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SLUDGE CLEANER

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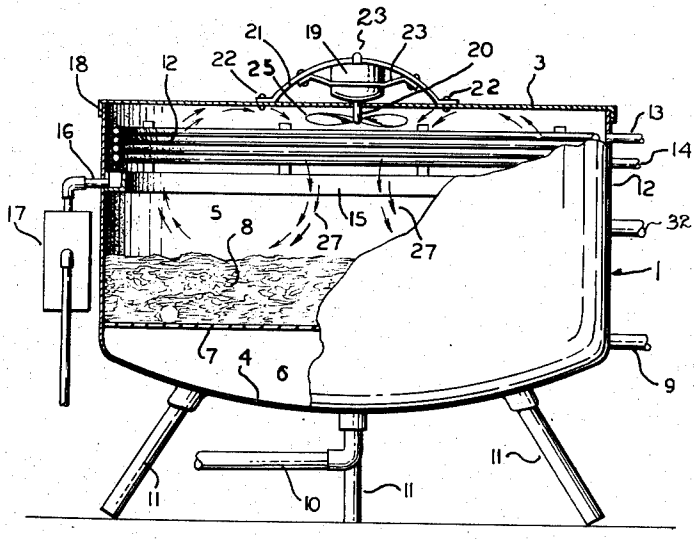


FIG. 1

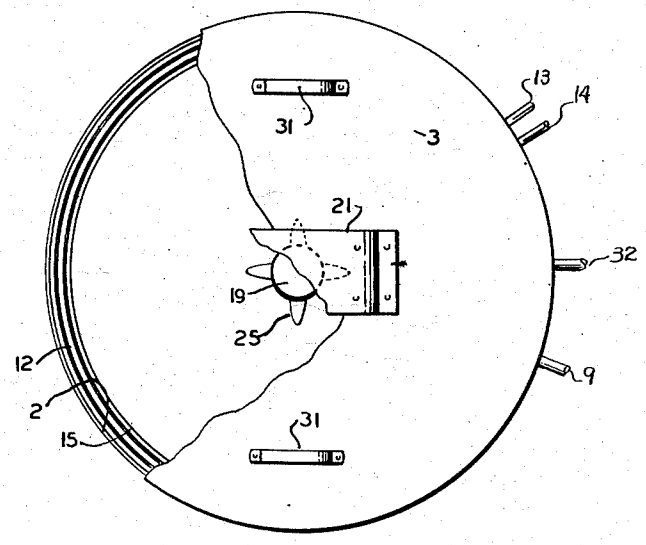


FIG. 2

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SLUDGE CLEANER

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4 Claims. (Cl. 202—170)

The present invention relates to an improved device for removing a maximum amount of cleaning fluid from the filter material used in the dry-cleaning industry.

In the dry-cleaning field, filter materials are used in a cake form to clean and process the cleaning fluid used on the clothing. Periodically, this filter material must be replaced; for as it collects foreign matter, the effectiveness of the filter material in removing this foreign matter from the dry-cleaning fluid is reduced. As this waste filter material, often called sludge, contains a large quantity of the cleaning fluid and as this cleaning fluid is expensive, it has been common in the dry-cleaning art to remove as much of the cleaning fluid from the sludge as possible, prior to discarding the sludge. In the fluid removal process, the fluid is removed by vaporizing it and then collected by condensing the vapors. The prior art practice, however, is quite slow and tedious in nature, partially because the cleaning fluids and vapors, such as perchlorethylene, are quite heavy in nature and the evaporation process required a considerable length of time and heat.

The present invention, however, overcomes these difficulties by providing a structure in which the fluid may be removed in a fraction of the time that it previously took. In the present invention, the cleaning fluid is removed in a fifth to a tenth of the time previously consumed with a substantially greater efficiency of fluid removal.

The objects of the present invention are obtained by positioning a rotating fan member at the upper center portion of the tank containing the sludge. The sludge is heated so that the cleaning fluid vaporizes and the cleaning fluid is, in turn, circulated close to the condensing coils by the action of the centrally located rotating fans.

This structure, as well as other objects and advantages of the present invention, will be more clearly understood in connection with the accompanying drawings in which:

Figure 1 is a side fragmentary elevation of the invention and

Figure 2 is a top fragmentary elevation of the invention.

Referring to the drawing, there is shown a chamber or container 1 preferably having cylindrical side walls 2 and a removable cover 3 with the bottom 4 downwardly bowed at the center. This container 1 is divided into an upper chamber 5 and a lower steam chamber 6 by the partitioning member 7 which extends completely across the container as indicated. This partitioning member 7 serves as a floor to support the sludge 8 being processed, and as a partitioning element for retaining steam within the chamber 6 which steam is used to heat the sludge 8. There is provided a steam inlet pipe 9 at the side of the container 1 connecting into the steam chamber 6 with the steam return pipe 10 connecting to the center lower portion of the chamber 6. Conventional legs 11 are secured by suitable means to the bottom of the container 1 for supporting it at a desired height.

Positioned and suitably secured at the top of the upper chamber 5 about its periphery are a series of condensing coils 12 formed preferably of a continuous copper tubing

entering the container at 13 and leaving it at 14. These copper condensing coils are adapted to circulate cool water through the end 13 and out of the end 14. Also arranged about the periphery of the upper chamber 2 and just below the condensing coils 12 is a channel-like peripheral catch pan 15 adapted to receive the condensed fumes. This catch pan 15 is suitably secured to the side walls with preferably a slightly inclined angle towards the outlet pipe 16 which extends into a water separator 17.

The water separator may be of conventional style to separate the water content usually present from the pure heavier cleaning fluid. This separator 17 may be formed of a tank having an elongated section with a top inlet pipe and a centrally located outlet pipe with a downwardly extending mouth within the tank.

The cover 3 is provided with preferably a peripherally downwardly extending flange 18 fitting about the upper edge of the wall of the container 1. Centrally positioned and supported on the outside of this cover 3 is a motor 19 having a shaft 20 projecting normally through the cover 3. The motor is secured to the cover member 3 on the outside by an arcuate band 21 riveted to the cover at 22 and secured by screw 23 and retaining bands 24 to the motor. A propeller 25 is mounted on the shaft 20 at a level slightly higher than the level of the condensing coils 12. The motor is positioned so as not to actually touch the cover and the shaft is also slightly spaced from the cover or mounted in a bearing therein so as to insulate it from the cover as much as possible. This motor should be air-cooled to compensate for the heat of the cooking chamber. The speed of this motor should be moderate and together with the pitch of the fan blades should be adapted to cause a circulation of fumes in the direction of the arrows 27. If too great a speed or pitch of the blade is used, the cooling effect will be too great and further there is a possibility that the dried distilled filter powder will be blown on the condensing coils, possibly contaminating the recovered distilled fluid, such as perchlorethylene.

As illustrated in Figure 1, there is provided an additional steam sweep pipe 32 entering the upper chamber section 5 which is adapted to permit the entrance of steam into this upper chamber. This additional steam inlet provides an added heat source for maintaining the temperature at a desired level and further permits an added amount of cleaning fluid to be vaporized from the sludge 8.

For convenience in removing and positioning the cover 3, a pair of arcuately shaped arms 31 oppositely arranged on the cover and secured by suitable means is provided.

In order to increase the rate of distillation, the sludge may be mixed with sufficient water to cover it when placed in the container. The rate of cleaning fluid evaporation from this mixture is twice that of the conventional process. In this process, however, large amounts of bubbles will form during evaporation. The downward blowing action of the fan, however, will prevent the bubbles from building up and overflowing into the catch pan.

Having now described our invention, we claim:

1. A distillation device for removing volatilizable cleaning fluid from sludge comprising an enclosed container having side walls, a top, and bottom, a wall member dividing said container into separate upper and lower chambers, steam inlet and outlet pipes connected to said lower chamber, cooling coils adjacent the upper edges of said side walls within said upper chamber, a condensation collecting channel positioned adjacent said side walls below said coils, a fan mounted on a shaft centrally positioned below said top, means external of said container and connected to said shaft adapted to rotate said fan, said fan circulating the volatilized fluid upwardly at the side walls of the container to the cooling coils.

2. A distillation device for removing volatilizable cleaning fluid from sludge comprising an enclosed container having means forming a separate upper condensation chamber adapted to receive fluid laden sludge and a lower heating chamber for raising the temperature of the fluid to volatility, means for introducing steam to the upper chamber for aiding in the volatilizing of the fluid, cooling means positioned at the upper periphery of said condensation chamber, condensation collecting means positioned below said cooling means and within the condensation chamber for receiving the fluid condensed by the cooling means, and means driving the volatilized fluid upwardly at the periphery of said container to the cooling means.

3. A device as set forth in claim two, wherein said enclosed container has a separable cover member forming the top thereof, and said means driving the volatilized fluid comprises a rotatable fan centrally positioned on the lower side of the cover member, and a motor and shaft with said motor mounted externally of said container and said shaft operatively interconnecting said motor and fan.

4. A device as set forth in claim two, wherein said enclosed container has a separable cover member forming the top thereof, and said means driving the volatilized fluid comprises a rotatable fan centrally positioned on the lower side of the cover member, and a motor and shaft, means mounting the motor externally of and normal to said cover member, and said shaft operatively interconnecting said motor and fan.

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