to scrape any debris, that will not readily discharge from the drum, off of said drum. The debris slides or is pushed from the chute 50 onto the conveyer 52 and the flights 54 of said conveyer discharge the debris therefrom at one end of said conveyer to one side of the container.

It is understood that the invention is not limited to the specific construction shown in the drawings and hereinabove described but that changes may be made therein within the spirit and scope of the appended claims.

I claim:

1. An apparatus for removing objects from a liquid body comprising a rotary drum, means to rotate the drum, teeth arranged in rows at the periphery of the drum, one row being diametrically opposite the other, and means to reciprocate the teeth in and out of the drum, one row moving in while the other row is moving out.

2. An apparatus for removing objects from a liquid body comprising a rotary drum, means to rotate the drum, teeth at the periphery of the drum, and means operative by rotation of the drum to move the teeth in and out.

3. An apparatus for removing objects from a liquid body comprising a rotary drum, means to rotate the drum, teeth at the periphery of the drum, and means including a cam to move the teeth in and out as the drum rotates.

4. An apparatus for removing objects from a liquid body comprising a rotary drum, means to rotate the drum, teeth at the periphery of the drum, and means including a cam and operative by rotation of the drum to move the teeth in and out.

5. An apparatus for removing objects from a liquid body comprising a rotary drum having spaced bars in the form of rings, means to rotate the drum, teeth movable in the spaces between adjacent rings, and means to move the teeth in and out.

6. An apparatus for removing objects from a liquid body comprising a rotary drum having spaced bars in the form of rings, means to rotate the drum, teeth movable in the spaces between adjacent rings, and means operative by rotation of the drum to move the teeth in and out.

7. An apparatus for removing objects from a liquid body comprising a channel, brackets mounted on the sides of the channel, hubs rotatively mounted on said brackets, arms radiating from said hubs, bars connecting the arms of one hub with the arms of the other of said hubs, spaced rings mounted on the bars, teeth adapted to project outward between the rings, and means to rotate said hubs.

8. An apparatus for removing objects from a liquid body comprising a revolving drum, means to rotate said drum, a chute having one edge adjacent the periphery of the drum, movable teeth at the periphery of the drum, and means to move the teeth in and out as the drum rotates, said teeth being flush with the periphery of the drum when they are adjacent the chute.

9. An apparatus for removing objects from a liquid body comprising a revolving drum, means to rotate the drum, a chute having one edge adjacent the periphery of the drum, movable teeth at the periphery of the drum, and means operative by turning of the drum to move the teeth in and out as the drum rotates, said teeth being flush with the periphery of the drum when they are adjacent the chute.

10. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum extending through the periphery of the screen to rake up trash, means to rotate the drum, means inside of the drum to move the teeth in and out, a conveyer extending parallel with the axis of the drum and means to operate the conveyer.

11. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum to rake up trash, means to rotate the drum, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending from adjacent the periphery of the drum to the conveyer.

12. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum to rake up trash, means to rotate the drum, and means to remove material from the periphery of the drum as it rotates.

13. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum to rake up trash, means to rotate the drum, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and means to remove material from the periphery of the drum as it rotates.

14. An apparatus for removing objects from a liquid body comprising a rotary

drum, teeth at the periphery of the drum to rake up trash, means to rotate the drum, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending aslant upward from the conveyer to adjacent the periphery of the drum to scrape material off of the drum and direct it into the conveyer.

15. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means to move the teeth in and out as the drum rotates, a conveyer extending parallel with the axis of the drum, and means to operate the conveyer.

16. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means operative by rotation of the drum to move the teeth in and out as the drum rotates, a conveyer extending parallel with the axis of the drum, and means to operate the conveyer.

17. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means to move the teeth in and out as the drum rotates, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending from the conveyer to adjacent the periphery of the drum.

18. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means operative by rotation of the drum to move the teeth in and out as the drum rotates, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending from the conveyer to adjacent the periphery of the drum.

19. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means to move the teeth in and out as the drum rotates, and means to remove material from the periphery of the drum as it rotates.

20. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum, means to rotate the drum, means operative by rotation of the drum to move the teeth in and out as the drum rotates, and means to remove material from the periphery of the drum as it rotates.

21. An apparatus for removing objects from a liquid body comprising a rotary drum, teeth at the periphery of the drum to rake up trash, means to rotate the drum, means to move the teeth in and out as the drum rotates, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending aslant upward from the conveyer to adjacent the periphery of the drum to scrape material off of the screen and direct it into the conveyer.

22. An apparatus for removing objects from a liquid body comprising a rotary drum, means at the periphery of the drum to rake up trash, means to rotate the drum, means operative by rotation of the drum to withdraw and project the teeth in and out as the screen rotates, a conveyer extending parallel with the axis of the drum, means to operate said conveyer, and a chute extending aslant upward from the conveyer to adjacent the periphery of the drum to scrape material off of the drum and direct it into the conveyer.

23. An apparatus for removing objects from a liquid body comprising a rotatively mounted paddle wheel, a rotary cylindrical drum, teeth at the periphery of the drum to rake up trash, a conveyer extending parallel with the axis of the drum adjacent the drum and between the drum and paddle wheel, and means operatively connecting the paddle wheel with the conveyer and drum.

24. An apparatus for removing objects from a liquid body comprising a rotatively mounted paddle wheel, a rotary drum, teeth at the periphery of the drum mounted for reciprocative movement relative to the periphery of the drum, a conveyer extending parallel with the axis of the drum adjacent the drum and between the drum and paddle wheel, and means operatively connecting the paddle wheel with the conveyer and drum and teeth.

25. An apparatus for removing objects from a liquid body comprising a rotatively mounted paddle wheel, a rotary drum, teeth at the periphery of the drum mounted for reciprocative movement relative to the periphery of the drum, and means operatively connecting the paddle wheel with the drum and teeth.

26. An apparatus for removing objects from a liquid body comprising a rotatively mounted paddle wheel, a rotary drum, teeth at the periphery of the drum mounted for reciprocative movement relative to the periphery of the drum, a conveyer extending parallel with the axis of the drum adjacent the screen, and means operatively connecting the paddle wheel with the conveyer and drum and teeth.

27. An apparatus for removing objects from a liquid body comprising a rotatively mounted drum having its periphery formed of spaced bars in the form of rings, teeth, means to project and withdraw the teeth between the bars, and means to turn the drum.

28. An apparatus for removing objects from a liquid body comprising a revolvable

at the periphery of the drum, and means for projecting and withdrawing the teeth.

29. In an apparatus for removing objects from a liquid body, the combination of channel forming means, a drum rotatably mounted at its opposite ends on the sides of the channel, means to rotate the drum, teeth at the periphery of the drum, and means operative by rotation of the drum to move the teeth in and out.

30. An apparatus for removing objects from a liquid body, comprising a rotary screen, means to rotate the screen, teeth at the periphery of the screen, and means operative by rotation of the screen to move the teeth in and out.

Signed at Riverside, California, this 29th day of April, 1918.

FRANCIS CUTTLE.

Witnesses:
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