March 26, 1935. W. S. WISE 1,995,829

APPARATUS FOR REMOVING FIBROUS MATERIAL FROM LIQUIDS

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Fig. 1.

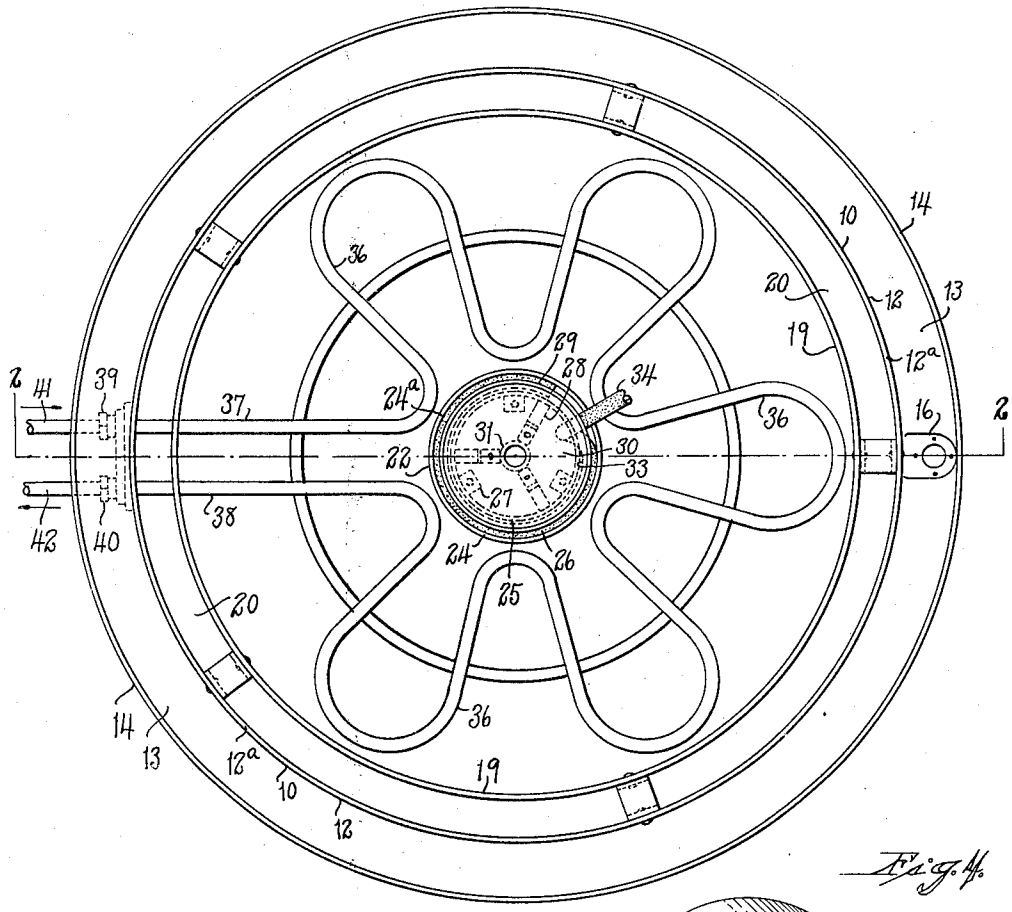


Fig. 4.

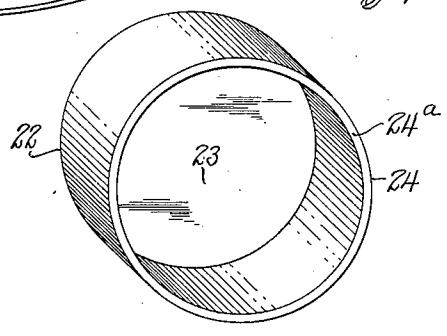
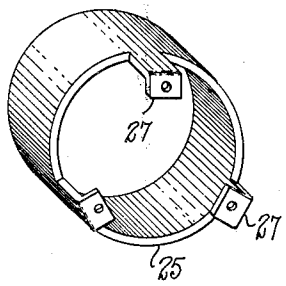


Fig. 3.



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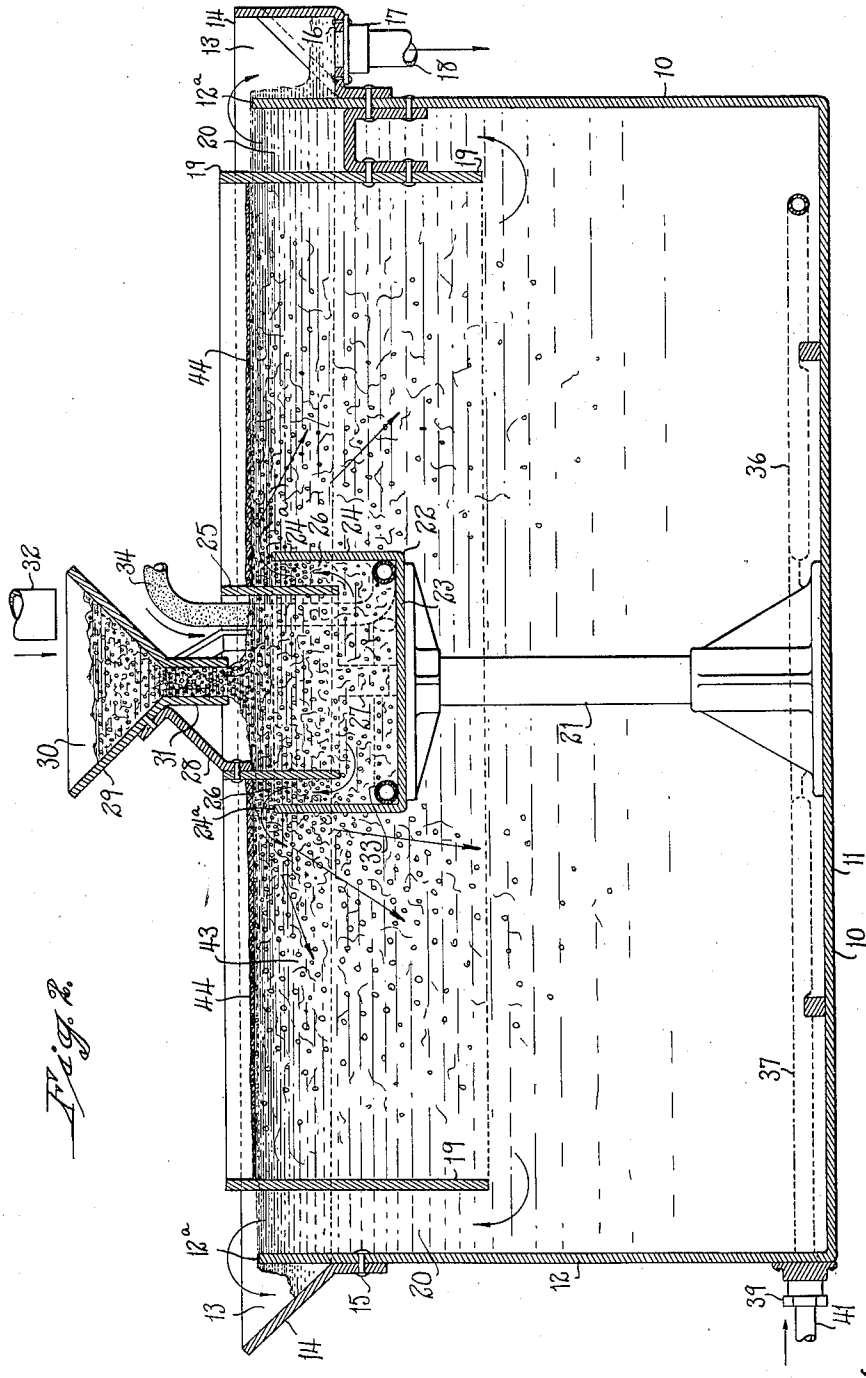


Fig. 2.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR REMOVING FIBROUS MATERIAL FROM LIQUIDS

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Application July 27, 1933, Serial No. 682,471

2 Claims. (Cl. 210—53)

This invention relates to methods and apparatus for removing hair and other fibrous material from liquids, such, for instance, as from the waste or re-used waters in hat factories, woolen mills, etc., though not so limited.

One of the most troublesome materials in waste or re-used waters is material of a fibrous character, a relatively-small amount of which tends to clog screens, filters, pipes, valves and the like and render such equipment inefficient or even inoperative.

One of the objects of the present invention is to provide a simple, reliable and effective method and apparatus for removing fibrous material from liquids.

Another object is to provide a method and apparatus by means of which fibrous material may be removed from liquids at low cost.

A further object is to provide a method and apparatus whereby hair and other fibrous material may be efficiently removed from liquids as a continuous operation.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings and appended claims.

In the accompanying drawings:

Fig. 1 is a top or plan view of one form which an apparatus for removing fibrous material from liquids may assume in accordance with the present invention;

Fig. 2 is a central, transverse, sectional view taken on line 2—2 of Fig. 1, but on a larger scale;

Fig. 3 is a perspective view of the inner baffle-ring; and

Fig. 4 is a similar view of the receiving-chamber.

The particular apparatus herein chosen for the illustration of the present invention includes a tank, generally designated by the reference character 10 and having a bottom 11 and an annular side-wall 12 all or a portion of the upper edge of which constitutes an overflow edge 12^a. Surrounding the upper edge of the said tank is an annular overflow-trough 13 formed by securing to the exterior of the side-wall 12 of the tank, adjacent the upper end thereof, a sloping flange-like ring 14, which is secured in place in any suitable manner, such, for instance, as by rivets 15. At one side, the ring 14 is offset as at 16 to provide for the attachment thereto of an outlet-fitting 17 into which is connected a suitable outlet-pipe 18, as shown in Fig. 2.

Concentrically mounted within the tank 10 is what may be, for convenience of description, termed an "outer" baffle- or guard-ring 19, having its upper edge above the overflow edge 12^a of the said tank and, therefore, above the normal water level therein, and spaced from the side-wall 12 of the said tank to provide a vertical passage 20 through which upwardly passes the effluent liquid, as will hereinafter appear. The bottom edge of the guard-ring 19 just referred to is located below the overflow edge 12^a and is above the bottom 11 of the tank 10, so as to permit the outward lateral flow of liquid into the vertical passage 20.

Secured centrally to and upstanding from the bottom-wall 11 of the tank 10 is a standard 21 supporting at its upper end a receiving-chamber or mixing-cup 22 having a bottom-wall 23 and an annular side-wall 24, which latter also serves as a baffle. The upper edge of the side-wall 24 of the chamber 22 just referred to provides an overflow edge 24^a positioned below the overflow edge 12^a of the tank and hence below the normal liquid level in the said tank, so that the liquid may overflow outwardly over the said edge 24^a, as indicated by the arrows in Fig. 2.

Located within the receiving-chamber 22 is what might be termed an "inner" baffle- or guard-ring 25, which is smaller in diameter than the diameter of the side-wall 24 of the receiving-cup 22 so as to provide between the two said members a vertical flow-passage 26 through which the liquid flows upwardly and radially outwardly. The under edge of the said ring 25 is supported above the bottom 23 of the receiving-cup 22 by any suitable means, such, for instance, as by integral supporting-legs 27, and the upper edge of the said ring extends slightly above the normal liquid level in the tank 10 so as to compel the influent liquid to pass downwardly through the ring in a manner as will be more fully hereinafter described.

Supported axially over the baffle-ring 25 by means of suitable brackets 28 is a funnel-shaped member 29 providing a conical upwardly-opening eddy- or mixing-chamber 30 having the lower edge of its tubular stem 31 preferably located above the normal liquid level in the tank 10.

Eccentrically position over the mixing-member 29 is a supply-pipe 32 from which waste waters or other liquids are delivered into the tank 10 in order to remove hair or other fibrous material from such liquid.

For the purpose of positively supplying air or other gaseous material to the liquid when conditions of temperature and viscosity require, an air-ring 33 is provided having a vertically-extending inlet-pipe 34 which may be connected to a source of compressed air or other gaseous ma-

terial, not shown. The ring 33 is preferably made of porous material, such, for instance, as carborundum, alundum, etc., and is preferably located, as shown, in the bottom of the receiving-chamber 22, beneath the passage 26 between the exterior of the ring 25 and the interior of the wall 24 of the said receiving-chamber.

For the purpose of elevating the temperature of the liquid contained within the tank, should conditions require, I provide, adjacent the bottom of said tank, a loop-shaped heating-coil 36 having a substantially-radial inlet-arm 37 and a similar outlet-arm 38 extending through the side-wall 12 of the said tank, adjacent the bottom thereof, and respectively coupled by means of suitable fittings 39 and 40 to an inlet-pipe 41 and an outlet-pipe 42. Steam or other heating fluid may be introduced into the coil 36 through the pipe 41 and permitted to flow outwardly therefrom through the outlet-pipe 42 in the usual manner of heating-coils.

Let it be presumed that water or other liquids containing hair or other fibrous material is flowing from the supply-pipe 32 into the eddy-chamber 30. Under these conditions, the said liquid will swirl and eddy within the chamber and entrap an appreciable amount of air. From the chamber 30 the liquid flows downwardly through the stem 31 of the member 29 and drops through the interior of the baffle-ring 25 and into the receiving- or mixing-chamber 22, with the effect of further entrapping air. After passing beneath the lower edge of the baffle-ring 25 the now aerated liquid will flow upwardly through the passage 26 and laterally outward over the overflow edge 24^a of the side-wall 24 of the receiving-chamber 22, thence at a greatly reduced speed outwardly into the ring-like space enclosed within the outer guard-ring 19, which space may be said to constitute a separating-zone 43 through which the liquid flows at such relatively-slow speed, as compared to its speed of delivery from the pipe 32, that it may be said to be relatively-dormant in the said zone. The slowing-up of the speed of flow of the liquid as described is occasioned by the progressively increasing flow area available to it as it flows outwardly from the overflow edge 24^a toward the guard-ring 19.

From the separating-zone 43 the liquid flows outwardly beneath the under edge of the outer baffle-ring 19 and upwardly through the annular passage 20 provided between the said ring and the inner face of the wall 12 of the tank 10.

After flowing upwardly through the passage 20, as above described, the liquid overflows over the overflow edge 12^a of the side-wall 12 of the tank 10 and into the drain-trough 13, thence outwardly through the drainpipe 18 to a sewer, or, if the liquid is to be re-used, to such apparatus as may be desired.

As the aerated liquid flows upwardly through the passage 26 and laterally outwardly over the upper or overflow edge of the receiving-chamber 22, the major proportion of the hair and fibrous material contained therein will float to the top of the liquid circumscribed by the outer baffle 19, owing to the attachment to such fibrous material of the minute bubbles or globules of air entrapped in the liquid, as described. This fibrous material will collect at the top of the liquid within the separating-zone 43 and form a mat 44, as indicated in Fig. 2, and when of sufficient thickness, this mat of fibrous material may be removed in any approved manner, such, for instance, as by raking the same from the surface of the liquid.

As before pointed out, should the liquid from which it is desired to separate the fibrous material be of such nature as to require the direct introduction thereinto of air or equivalent gaseous material, this may be done by means of the air-ring 33 before described.

It has been found that the separating action, above referred to, is most effective and rapid when the fluid being treated is warm, and should the liquid being treated require warming, this may be accomplished by flowing steam or other heating fluid through the heating-coil 36. Preferably, the temperature of the fluid is maintained above 90° F.

By means of the apparatus above described, it is possible to continuously remove fibrous material from liquids at trifling cost, so that the clogging effects of such fibrous material upon screens, filters, valves, piping, etc., may be avoided.

The invention may be carried out in other specific ways than that herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. An apparatus for removing fibrous material from liquids comprising a tank having an overflow edge; a guard-member extending both above and below the overflow edge of the said tank in horizontally-spaced relationship thereto; a receiving-chamber located on the side of the said guard-member opposite the said overflow edge; the said receiving-chamber having an overflow edge positioned at a level below the overflow edge of the said tank; and a baffle-member located in said receiving-chamber and extending both above and below the overflow edge thereof.

2. An apparatus for removing fibrous material from liquids comprising a tank having an overflow edge, a ring-shaped guard-member extending both above and below the overflow edge of the said tank and positioned in spaced relationship horizontally with respect thereto; a receiving-chamber positioned within the said guard-member and having an overflow edge positioned below the overflow edge of the said tank; and a baffle of ring-like form positioned within the said receiving-chamber and extending below the overflow edge thereof and above the overflow edge of the said tank.

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