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APPARATUS FOR CLEANING COILS

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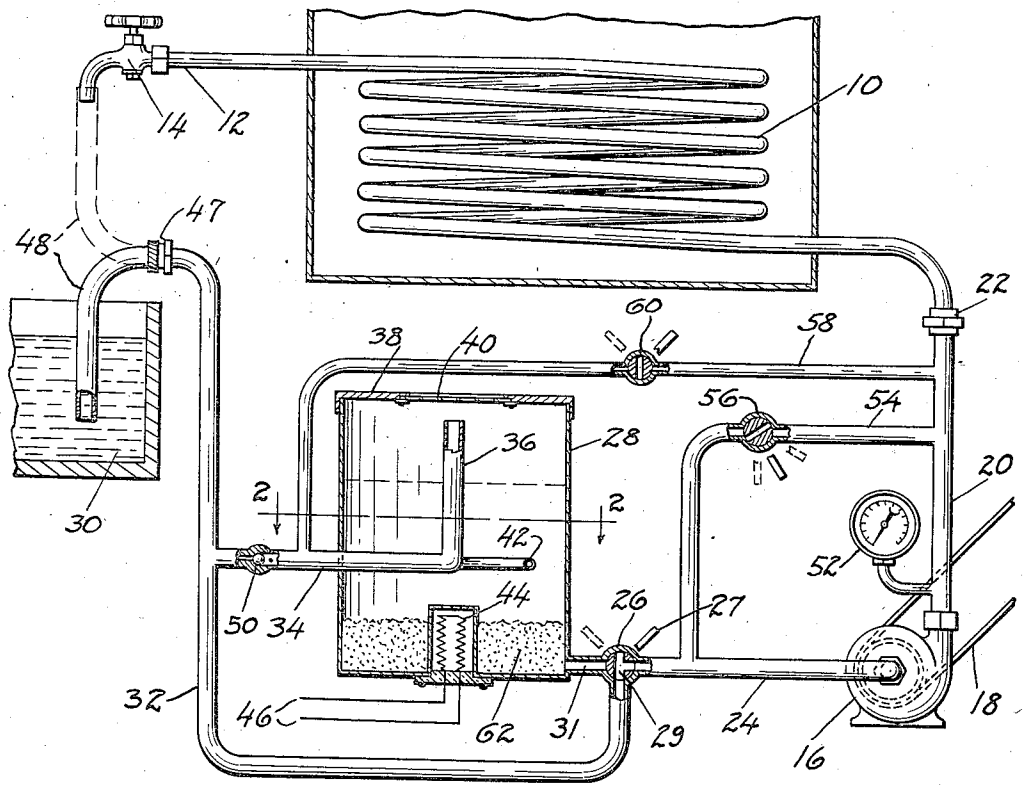

Fig. 1.

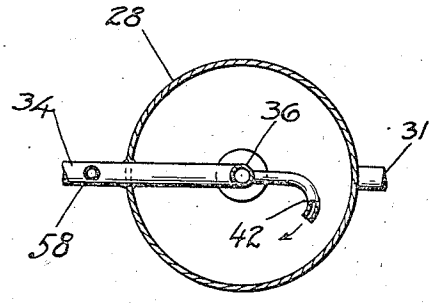

Fig. 2

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APPARATUS FOR CLEANING COILS

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8 Claims. (Cl. 225—13)

My invention relates to an improved process of and apparatus for cleaning tubular coils, such as beer coils.

An object is to provide an improved method whereby coils of the above character may be readily and quickly cleaned in a thorough manner. Heretofore it has been proposed to clean such coils by employing steam and forcing the steam through the coils; and it has also been proposed to clean the coils through the use of a chemical cleaner in solution. The cleaning of coils through the use of steam is attended with certain difficulties due to the effect of the heat and the tendency to cake the material in the interior of the coils. My invention relates to the cleaning of a coil of this character through the use of a chemical detergent and is concerned with an improved method and apparatus whereby this may be accomplished.

A further object of my invention is to provide simple and inexpensive means whereby detergent in solution may be forced under pressure through the coil following an initial flushing out of the coil and whereby the pressure may be held so as not to exceed a determined maximum and a cleaning fluid re-circulated into the coil for a sufficient period of time to remove the foul material and the coil may then be flushed out and all the cleaning material removed in the flushing.

Another object is to provide suitable apparatus whereby an initial flushing of the coil is accomplished, and through adjustment provided by my mechanism a tank of detergent solution is prepared during the initial flushing of the coils and upon the completion of the flushing operation the detergent solution is re-circulated through the coil under pressure, which is maintained within limits through the employment of a subsidiary circulating system. Upon the completion of the cleaning process the coil may be again flushed with clean water.

A meritorious feature resides in the provision of a novel circulating system to accomplish the above set forth objects and the provision of a novel detergent tank wherein the detergent solution is prepared.

The above objects and other, together with advantages and meritorious features will more fully appear from the following specification, appended claims, and accompanying drawing, wherein:

Figure 1 is a schematic elevation partly in cross section illustrating my invention, and

Figure 2 is a horizontal sectional view taken on the line 2—2 through the detergent tank illlustrated in Figure 1.

In the illustrative embodiment of the invention shown in Figure 1 let 10 indicate a coil adapted for cleaning which has a discharge 12 provided with a faucet 14 whereby the discharge of fluid therefrom may be regulated. 16 indicates a suitable fluid pump which may be driven from a power source, not shown, by the drive belt 18. The outlet of the pump is indicated as 20 and a coupling 22 is provided to connect this outlet with the inlet of the coil 10. The intake to the pump is indicated as 24. There is a three-way valve 26 located in such intake which is adapted to place the same in communication either with detergent tank 28 or with a suitable source of liquid 30. This source of liquid may be a fluid tank or some other fluid receptacle wherein clean water may be maintained at a desired level. The communication from the tank 30 into the three-way valve 26 is by a conduit 32 which by-passes the detergent tank 28.

There is provided a lead 34 which leads from the pipe 32 and terminates in a standpipe 36 located within the detergent tank 28. The tank 28 has a suitable cover 38 which may be provided with a transparent face plate 40. The intake 34 to the detergent tank is provided with a curved discharge spout 42 so shaped and arranged within the tank as to set up a swirl of liquid therein to thoroughly mix the detergent chemical into a solution. The tank may be provided with an electrical heating element such as 44 in a circuit 46 leading to any suitable source of electrical energy whereby the solution in the tank may be heated.

The conduit 32 is provided with a connection 47 to which is secured a flexible conduit such as a rubber hose 48 which may depend into the tank 30 as shown in Figure 1 in solid line or may be coupled with the faucet 12 as shown in the same figure in dotted line. When it is depended into the tank 30, as shown in solid line, liquid may be drawn from the tank 30 and by the pump 16 and forced through the coil 10 and discharged out of the faucet 12 into any suitable receptacle provided to care for such discharge, such receptacle not being shown in the drawing. When the portion 48 is connected with the faucet shown in dotted line in Figure 1 the pump may be operated to re-circulate the liquid through the coil as hereinafter more fully described.

It is understood that the three-way valve 26 may be positioned as shown in Figure 1 of the

drawing or that the handle 27 thereof may be manipulated so as to bring the opening 29 through the valve, which stands in a vertical position in Figure 1, to the horizontal position to connect the pump directly with the detergent tank through an outlet 31 at which position the pipe 32 would be closed and liquid to be drawn from the tank 28 by the pump and driven through the coil and would pass out through the faucet 12 and the connection 48, which connection would then be disposed as shown in dotted line, and through the upper portion of the conduit 32 and through the conduit 34 into the detergent tank. There is a check valve 50 which permits liquid to be directed in this manner to the tank and which prevents out flow therefrom.

The pipe 20 which communicates with the outlet to the pump is provided with a pressure gauge 52 which registers the pressure in the system and there is provided a subsidiary circulatory system formed by the conduit 54 which leads from the pipe 20 on one side of the pump to the pipe 24 on the other side of the pump and is provided with a valve 56 which may be arranged as shown in Figure 1 in solid line to cut such subsidiary system out or which may be manipulated in a manner that will be readily understood to include such subsidiary system as a part of the liquid circulatory system.

There is also included another secondary communication line provided by the conduit 58 which leads from the outlet pipe 20 to the pipe 34 as shown in Figure 1 and is provided with a two-way valve 60 for the purpose hereinafter set forth.

In the operation of the system a preferred method is to arrange the system as shown in solid line in Figure 1 and to first withdraw clean water from the tank 30 and drive the same through the coil 10, flushing it out. It will be understood that the water would pass from the tank 30 through the flexible conduit 48, the pipe 32, the three-way valve 26, the pipe 24, pump 16, pipe 20, and into the coil 10 from which it would be discharged through the faucet 12 into a provided receptacle or place of disposition. During the flushing out of the system the detergent tank may be prepared with its detergent solution. A chemical detergent 62 may be placed therein and the valve 60 opened so as to place the passageway therethrough in a horizontal position whereby a certain portion of the liquid being forced outwardly by the pump would be driven through the conduit 58 and discharged through the pipe 34 and standpipe 36 and curved discharge outlet 42 into the detergent tank to form a solution of detergent within the tank.

After this initial flushing of the coil has been completed the solution within the detergent tank should be ready for use and at such point the three-way valve is moved to a position to connect the detergent tank 28 with the pump and to cut off the tank 30 therefrom. At this point the flexible conduit 48 is coupled with the discharge outlet of the faucet and further operation of the pump will build up a pressure in the system which will force detergent in solution through the coil 10, the detergent re-circulating through the coil being carried into the detergent tank from the faucet outlet through the flexible conduit 48 and the upper portion of the conduit 32 and the conduit 34. The fluid being withdrawn from the coil will discharge in the form of a fountain from the standpipe 36 against the plate 40 and the character of such discharge with the contained material which is being taken from the coil will be apparent to an observer looking through the plate 40. The curved discharge 42 is so shaped that it will serve to maintain a swirl and agitation of the detergent in solution so as to secure a thorough mixing thereof within the detergent tank. It will be understood that after the solution in the detergent tank has been prepared, at the conclusion of the initial flushing operation, that the valve 60 may be positioned so as to close off communication through the conduit 58 and the arrangement of such valve would then be as shown in Figure 1 of the drawing in solid line.

The pressure which it is desired to build up to effect the cleaning of the coils may be controlled as I have provided by a subsidiary circulatory system through the employment of the conduit 54. If the pressure gets too high the valve 56 may be turned so that a portion of the liquid discharged through the outlet 20 may be taken back to the intake 24 to the pump and merely be circulated through the pump, thereby holding down the pressure within the coil.

What I claim is:

1. Apparatus of the character described comprising, a fluid pump, a source of fluid, said pump having an intake communicating with said source of fluid through a three-way valve, a detergent solution tank communicating with said intake through said three-way valve, said three-way valve operable to place either the detergent solution tank or the source of fluid in communication with the pump, a by-pass provided with a valve connecting the intake and the outlet of the pump.

2. In apparatus of the character described, comprising a fluid pump, a detergent tank communicating with the fluid pump, a source of fluid communicating with the pump through a three-way valve and with the detergent tank through a check valve, said detergent tank communicating with the pump intake through said three-way valve and communicating with the outlet of the pump through a valve, and a by-pass operable to connect the outlet and intake to the pump.

3. In apparatus of the character described, a detergent tank having a liquid outlet and a liquid inlet and provided with a transparent cover portion, said inlet communicating with a standpipe to direct a detergent solution against the transparent cover portion and provided with an arcuate discharge member adapted to set up a swirl of liquid delivered into the tank.

4. In apparatus of the character described, a detergent tank having a liquid outlet and a liquid inlet and provided with a transparent cover portion, said inlet communicating with a standpipe to direct a detergent solution upwardly toward the transparent cover portion and provided with an arcuate discharge member adapted to set up a swirl of liquid delivered into the tank, said tank provided with a heating element.

5. Apparatus of the character described comprising, in combination, a detergent tank having an inlet, and an outlet, a fluid pump having its intake communicating with the outlet of said tank to establish a flow of fluid therethrough and having its outlet adapted to be connected with coils to be cleaned, a by-pass around said tank connecting the inlet of the tank with the outlet thereof, a three way valve in the connection of said by-pass with the outlet of the tank, and a second by-pass extending from the outlet of said

pump to the inlet of said tank so as to enable the detergent tank to receive fluid under pressure while the pump is communicating through the three way valve with the by-pass around said tank.

6. Apparatus of the character described comprising, in combination, a detergent tank having an inlet and an outlet, a fluid pump having its intake communicating with the outlet of said tank to establish a flow of fluid therethrough and having its outlet adapted to be connected with coils to be cleaned, a by-pass around said tank connecting the inlet of the tank with the outlet thereof, a three way valve in the connection of said by-pass with the outlet of the tank, and a second by-pass extending from the outlet of said pump to the inlet of said tank so as to enable the detergent tank to receive fluid under pressure while the pump is communicating through the three way valve with the by-pass around said tank, and a third by-pass extending around the pump and valve controlled so as to regulate the pressure of the fluid urged onward by the pump.

7. Cleaning apparatus of the character described comprising, in combination, a fluid pump, a detergent tank communicating therewith so as to establish a flow of fluid through the tank upon operation of the pump, a by-pass around said tank terminating at the outlet side of the tank in a three way valve, said valve adapted to cut off the flow of fluid from the tank at the same time permitting the passage of fluid by-passed thereabout, and communicating means adapted to permit the detergent tank to receive fluid through its inlet to prepare the detergent while its outlet is cut off by the three way valve.

8. Apparatus for cleaning coils comprising, in combination, a detergent tank having an inlet and outlet therefrom, a fluid pressure pump communicating with said tank and adapted upon operation to establish a flow of fluid through the tank, a by-pass around said tank connecting the inlet thereof with the outlet thereof, valve control mechanism in the connection of the by-pass with the outlet of said tank, said valve mechanism so arranged that it is adapted to cut off the discharge of detergent material from the outlet of the tank during the filling of the same while at the same time permitting fluid to by-pass around said tank.

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