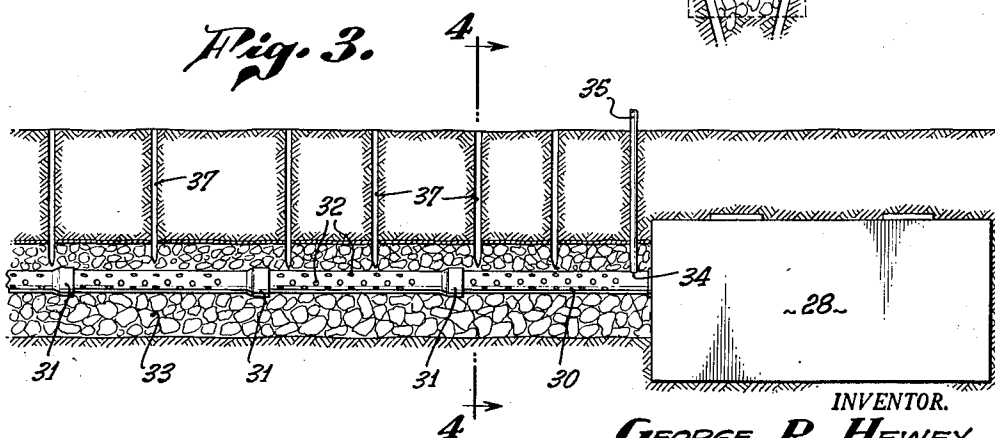
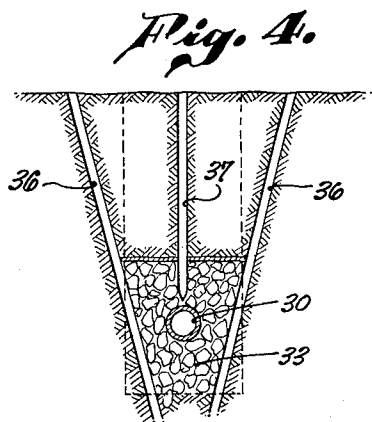
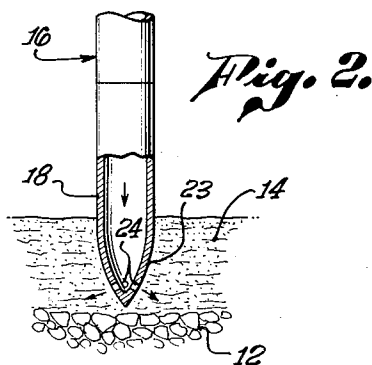
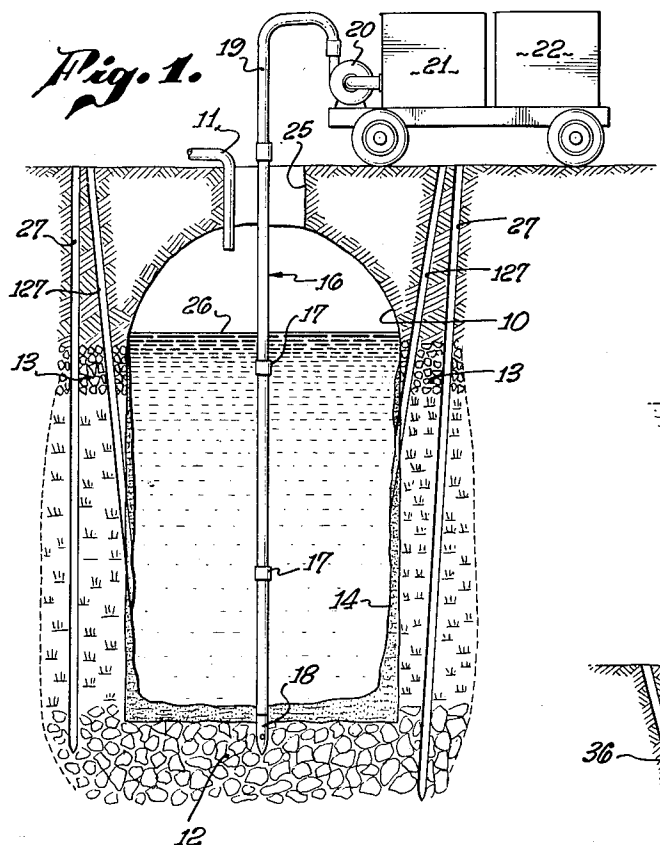


Oct. 30, 1956

G. R. HEWEY
METHODS FOR TREATING CLOGGED UNDERGROUND
SEWAGE DRAIN SYSTEMS
Filed Aug. 17, 1953

2,768,949



INVENTOR.
GEORGE R. HEWEY,
BY *Walter H. Tate*
ATTORNEY.

1

2,768,949

METHODS FOR TREATING CLOGGED UNDERGROUND SEWAGE DRAIN SYSTEMS

George R. Hewey, Mentone, Calif.

Application August 17, 1953, Serial No. 374,590

16 Claims. (Cl. 210-6)

This invention relates to improved methods for cleaning out or reconditioning clogged sewage draining systems, such as cesspools, drain pits, or leach lines, each of which includes an underground chamber or pipe line into which sewage is fed and from which the sewage drains into a porous earth formation. In certain respects, the present method may be considered improvements on treating methods disclosed in my copending application No. 274,550, filed March 3, 1952, on "Method for Cleaning Cesspools."

After an underground sewage draining system has been in use for a period of time, it frequently accumulates a mass of dense clogging material along the walls of the underground chamber and within the communicating initially porous drain formation. This accumulated material acts to clog the system and thereby prevent proper drainage from the chamber. The conventional method of cleaning such a system has been to break up the accumulation within the chamber and then pump it and the water in the chamber upwardly to the surface of the earth and into a tank for disposal.

The present invention has to do with an improved treating system which completely eliminates the necessity for thus withdrawing any of the contents from the underground chamber, and at the same time reestablishes the original lateral and bottom drainage. Specifically this is achieved by so treating the accumulated clogging material within the chamber and formation as to disintegrate and decompose it to a state capable of passage through the interstices of the formation to the outlying formation. The decomposed material may then be drained rather completely from the chamber and formation, leaving the system substantially as open as it originally was.

The decomposition of the clogging material may be effected largely by contacting the material with a decomposing acid, preferably sulfuric or phosphoric acid, having the effect of solubilizing the material. The effect of the acid may be enhanced by also contacting the material with an ammonia reagent, desirably an aqueous solution of ammonium hydroxide. It is also found that the addition of a strong oxidizing agent to the system, desirably potassium permanganate, aids in completely decomposing or burning the accumulated clogging material. A final chemical which has been found useful is saponin, which may be added in extract form or as yucca plant, and acts to prevent the formation of a new crust and keep the formation soft and open after an acid treatment.

The acid and other chemicals are in part filled directly into the drainage chamber, and in part injected into the porous formation at locations spaced from the chamber. The chemicals fed to the formation may be applied by drilling a number of holes into the formation, desirably from both the interior and exterior of the chamber, and filling the chemicals into those holes. In accordance with the disclosure of my copending application Ser. No. 274,550, these drilling operations may be performed by a hydraulic nozzle, acting to discharge a high velocity flow of liquid which progressively penetrates into the forma-

2

tion. The chemicals may then be forced into the formation through the same nozzle after it has penetrated to a desired depth. Such a nozzle may also be employed for initially breaking up the accumulated clogging material within the chamber or in the porous formation, by directing high velocity liquid streams into the material or formation at a number of different locations about the chamber walls.

The above and other features and objects of the present invention will be better understood from the following detailed description of the typical embodiments illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical section through a cesspool being cleaned by the present method;

Fig. 2 is an enlarged fragmentary section through the drilling and fluid injecting nozzle shown in Fig. 1;

Fig. 3 is a vertical section through a septic tank and leach line system being cleaned by the present method; and

Fig. 4 is a vertical section taken on line 4-4 of Fig. 3.

Referring first to Fig. 1, I have there shown a conventional cesspool system for sewage disposal, including the usual cesspool chamber 10 into which sewage is fed through line 11. At its bottom, chamber 10 communicates with a stream of gravel or other initially porous formation 12, through which liquid from within chamber 10 drains into the outlying formation. Spaced above formation 12, there may typically be a second porous formation 13, affording a second liquid outlet from chamber 10. In some cases, the lower drainage layer 12 is not present, in which case the chamber 10 is usually referred to as a "drain pit," rather than a cesspool. Where the term cesspool is used in the claims, it is to be considered as including such a drain pit arrangement. After the system of Fig. 1 has been in use for a considerable period of time, a dense hardened coating of clogging material 14 accumulates along the chamber bottom and side walls as shown, closing off the drainage of water and other materials from the chamber into the porous formations. This clogging material also accumulates within and closes the pores of the various formations adjacent the bottom and sides of chamber 10. The purpose of the present invention is to remove the accumulated material from within chamber 10 and the surrounding formation, to again open up the original drainage paths from the chamber.

For use in cleaning the accumulated material from the system, I employ an elongated pipe 16, typically formed of a number of stands interconnected at joints 17, and carrying at its lower end a nozzle 18 adapted to hydraulically drill into the accumulated material or earth formation, and then inject a treating liquid into the material or formation. Pipe 16 is connected at its upper end by a hose 19 to a vehicle carried pump 20, adapted to force liquid under pressure downwardly from the pipe and to nozzle 18. The suction side of pump 20 may be connected selectively to either of two chemical supply tanks 21 or 22, or to a source of water.

Nozzle 18 is tubular (see Fig. 2) and has a lower tapered or pointed end 23 adapted to penetrate into the earth. Spaced a short distance above its lowermost end, the tapered lower portion 23 of nozzle 18 has a number of circularly spaced liquid outlet openings 24, through which high velocity streams of liquid jet from the nozzle. Openings 24 extend angularly as shown, to direct the liquid streams at an angle laterally and forwardly, in a manner such that the ejection of liquid from the nozzle acts to hydraulically drill a hole in the earth through which the nozzle and pipe 16 may penetrate. In cleaning a cesspool with the apparatus of Figs. 1 and 2, pipe 16 and nozzle 18 are lowered into the cesspool chamber 10 through an upper access opening 25, and pump 20 is

then caused to feed water under high pressure, say between about 300 and 600 lbs. per square inch, to nozzle 18. This high pressure water is of course emitted through nozzle openings 24 as a series of circularly spaced high velocity streams. Pipe 16 may be manipulated to cause the nozzle to penetrate the accumulated material 14 within chamber 10, and the water streams then act to break up or disintegrate the coating material into a large number of particles. When this preliminary procedure is used, the nozzle is injected into coating 14 at enough different places across the bottom and sides of the chamber to completely break up the inner coating of clogging material. Nozzle 16 is then advanced downwardly within bottom formation 12 at a number of different locations, to hydraulically drill into the formation and break it up.

After the above steps have been taken, nozzle 18 is cause to hydraulically drill into or penetrate the formation beneath chamber 10 to a depth of about 6 to 10 feet below the bottom of the chamber, the high pressure water discharge at the nozzle of course being maintained throughout the drilling process. With the nozzle then located 6 to 10 feet below the bottom of the chamber and within the porous formation 12, the suction side of pump 20 is changed over to draw from tank 21, rather than the water source. This tank contains a supply of a strong acid, preferably selected from the group consisting of phosphoric acid and sulfuric acid, and for best results the latter. Between about 5 and 10 gallons of this acid, typically of a concentration of 66° Bé., are discharged through the nozzle into the surrounding formation at a pressure, between about 60 and 80 lbs. per square inch. The nozzle is then withdrawn and caused to drill into the formation 12 at a second and different location, and again desirably to a depth between about 6 and 10 feet below the chamber. A second charge of acid is fed into the formation at the second penetrated location. This process is repeated at several different locations spaced across the entire area of the chamber bottom, to distribute the acid about the entire lower formation. This acid acts to decompose or solubilize the clogging material within formation 12, to a condition in which the material will flow freely from the formation into the outlying earth formation.

To further the disintegration of the coating material 14 within the chamber, and to decompose and solubilize that material, I add to the body of water 26 within the chamber, preferably after all of the above steps have been completed, sufficient acid of the above discussed type and concentration to amount to approximately 1 to 2 gallons for each 100 gallons of capacity of chamber 10. The decomposition of some of the material in coating 14 may be enhanced by also adding to the chamber contents a strong oxidizing agent, such as potassium permanganate, nitric acid, or the like. For best results the oxidizing agent is potassium permanganate, about 5 to 10 lbs. of this chemical typically being employed. The oxidizing chemical preferably is placed on top of whatever residue may remain along the bottom of the chamber. As a final step in the internal treatment of chamber 10 a quantity of saponin is added into the cesspool chamber, either as about 1 gallon of saponin extract, or about 25 lbs. of yucca plant, to aid in leaching out any clogging material not removed by the other chemicals.

In the above internal treating system, the decomposition of clogging material is of course effected in large part by the acid reagent. In many instances, it has been found that the utilization of an ammonia reagent in addition to the acid results in more rapid and complete decomposition of the clogging material. The preferred reagent for this purpose is an aqueous solution of ammonium hydroxide, e. g. 1 gallon of ammonium hydroxide to 300 gallons of water. This ammonium hydroxide may be ejected into formation 12 at locations deep within the formation in the manner discussed in connection with

the acid ejection, and/or mixed with the water in chamber 10. Preferably, the chamber and formation are first treated with ammonium hydroxide, and then with acid, the former being especially helpful in initially breaking up the clogging material, while the latter is most effective as a decomposing or solubilizing agent. In some cases, the ammonium hydroxide solution rather than water may be fed to nozzle 18 during drilling, so that the disintegrating effect of the high velocity liquid streams may be supplemented by the chemical action of the ammonium hydroxide.

After the cesspool chamber has been internally treated, nozzle 18 and pipe 16 are again connected to a high pressure source of water, and utilized to drill a number of vertical holes 27 downwardly from the surface of the earth at a series of locations spaced outwardly from the chamber, and spaced circularly about the chamber. Into these holes 27, which may extend downwardly to approximately the bottom of the cesspool chamber, I pour sufficient sulfuric or phosphoric acid to fill the holes, usually about 1 to 2 gallons in each hole. Additional holes 127 may be drilled angularly downwardly from the surface of the earth into the sides of the chamber and through the accumulation 14 therein. These angular holes allow chemicals from within the chamber to flow to the back side of accumulation 14, and thus facilitate its removal from the chamber walls.

Prior to the filling of acid into holes 27, I may fill an aqueous solution of ammonium hydroxide into the holes. Also, the above discussed oxidizing agent and saponin may be filled into the holes, to enhance the effect of the acid and ammonium hydroxide in thoroughly disintegrating and decomposing the clogging material accumulated with the side wall formation.

The discussed internal and external treatment of the cesspool of Fig. 1 acts to thoroughly decompose the major portion, and usually substantially all, of the clogging material within chamber 10 and the adjacent formation. This decomposed or solubilized material is able to pass through the interstices of formation 12 and 13 into the outlying formation with the water from the chamber. The chamber is thus completely drained and placed in substantially its original free draining condition.

Figs. 3 and 4 illustrate a variational form of sewage draining system including an underground septic tank 28, from which sewage flows through a horizontally elongated underground leach line 30. Line 30 may be formed of a number of sections loosely connected at joints 31, and containing wall apertures 32 along the entire length of the line through which water from within the line discharges into a surrounding gravel or other porous formation 33. In this system of Figs. 3 and 4, leach line 30 may be considered to form an underground drain chamber corresponding essentially to chamber 10 of Fig. 1. After an extended period of use, dense and hardened clogging material accumulates within pipe 30 and its apertures, and within the formation or gravel fill 33, acting to close off the system against proper drainage into the outlying formation.

For cleaning out the system of Figs. 3 and 4, I first make a hole in the leach line at a location 34 near the septic tank, and connect a hose 35 into the line at that point. An ammonia reagent, preferably an aqueous solution of ammonium hydroxide, is then forced through hose 35 into line 30 under high pressure, typically about 400 lbs. per square inch. This operation is repeated at 50 ft. intervals along the length of line 30 and to its end.

Next, sulfuric or phosphoric acid, preferably the former and having a concentration of about 66° Bé., is ejected under pressure (e. g. about 80 lbs. per square inch) into line 30 through hose 35 at 50 foot spaced locations in the same manner in which the ammonia reagent was introduced.

After such internal treatment of line 30, a nozzle 18 and line 16 corresponding to those shown in Fig. 1 are utilized to hydraulically drill downwardly into the earth

5

formation adjacent line 30. A pair of holes 36 at opposite sides of line 30 may be drilled in this manner at each 3 foot interval along the length of line 30. These holes 36 may extend angularly downwardly as seen in Fig. 4, through the gravel fill 33 and to a depth about 8 or 10 feet below the gravel fill. At the locations of each pair of diagonal holes 36, a third hole 37 may be drilled directly downwardly above line 30, terminating in the gravel fill 33 above the line.

Into each of the holes 36 and 37 drilled in the above manner, I pour acid of the type and concentration previously discussed, in quantities sufficient to fill the holes. While this acid treatment is generally found sufficient for the purpose, I may in certain circumstances precede the use of acid by the filling of an ammonium hydroxide solution into the holes. Also, if desired, the oxidizing agent and/or saponin referred to in connection with Figs. 1 and 2 may be ejected into pipe 30 internally or filled into holes 36 and 37.

The described treatment of the Figs. 3 and 4 system acts to disintegrate and decompose or solubilize the clogging material which has accumulated within line 30 and gravel fill 33, as well as the adjacent earth formation. The accumulated material is then able to flow with the other contents of line 30 through gravel 33 into the outlying formation. This of course returns the septic tank and leach line system to substantially its original free draining condition. After this treatment, the owner of the system is encouraged to feed saponin at regular intervals through the system, typically about 1 gallon of saponin extract per month, as an aid in maintaining the system in its cleaned condition.

In the above described treating methods, to accomplish sulfation or sulfonation of materials in the regions being treated, I may in certain instances use sulfur trioxide instead of and as the equivalent of sulfuric acid, although the latter is preferred.

I claim:

1. The method of treating an underground drain system including a water containing chamber and a porous formation initially communicating therewith to remove dense clogging material from the walls of the chamber and within the formation; said method including disintegrating and decomposing said clogging material in the chamber to a condition capable of passage through the interstices of said porous formation, disintegrating and decomposing the clogging material in said formation by penetrating and injecting within the formation a pressurized acidic fluid stream to open a drainage path there-through, and draining the contents of said chamber including said clogging material through the porous formation and into the outlying formation.

2. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is effected by an acid in said stream selected from the group consisting of sulfuric acid and phosphoric acid.

3. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is effected by sulfuric acid in said stream.

4. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is effected by including in said stream an ammonia reagent and an acid selected from the group consisting of sulfuric acid and phosphoric acid.

5. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is effected by ammonium hydroxide and sulfuric acid in said stream.

6. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is effected by including in said stream an acid selected from the group consisting of sulfuric acid and phosphoric acid and an oxidizing agent.

7. The method recited in claim 1, in which the disintegration and decomposition of said clogging material is

6

effected by including in said stream ammonium hydroxide, sulfuric acid and potassium permanganate.

8. The method of treating an underground sewage drain system including a water containing chamber and a porous formation initially communicating therewith to remove dense sewage clogging material from the chamber and from within the porous formation preventing proper drainage from the chamber, said method including, acid treating and disintegrating said material in the chamber, drilling a hole into the earth from a location at the outside of said chamber and into said porous formation, and introducing into said hole a reagent acting to break up said clogging material and thereby open the porous formation for drainage from the chamber.

9. The method of treating an underground sewage drain system including a water containing chamber and a porous formation communicating therewith to remove dense sewage clogging material from the walls of the chamber and within the formation; said method including disintegrating said material within the chamber, drilling a plurality of holes into the earth from locations at the outside of said chamber and into said porous formation, introducing an acid selected from the group consisting of sulfuric acid and phosphoric acid into said holes and into said chamber to thereby disintegrate and decompose said clogging material, and then draining the contents of said chamber including said clogging material through the porous formation and into the outlying formation.

10. The method as recited in claim 9, in which said acid is sulfuric acid, said method including introducing an aqueous solution of ammonium hydroxide into said holes and chamber prior to introducing acid therein to facilitate the disintegration of said material.

11. The method of treating a water-containing cess-pool chamber and porous formation initially communicating therewith to remove dense accumulated material sewage on the walls of the chamber and within the formation preventing proper drainage from the chamber; that includes acid treating and disintegrating and decomposing said clogging material in the chamber to a condition capable of passage through the interstices of said porous formation, independently penetrating said porous formation and introducing thereinto at a location spaced from said chamber an acid selected from the group consisting of sulfuric acid and phosphoric acid acting to clean the porous formation, and then draining the contents of said chamber including said clogging material through the porous formation and into the outlying formation.

12. The method of treating a water-containing cess-pool chamber as recited in claim 11, in which said disintegration and decomposition within the chamber is effected by penetrating said clogging material on the walls of the chamber at different locations and jetting thereinto a high velocity liquid stream, and introducing into the chamber water an acid selected from the group consisting of sulfuric acid and phosphoric acid acting to solubilize the clogging material.

13. The method recited in claim 11, including jetting into said porous formation at a plurality of locations outside of said chamber an aqueous ammonia stream for facilitating the disintegration of the clogging material.

14. The method of treating a water-containing cess-pool chamber and porous formation initially communicating therewith to remove dense accumulated material on the walls of the chamber and within the formation preventing proper drainage from the chamber; that includes penetrating said clogging material on the chamber walls at different locations and jetting thereinto a high velocity liquid stream acting to break up the material, adding ammonium hydroxide and sulfuric acid to the water in said chamber in quantities acting to decompose said material in the chamber to a condition capable of passage through the interstices of said formation, pene-

7

trating said porous formation and jetting thereinto under pressure at a plurality of locations spaced from the chamber high velocity streams of ammonium hydroxide and sulfuric acid to clean the porous formation, and then draining the contents of said chamber including said clogging material through the porous formation and into the outlying formation.

15. The method as recited in claim 14, including adding potassium permanganate into said chamber to aid in decomposing said clogging material.

16. The method of treating a perforated leach line embedded within a porous formation to remove dense accumulated clogging material from within the line and in said formation; that includes injecting an acid selected from the group consisting of sulfuric acid and phosphoric acid under pressure into said line to solubilize the clog-

8

ging material therein, drilling holes into said porous formation at the outside of said line, filling acid into said holes to clean the formation, and draining the contents of said line including said clogging material through said porous formation into the outlying formation.

References Cited in the file of this patent

UNITED STATES PATENTS

	168,477	Gillespie	Oct. 5, 1875
10	1,892,093	Battistella	Dec. 27, 1932
	2,010,540	Evans	Aug. 6, 1935
	2,352,832	Gunderson	July 4, 1944
	2,419,076	Horsley	Apr. 15, 1947
15	2,648,440	Mullins	Aug. 11, 1953