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2,015,567

APPARATUS FOR CLEANING COILS

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2 Sheets-Sheet 1

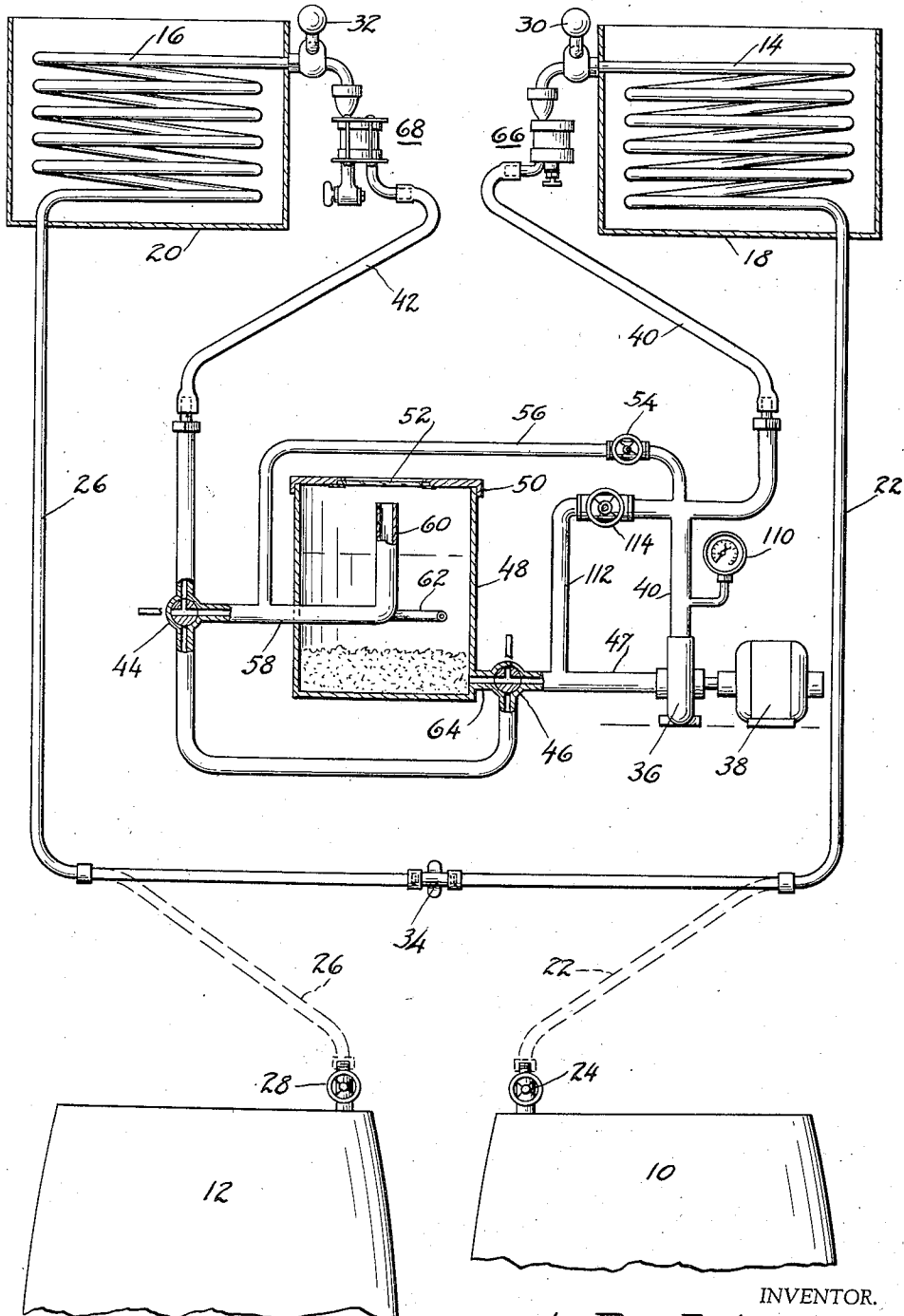


Fig. 1

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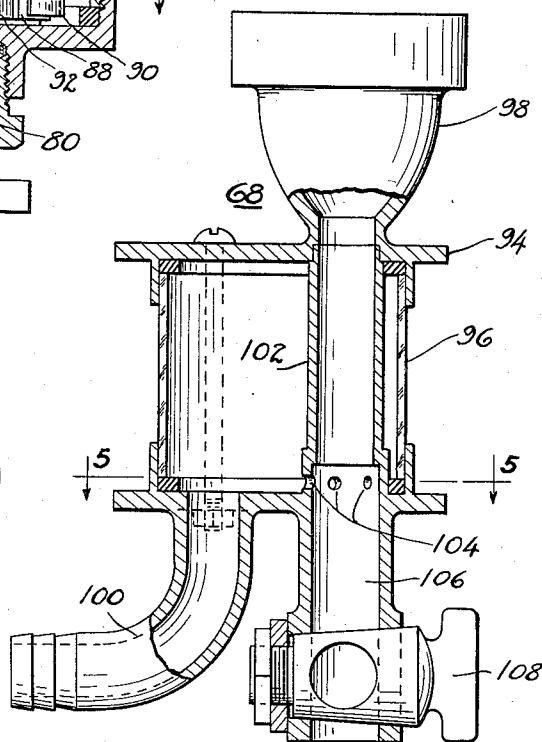
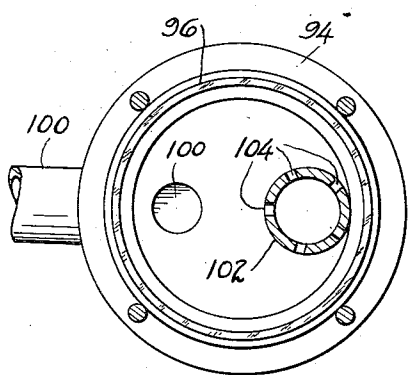
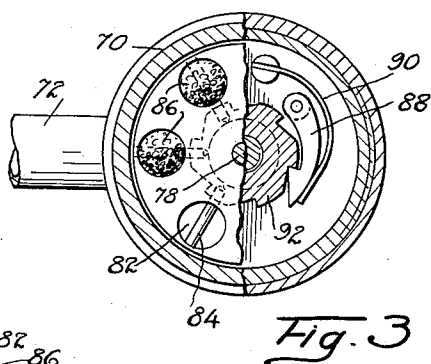
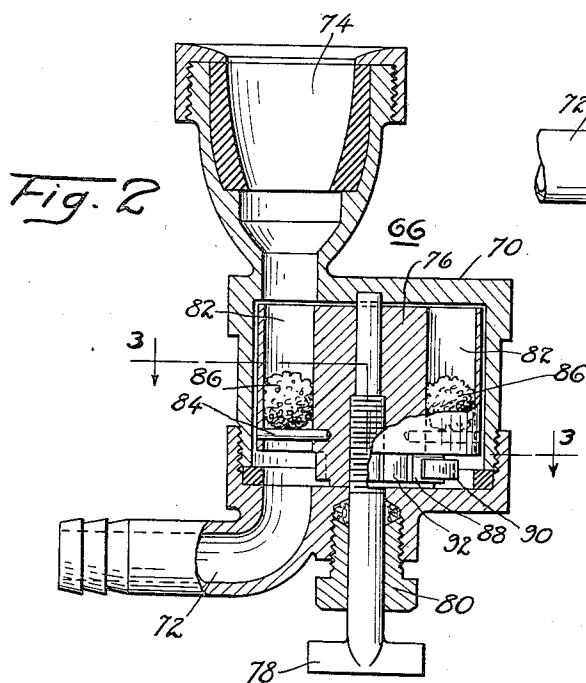
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2 Sheets-Sheet 2



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2,015,567

APPARATUS FOR CLEANING COILS

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Application March 16, 1934, Serial No. 715,798

12 Claims. (Cl. 225—13)

My invention relates to improvements in apparatus for and a method of cleaning tubular coils such as beer coils.

An object is to provide improved means which will function to quickly and thoroughly clean tubular coils of the character above specified and an improved method for carrying out this cleaning operation.

Another object is to provide improved mechanism of the character set forth which will feed liquid cleaner from a suitable source of supply under pressure through the coil or coils to be cleaned. This mechanism includes means operable to deliver at intervals into a liquid stream which is being urged through the coils a plurality of cleaning sponges or other similar scrubbing or cleaning swabs to be driven through the coils by the force of the liquid pressure to clean the walls of the coils.

The device is such that a plurality of such scrubbing swabs or pellets may be delivered successively and at intervals as desired into the liquid stream and carried thereby as set forth. The construction is of such a character that each of these sponges may be discharged from the fluid circulatory system after it has passed through the coil and without interrupting the flow of the liquid through the coil.

My improved process is continuous in its functioning and may be carried on without interruption until the coil or coils are thoroughly cleaned. A plurality of coils may be connected up in series. The apparatus is adapted to carry out the entire process of cleaning.

Other objects, advantages, and meritorious characteristics will more fully appear from the following description, appended claims and accompanying drawings wherein:

Figure 1 is a diagrammatic illustration of apparatus embodying my invention,

Fig. 2 is a vertical sectional view through the sponge carrier which delivers sponges into the circulatory system,

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is a vertical sectional view taken through the sponge extractor which discharges sponges from the circulatory system, and

Fig. 5 is a horizontal sectional view taken on the line 5—5 of Fig. 4.

In Fig. 1 of the drawings there is a diagrammatic illustration of an embodiment of my invention in association with a beer cooling system provided with cooling coils. My invention is shown as coupled up with these coils to effect their

cleaning. In the arrangement there shown two beer barrels are indicated as 10 and 12. These barrels are provided with coils 14 and 16 respectively. Coil 14 is located in a tank 18 and coil 16 is located in a tank 20. A line 22 controlled by valve 24 leads from barrel 10 to coil 14. A line 26 controlled by valve 28 leads from barrel 12 to coil 16. Coil 14 is provided with a valve or control tap 30. Coil 16 is provided with a valve or control tap 32. Each tap includes a faucet of a conventional character.

When it is desired to clean one or both of the coils my pumping and detergent distributing mechanism is coupled up with either one or both of them as may be desired. In Fig. 1 it is shown as connected with both coils. In this arrangement the end of the line 22 which leads from coil 14 is connected with the end of the line 26 which leads from the coil 16 through a coupling 34 as shown in solid line in the drawings. The dotted line extensions of the conduits 22 and 26 illustrate their position when functioning to dispense beer from the barrels. The solid line illustrates their position when functioning as part of my cleaning system.

I provide a pump 36 of any suitable character to force liquid detergent material under pressure through the system. This pump may be driven by an electric motor 38 in a conventional manner. The pump has a liquid delivery conduit 40 which leads to the tap 30 to deliver liquid therethrough to flow through the coil 14 and through the return line 22 leading from the coil. This line 22 is the beer delivery line from the barrel to the coil and is connected as shown in solid line with the beer delivery line 26 to the coil 16. The liquid flows from the line 22 through the line 26 to the coil 16 and therefrom through the tap 32 and through my circulatory system in the manner hereinafter set forth.

At the commencement of the cleaning of the coils it is desirable to flush them out with water to remove any beer that may be therein before the detergent is forced through. To accomplish this the end of the conduit 42 may be inserted in a water tank or other suitable source of supply rather than connected as shown with the faucet 32 of the coil 16 and water is withdrawn therefrom by the action of the pump and driven through the two coils and discharged therefrom as desired to flush out the coils. In this operation the three-way valve 44 is positioned so that the water by-passes the detergent tank and flows through the conduit 42 through the valve 44 and the valve 46 which is disposed so as to permit

water to be drawn therethrough into the pump 36 from which the water is expelled through the line 40 to the coil 14 and through the lines 22 and 26 to coil 16 for discharge therefrom through its tap 32 and wasted as desired.

During this initial flushing of the coils the detergent tank may be prepared with a suitable supply of liquid detergent. This tank is indicated as 48 and has a cover 50 which may be provided with a transparent plate 52 to observe the action of the detergent therein. A suitable quantity of powdered detergent is deposited in the tank. The valve 54 is opened to permit a portion of the water passing through the system to flow through the secondary line 56 into the tank 48 through the line 58 and standpipe 60. There is a curved extension 62 which tends to set up a swirl of water entering the detergent tank so as to obtain a more complete mixture. Due to the admission of water in this fashion into the detergent tank while the system is being flushed out the liquid detergent in the tank will be ready for use upon the completion of the flushing operation. Upon the completion of the flushing operation the conduit 42 will be connected with the tap 32. The valve 44 will then be turned as shown in solid line in Figure 1 so that liquid will not by-pass the tank 48 but will flow from the conduit 42 through the valve 44 and lead 58 into the tank 48 and will be withdrawn from this tank through outlet 64, valve 46 and lead 47 into the pump 36. This forms a closed circulating system whereby the liquid detergent is driven through the two coils and back through the tank and through the coils successively.

My invention concerns itself primarily with the provision of means for accomplishing a more thorough cleaning of the coils through the employment of swabs, sponges or other cleaning pellets which are driven in the liquid stream through the coils and engage the inner walls thereof and scrub the same of any foul material which has collected thereon or which the detergent has failed to completely remove. I provide mechanism which is intended to deliver these cleaning sponges into the fluid stream at intervals to be carried thereby through the coils in the manner set forth and in addition I provide mechanism which is adapted to extract these sponges from the fluid stream without interrupting the continuous flow thereof after the sponges have served their cleaning purpose. Wherever the word "sponges" is employed throughout the specification and claims to designate the cleaning pellets or swabs, it is intended to serve broadly as such a designation.

This mechanism comprises a sponge carrier which is indicated in assembly as 66 and is shown in detail in Figs. 2 and 3 and a sponge extractor indicated in assembly as 68 and shown in detail in Figs. 4 and 5. The sponge carrier comprises a casing 70 having an intake conduit 72 adapted to be connected with the hose of line 40 as shown in Fig. 1. This casing has an outlet 74 adapted to be snugly engaged with the faucet end of the tap 30.

Within the casing 70 is a barrel 76 which is supported for rotation within the casing and is provided with a manually operable handle 78 or the like through which its rotation is accomplished. A packing gland 80 of a suitable character may be provided. The barrel has formed therein a plurality of tubular chambers 82. Across each of these chambers across the lower end is a pin or the like 84. A series of sponges

86 are provided. Enough of these sponges or cleaning swabs are provided so that each chamber, with the exception of one chamber, is supplied with such a sponge or pellet. The word "sponge" is used to indicate any suitable swab element that might be employed to be driven through the coil for the purpose of scrubbing the walls thereof and is to be so understood throughout the specification and claims.

Any suitable ratchet mechanism is provided to retain the barrel at different positions of rotation which bring different chambers into the line. The ratchet mechanism shown is a dog 88 held by spring 90 against a toothed portion 92 of the rotatable barrel. This is adapted to releasably lock the barrel in adjusted position for rotation where a chamber is brought into the line.

In the flushing out of the coils and in the initial passing of the detergent liquid therethrough to break down the foul material collected on the wall of the coils the barrel is positioned so that an open or empty chamber 82 is brought into the line and the liquid flows freely therethrough. After the flushing has been accomplished and the liquid detergent has been passed through the coils for such a period of time as is desired the barrel may be rotated to bring a chamber having a sponge into the line and this sponge is then driven under the force of the cleaning liquid through the coils scrubbing the walls thereof. As the sponge leaves the coil 16 it passes through the sponge extractor 68 which removes it from the liquid stream otherwise it would get into the detergent tank or clog up the pump. This removal of the sponge from the stream is accomplished without interrupting the flow of liquid.

My extractor comprises a casing 94 which may be provided with a transparent wall portion 96 to observe the character of the liquid flowing therethrough. It has a cup-shaped inlet 98 of a character similar to the outlet 74 described in connection with the sponge carrier. This inlet 98 is adapted to be snugly secured to the faucet end of the tap as shown in Fig. 1. There is a fitting 100 at the opposite end of the casing which is adapted to be connected with the hose conduit 42. The inlet 98 terminates within the casing in a tubular extension 102 which is provided with a plurality of apertures 104 through which liquid flows to continue on through the system. The portion of the extension 102 within which these apertures 104 are located is of a larger diameter than the upper portion of the conduit 102 for a purpose hereinafter set forth. There is a sponge discharge chamber 106 controlled by a valve 108 and in the functioning of the system when a sponge enters the portion 102 it drives ahead of it foul material removed from the wall of the coil which liquid material passes out through the apertures 104 and continues on with the fluid stream. The sponge however passes into the discharge portion 106. The enlarged diameter of the extension 102 is due to the fact that it is desired to provide sufficient clearance at such point so that the sponges will not expand into the apertures 104 and clog them but will pass freely down into the reservoir 106 to be discharged therefrom upon suitably rotating the valve 108 to accomplish such discharge. This may be accomplished without any appreciable loss of liquid and without interrupting the continuous flow of liquid through the system.

The system is provided with a pressure gauge 110 and a secondary closed circuit 112. This circuit is controlled by a valve 114. If the pres-

sure rises too high in the system this valve may be manipulated to permit a portion of the liquid driven by the pump to merely by-pass through the discharge outlet 40 and conduit 112 and 47 so as to reduce the pressure in the system.

In the functioning of the apparatus, valve 108 is not necessarily required. The suction from the pump 36 operating through conduit 109 induces practically all the liquid passing through conduit 102 ahead of the swabbing pellet to be drawn through the apertures 104. Very little of the liquid continues on beyond these apertures due to the suction, and for this reason the employment of the valve 108 is not absolutely essential.

An unexpected advantage derived from this cleaning apparatus is the fact that the swabbing pellets in their passage through the beer coils emit a loud knocking noise when they travel through a kinked portion of the coil. Thus one who is skilled in manipulating this apparatus can determine almost exactly when an undesirable kink or sharp turn in the coil is located. This kink can be easily and immediately straightened to conform with the rest of the coil.

What I claim is:

1. Coil cleaning apparatus including, in combination, a liquid cleaner tank, a pump communicating therewith, a fluid discharge line leading from the pump adapted to be placed in communication with a coil, a sponge carrier in said line comprising a rotatable barrel having a plurality of tubular chambers adapted upon rotation of the barrel to be brought successively into registration for cleaning fluid to flow through in its travel through the line, cleaning sponges in certain of said chambers, a fluid return line leading to the tank, sponge discharge mechanism in said line operable to discharge sponges from the fluid stream passing therethrough without interrupting the flow of the cleaning fluid through the line.

2. Coil cleaning apparatus including, in combination, a liquid cleaner tank, a pump communicating therewith, a fluid discharge line leading from the pump, a sponge carrier in said line comprising a rotatable barrel having a plurality of tubular chambers adapted upon rotation of the barrel to be brought successively into registration for cleaning fluid to flow therethrough in its travel through the line, cleaning sponges in certain of said chambers, means for locking the barrel in position to bring any desired chamber into the line, a fluid return line leading to the tank, sponge discharge mechanism in said return line having a portion for cleaning fluid to flow through in its travel through the line and from which sponges may be discharged without interrupting the flow of fluid through the line.

3. Coil cleaning apparatus including, in combination, a liquid cleaner tank, a pump communicating therewith, a fluid line leading from the pump, a sponge carrier in said line comprising a rotatable barrel having a plurality of tubular chambers adapted upon rotation of the barrel to be brought successively into registration for cleaning fluid to flow therethrough in its travel through the line, cleaning sponges in certain of said chambers, means for locking the barrel in position to bring any desired chamber into the line, a fluid return line leading to the tank, sponge discharge mechanism in said return line having a sponge collecting chamber into which sponges are delivered without interrupting the flow of the liquid from the return line to the tank.

4. Coil cleaning apparatus including, in combination, a liquid cleaner tank, a pump communicating therewith, a fluid line leading from the pump to the coil, a sponge carrier in said line comprising a rotatable barrel having a plurality of tubular chambers adapted upon rotation of the barrel to be brought successively into registration for cleaning fluid to flow through in its travel through the line, cleaning sponges in certain of said chambers, a pin extending into each chamber to support the sponge therein and being of such a size as not to materially obstruct the flow of liquid therethrough, means adapted to hold said barrel releasably so that any given chamber thereof forms a continuation of said line.

5. Coil cleaning apparatus comprising, in combination, a fluid pump having a fluid discharge line, mechanism operable to introduce cleaning sponges into the fluid flowing through said discharge line, a fluid return line leading to the pump and mechanism arranged in said line operable to extract sponges from the fluid flowing therethrough without interrupting the flow of fluid through the line.

6. Coil cleaning apparatus comprising, in combination, a liquid solution tank, a pump communicating with the tank to receive liquid therefrom, a liquid discharge line leading from the pump, means for introducing cleaning sponges into the liquid flowing through said discharge line, a liquid return line leading to the tank and a sponge extractor communicating with the return line having one portion through which liquid and contained sponges travel and a second portion of larger diameter communicating with the first portion and into which sponges are discharged from the first portion.

7. Coil cleaning apparatus comprising, in combination, a liquid solution tank, a pump communicating with the tank to receive liquid therefrom, a liquid discharge line leading from the pump, means for introducing cleaning sponges into the liquid flowing through said discharge line, a liquid return line leading to the tank and sponge discharge mechanism arranged in the return line to the tank comprising a perforated tubular portion through which sponges and liquid travel and a portion of larger diameter forming an extension thereof into which sponges are discharged.

8. Coil cleaning apparatus comprising, in combination, a liquid solution tank, a pump communicating with the tank to receive liquid therefrom, a liquid discharge line leading from the pump, means for introducing cleaning sponges into the liquid flowing through said discharge line, a liquid return line leading to the tank and sponge discharge mechanism arranged in the return line to the tank comprising a tubular member having a liquid discharge aperture and provided with an open cup shaped portion of a large diameter at one end and a tubular portion of an enlarged diameter at the opposite end.

9. Coil cleaning apparatus comprising, in combination, a fluid pump having a fluid discharge line, mechanism operable to introduce cleaning sponges into the fluid flowing through said discharge line, a fluid return line leading to the pump, sponge discharge mechanism arranged in the return line to the pump comprising a tubular member open at one end for the admission of fluid and sponges and open at the opposite end for the discharge of sponges, said tubular member having a fluid discharge aperture intermediate its ends communicating with the pump.

10. Coil cleaning apparatus comprising, in com-

- 5 combination, a fluid pump having a fluid discharge line, mechanism operable to introduce cleaning sponges into the fluid flowing through said discharge line, a fluid return line leading to the pump, sponge discharge mechanism arranged in the return line to the pump comprising a chamber having a transparent wall portion, a tubular member extending through said chamber and having one end connected with the fluid return line to receive fluid therefrom and the other end provided with a controlled outlet through which sponges may be ejected, said tubular member having a fluid discharge aperture leading from its interior into the interior of said chamber, said chamber having a fluid discharge outlet connected with the fluid return line leading into the pump to discharge fluid thereinto.
- 10 11. Apparatus of the character described comprising, in combination, a detergent tank having a liquid intake line and a liquid discharge line, a pump having an intake connected with the tank discharge line to draw liquid from the tank, said pump having a liquid discharge line a liquid by-pass line connecting the discharge line of the pump with the intake line of the tank to deliver liquid from the pump into the tank, a second liquid by-pass line connecting the intake line of the pump with the intake line of the tank to re-

ceive liquid by-passed around the tank, mechanism operable to introduce cleaning sponges into the discharge line leading from the pump outwardly beyond the connection of the by-pass line therewith, and mechanism coupled with the intake line leading to the pump outwardly beyond the connection of the tank intake therewith operable to extract sponges from the liquid stream flowing therethrough.

12. Apparatus of the character described comprising, in combination, a fluid pump having a fluid receiving line leading thereto and a fluid discharge line leading therefrom, a fluid detergent tank connected with said discharge line to receive fluid therefrom and connected with said receiving line to discharge fluid thereinto, mechanism operable to control the connection of said tank with each of said lines, sponge delivery mechanism connected with the pump discharge line outwardly beyond the connection of the tank therewith operable to deliver sponges into the fluid stream flowing therethrough, and sponge extractor mechanism connected with the pump receiving line outwardly beyond the connection of the tank therewith operable to extract sponges from the fluid stream flowing through said line.

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