Nov. 13, 1928.

B. L. HARRISON

1,691,060

CLEANING APPARATUS

Filed Feb. 27, 1926

Fig. 1.

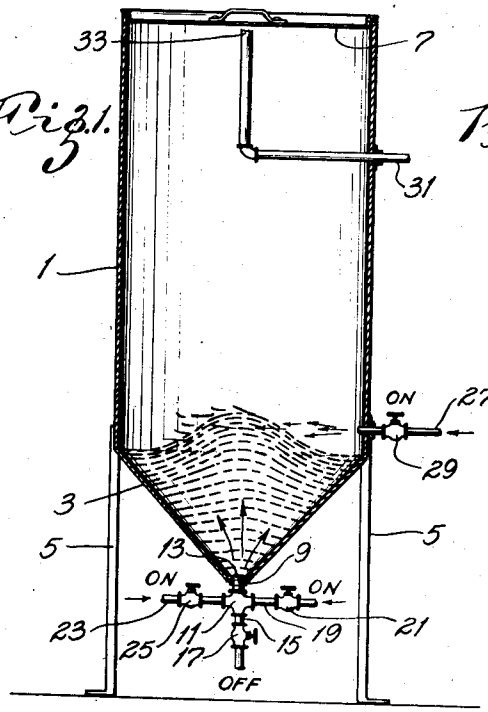


Fig. 2.

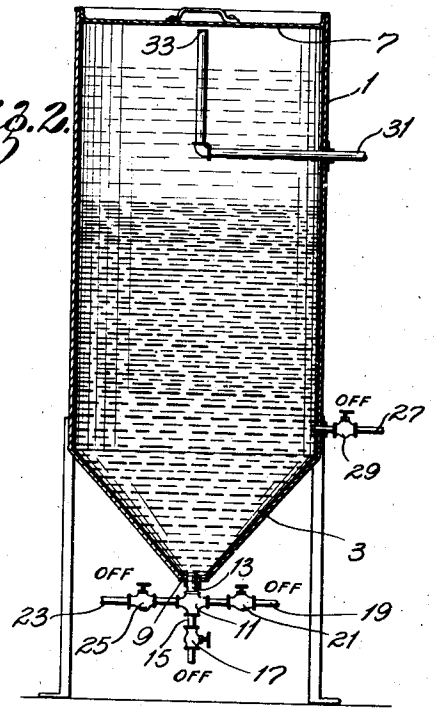


Fig. 3.

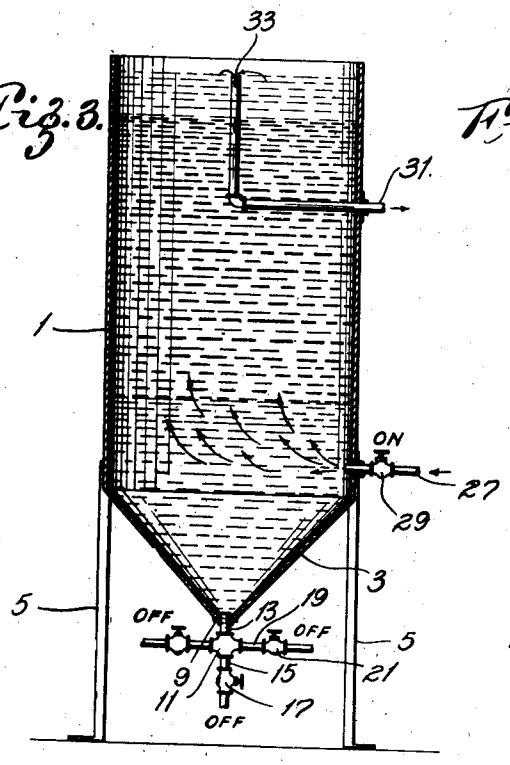
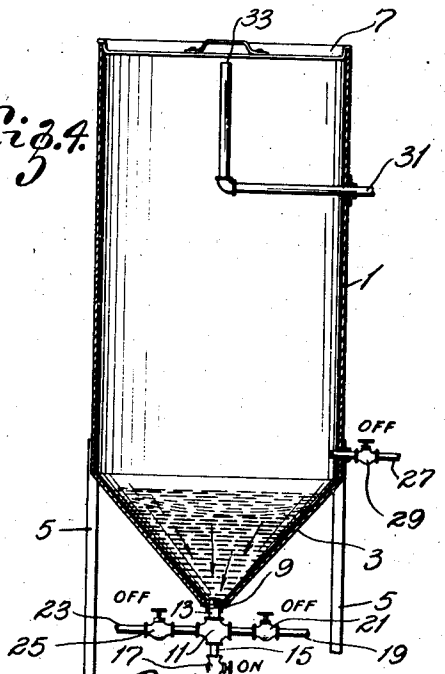


Fig. 4.



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Patented Nov. 13, 1928. 1,691,060

UNITED STATES PATENT OFFICE.

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CLEANING APPARATUS.

Application filed February 27, 1926. Serial No. 91,079.

This invention relates to cleaning apparatus, and with regard to certain more specific features, to a safety trap or solvent reclaimer to be interposed between clarifiers or tanks and the sewers or other waste systems, and to a method for operating the same.

Among the several objects of the invention may be noted the provision of a reclaimer or trap and method for operating the same, for reclaiming gasoline and the like from sludge which is being transmitted from solvent clarifiers, solvent tanks, and the like to sewage and other waste systems; the provision of a trap and method of the class described which makes safe the process of transmitting said sludge to the waste system both as regards the fire hazard and the chemical hazard to workmen; the provision of a trap and method which prevents the passage of material into a waste system which is dangerous to said system; the provision of a trap and the method of operating the same which is more economical in operation than the methods now employed for transmitting sludge; and the provision of a trap which may be simply and economically fabricated. Other objects will be in part obvious and in part pointed hereinafter.

The invention accordingly comprises the steps and sequence of steps, elements and combination of elements, features of construction, and arrangements of parts which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention.

Fig. 1 is a vertical section of the trap showing a sludge filling and agitating operation;

Fig. 2 is a view similar to Fig. 1 showing a settling operation after the trap has been substantially filled;

Fig. 3 is a view similar to Fig. 1 showing a solvent emptying or skimming operation; and

Fig. 4 is a view showing a sludge draining operation.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

In cleaning establishments wherein solvents such as gasoline, naphtha and the like are used, solvent clarifiers are usually employed for cleaning the solvents after use of said solvents. These clarifiers are adapted to settle out certain impurities in the solvents and saponify others by contacting alkalis such as caustic soda, tri-sodium phosphate, or the like with the impure solvent. By this means a sludge of saponic nature is engendered in the clarifiers. Ordinary storage tanks for the solvents also engender settled impurities therein which may or may not be of the saponic form, but are in the form of a sludge.

The described sludges when drained out of the clarifiers and tanks usually contain an appreciable percentage of usable solvent. Ordinarily these sludges are thrown directly into the sewers or similar waste systems without reclaiming any of the solvents. It is evident that this is a wasteful process and it is also a dangerous one. The workmen are usually required to drain the sludge and the like into vessels which are carried to the place of drainage. In so far as the sludges contain a large percentage of alkalis which are liable to burn the men, such as caustic soda, the practice is far from safe. Clothing worn by the workmen is also readily ruined because of the decomposing characteristics of the alkalis.

Another danger arising from this practice of throwing sludge into the sewers is that the unreclaimed solvent therein is more or less volatile and is apt to either explode or catch fire in the sewers themselves. As an example of the danger that may arise, if a sewer should back up into a residence or the like where there is an open flame, and the sewage carries a charge of a floating solvent (the solvent is lighter than water) then there is eminent danger of a fire or an explosion. This contingency has arisen with disastrous results during heavy rains when sewers blocked.

Referring now more particularly to Fig. 1 there is illustrated at numeral 1 a tank which is provided with an inverted conical bottom 3. The tank is supported by conventional legs 5 and is provided with a lid 7. At the inverted apex 9 of said conical bottom 3 is fastened a branch fitting 11 having one lead 13 communicating with the interior of the tank 1. Leading into said branch fitting 11 are three other leads. These are first, a lead 15 to the waste or sewer system having therein a manually operable valve 17; second, a lead 19 leading to the sludge drain connection from the clarifier system and car-

rying a manually operable valve 21; and third, a lead 23 leading to the sludge drain connection from the tank system, and having therein a manually operable valve 25. As many sludge producing devices as desired may be connected to the lines 19 and 23, and as many lines similar to lines 19 and 23 may be connected into the lead 13, merely by increasing the branches on the fitting 11.

Leading sidewardly into the tank 1, just above the conical portion 3, is a water inlet 27 having a manually operable valve 29 connected therein. The inlet pipe 27 carries a water pressure of the usual amount to be found in municipal water systems. The valve is positioned so as to be easily grasped by an operator peering into the tank 1.

Leading horizontally into the tank 1 at a more or less elevated point is a pipe 31 which leads upwardly within the interior of the tank 1 and is provided with an opening 33. This pipe 31 comprises an overflow discharge for carrying reclaimed solvent back to the storage tanks. As shown in the drawings, it is located centrally of the tank 1.

The operation of the reclaimer or trap is as follows:

The sludge drain valve 17 is shut off, and either or both the clarifier valve 21 and the tank valve 25 are opened. The inlet water control valve 29 is also opened. The lid 7 is on the tank 1. Sludge is thus discharged from the clarifiers and/or tanks into the present tank 1 by means of the lines 19 and/or 23. The sludge comes into this device in a more or less mushy condition, such that it will slowly pass through a one and one-half inch pipe. It may be forced in by gravity or pumped in. As this sludge runs into the reclaimer, a stream of water plays on and into it from the inlet pipe 27. Since this sludge consists of a large percentage of soapy matter, the action of the water is to thin the sludge by dissolving the soap, thereby freeing the gasoline and clean solvents that are confined in said sludge, and permitting the greater portion of impurities (other than soap) to settle by gravity, while the water itself holds the soapy matter in solution. One of the conditions that takes place during the filling operation is illustrated in Fig. 1.

After filling has been completed, all valves are shut off as illustrated in Fig. 2, that is, when the level of the liquid in the reclaimer is sufficient to permit of a settling action. The liquid is then left to settle for a period, after which the usable solvent appears at the surface as a flotation and a mixture of sludge and soapy water appears at the lower points in the tank 1(Fig. 2). The settling or flotation period is usually of short duration due to the weight of the sludge.

After settling has been completed the inlet water valve 29 is again opened whereby the upper level of the sludge and soapy water is gradually elevated and the volume of clean solvent thereabove caused to overflow into the pipe 31. The lid 7 is removed, and while an operator keeps his hand on the control valve 29 he may observe the progress of the overflowing event (Fig. 3). This comprises an ideal decanting process as the inflowing fresh water does not much disturb the relatively thick settled muck and sludge. The valve 29 is adapted by its position to be fully controlled as the operator watches the rising sludge level and the decanting process.

After the greater portion of the clear solvent has been drained to the overflow, its depth is decreased to such an extent that the operator can view the upper surface of the sludge as it rises toward the mouth 33 of the overflow. As said surface approaches the mouth 33 the operator shuts off the valve 29. Hence the reclaiming operation on the solvent is completed.

It now only remains to drain the now harmless sludge, water and suspended soapy matter to the sewer or other waste system. This is done by opening the drain valve 17 which permits said material to pass to the sewer or the like. It should be noted that the water which came in the valve 29 to force the solvent to overflow had a thinning action on the lower portions of the sludge. The sludge was thick enough however to prevent the moving water from disturbing its surface enough to cause a re-admixture of sludge with the separated solvent.

As the water and sludge drain out through the valve 17 the upper surface of the sludge gradually descends down to the conical portion 3. All but a small portion is permitted to leave the tank 1. It is not all drained because there is always a slight depth of solvent above it representing the differential depth at the outlet 33 which prevents sludge from going into the overflow. This solvent will tend to be reclaimed at the next operation of the device. During the draining operation the lid 7 may again be replaced (Fig. 4).

It is evident that the above described cycle of events may be repeated as often as desired. By means of this invention a great quantity of heretofore wasted solvent is reclaimed, the heretofore dangerous sludge is rendered harmless, the fire hazard, due to carrying out open vessels of inflammable sludge is reduced, and workmen are protected from the liability of being burned by splashing caustic solutions and the like. All dangerous liquids are kept within containers and pipes and under the control of operators by means of valves. A great amount of time is also conserved.

In view of the above, it will be seen that the several objects of the invention are

achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The method of reclaiming solvent and the like from sludge and the like, whereby the solvent is saved and sludge rendered harmless comprising passing at one time solvent carrying sludge and water into a chamber having an overflow therein to a depth below the overflow, mixing the sludge and water settling out the sludge and water below the solvent of said sludge, passing water into the chamber below the upper sludge and water surface whereby solvent is decanted into the overflow, shutting off said water before sludge and water reach the overflow, and then draining the sludge and water from the tank.

2. The method of reclaiming solvent and the like comprising passing sludge and water into a chamber having an overflow therein to a depth below the overflow, mixing the sludge and water within said chamber as they enter, settling out the sludge and water below the solvent of said sludge, passing water into the chamber below the upper sludge and water surface whereby solvent is decanted into the overflow, and draining the sludge and water from the tank.

In testimony whereof, I have signed my name to this specification this 25th day of February, 1926.

BENJAMIN L. HARRISON.