United States Patent

Kirschke

[15] **3,635,230**

[45] **Jan. 18, 1972**

[54] ROOT FUMIGANT SEWER CLEANER SPRAYER

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[22] Filed: **May 13, 1970**

[21] Appl. No.: **36,901**

[52] **U.S. Cl.** .....**134/168 C,** 134/24, 134/100

[51] **Int. Cl.** **B08b 3/02,** B08b 9/04

[58] **Field of Search** .....134/22 C, 24, 166 C, 167 C, 134/168 C, 169 C, 100

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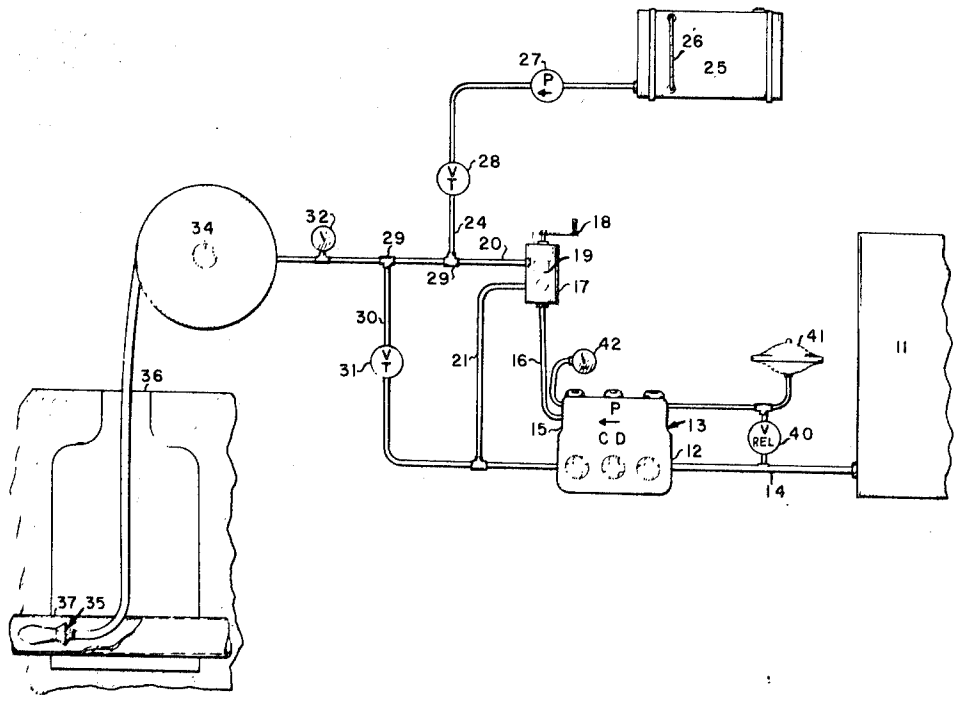
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Primary Examiner—Robert C. Bleutge
Attorney—Willard J. Hodges, Jr.

[57] **ABSTRACT**

An improved jet sewer cleaning device incorporating equipment for cleaning and dispensing predetermined controlled amounts of root-killing fumigant to obstructing root deposits.

4 Claims, 8 Drawing Figures



PATENTED JAN 18 1972

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SHEET 1 OF 3

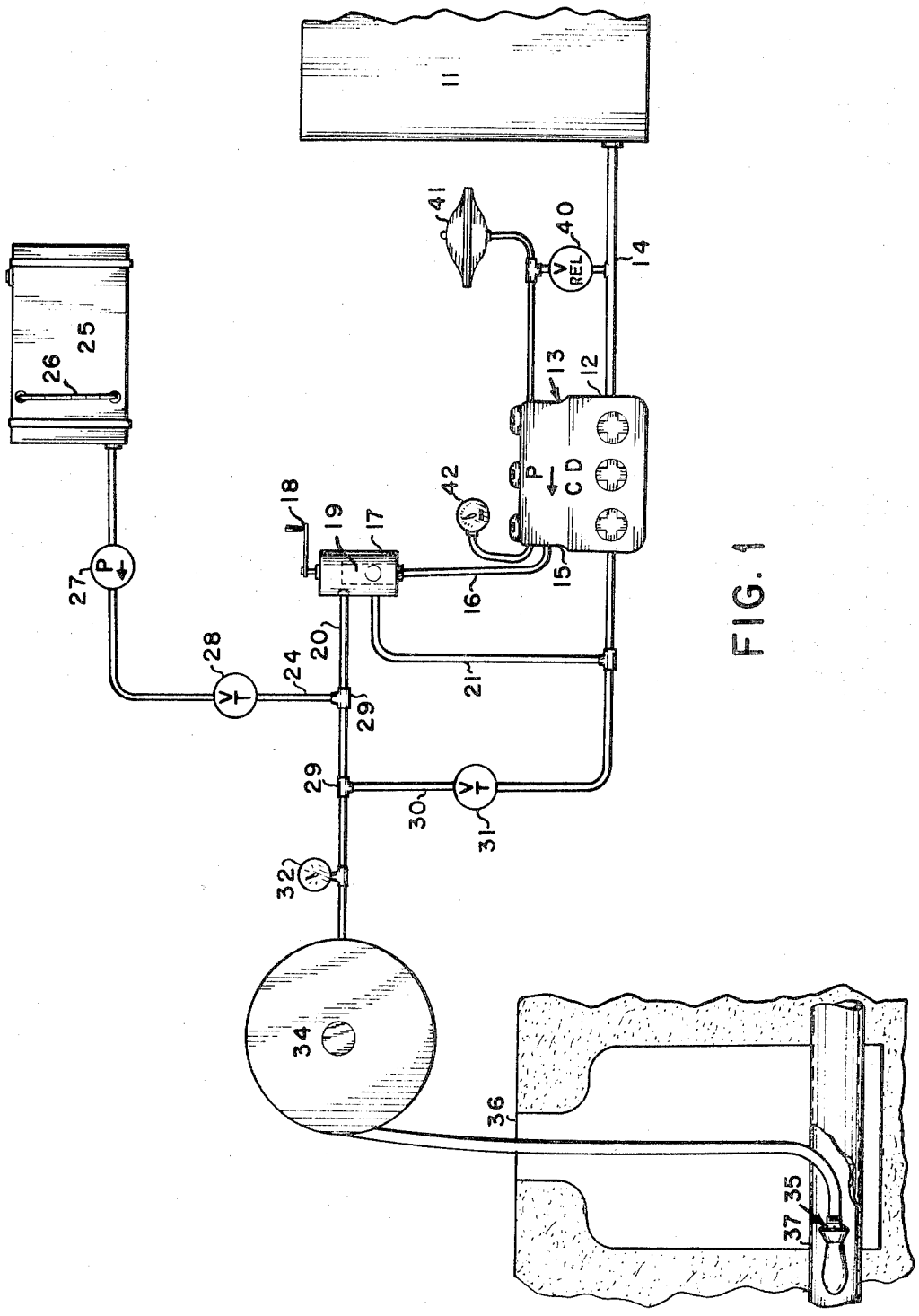


FIG. 1

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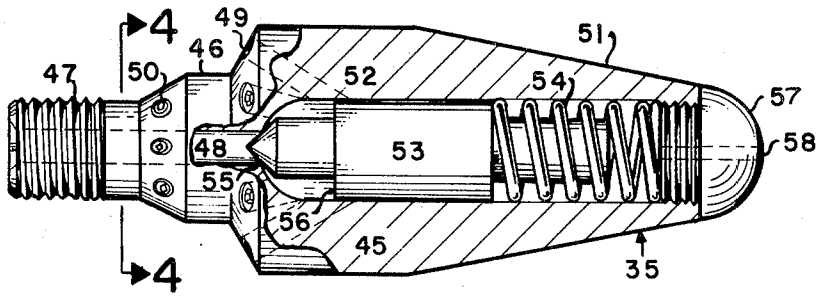


FIG. 2

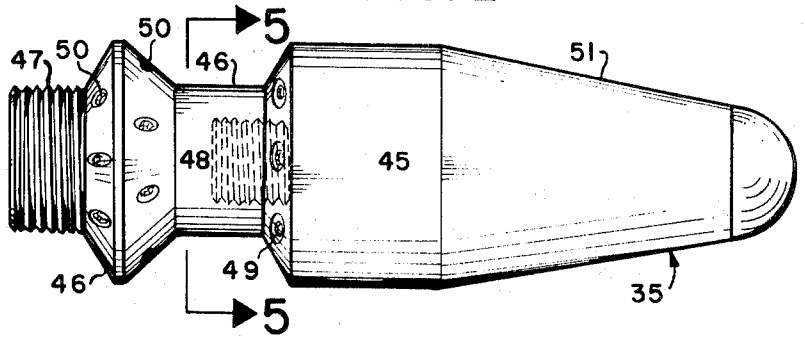


FIG. 3

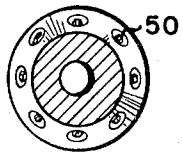


FIG. 4

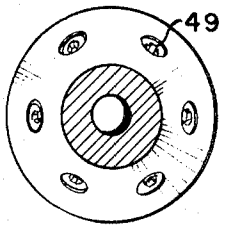


FIG. 5

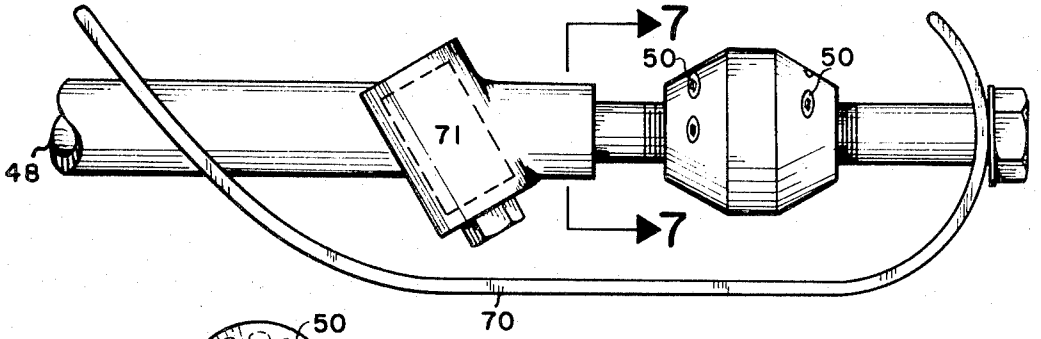


FIG. 6

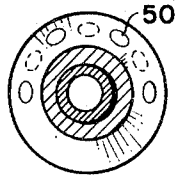


FIG. 7

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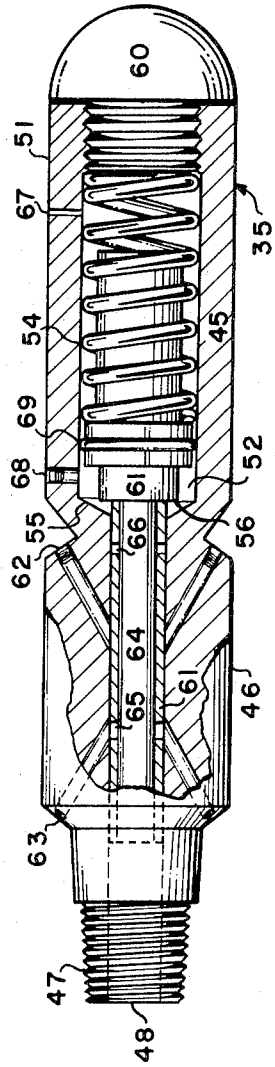


FIG. 8

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ROOT FUMIGANT SEWER CLEANER SPRAYER

High-pressure jet cleaners for sewer and waste disposal lines are well known to the art. Highly sophisticated nozzles and pressure power tools have been developed such as your inventor's U.S. Pat. No. 3,432,872 and No. 3,449,783. The improvement of this invention is designed for utilization with high-pressure pumping equipment and devices disclosed in the above-cited patents as well as an adjunct improvement to other manufactures equipment.

Nonsystematic chemicals for the control of roots in sewer mains, drain lines and other conduits have been developed. An example of an acceptable chemical is sodium methyl dithiocarbamate (anhydrous) sold under the trade name of "-Vapam" and "Vaporooter." Water soluble, foam-type formulations of the chemical is suitable for use with equipment and method of this invention. This invention, in conjunction with acceptable chemicals for killing the roots, also assist in the control of slime which generates objectionable gases and bacteria. This invention is believed to be a substantial advance in the art of cleaning sewers, killing roots and overall pollution control.

Present practices is to employ conventional cleaning methods and dispense chemical fumigant in internally blocked sewer line by completely flooding the line with the root killing foam fumigant utilizing fire-fighting foam equipment, using rodders and other dispensing methods to fill the sewer. These methods require a separate cleaning process and a dispensing process which is costly in man hours and time.

One of the objects of this invention was to develop equipment to combine the cleaning process and the root-killing fumigant process in one continuous series of steps saving man hours.

Another object was to perfect dispensing nozzles, integrated chemical equipment in conjunction and as an adjunct to cleaning equipment in existence to clean and dispense fumigant with one combination of equipment in a continuous process.

In summary, the device of the invention incorporates a chemical tank and dispensing pump in conjunction with a high-pressure pumping sewer cleaner having a hydraulic powered reel for paying out and retracting the sewer cleaner hose from a reel. The equipment is used in two separate but related methods: one is to jet clean the sewer line to an adjacent man hole then bypass the high-pressure system and place a slug of chemical in the line and replace the cleaning nozzle with a chemical-dispensing nozzle then readmit to the line a portion of the bypassed high-pressure output of the pumper and withdraw the cleaning hose onto the reel while dispensing the root-killing chemical.

A second aspect of this invention utilizes a dual jet two-stage cleaning nozzle of this invention with identical pumping equipment in an entirely different manner. With this nozzle, a dead end line with no access man hole may be cleaned and treated. The high-pressure pump is bypassed as before stated and a slug of chemical placed in the hose, employing a time pumping rate the slug is moved to the nozzle area, the high pressure is reduced to activate the low-pressure dispensing nozzle only. The pumping rate and rate of withdrawal of the reel is coordinated to dispense the desired root-killing fumigant in the line. The foregoing two methods of dispensing are highly economical of chemicals used and man hours efforts expended to clean and kill roots in a line.

For a detailed description of the construction and operation of the device of this invention and the method employed, reference is made to the attached several views wherein identical reference characters will be used to refer to similar or equivalent components throughout the various views.

FIG. 1 is a schematic view of a typical embodiment of the device.

FIG. 2 is planned view partially in section of the specialized two-stage nozzle incorporated in a species of the invention.

FIG. 3 is a planned view of another construction of the two-staged nozzle.

FIG. 4 is a sectionalized view of FIG. 1 taken substantially on line 4–4 of FIG. 1 looking in the direction of the arrows.

FIG. 5 is a sectionalized view of FIG. 3 taken substantially on line 5—5 of FIG. 3 looking in the direction of the arrows.

FIG. 6 is a planned view and embodiment of the device using a sled mounted spray nozzle.

FIG. 7 is a sectionalized view of FIG. 6 taken substantially on line 7—7 of FIG. 6 looking in the direction of the arrows.

FIG. 8 is a planned view partially in section of another specialized two-stage nozzle which may be incorporated in a species of the invention.

Attention is now invited to the several views and the following detailed description wherein identical reference characters are utilized to designate similar or equivalent components throughout the various views and the following detailed description.

Referring to FIG. 1, the device of this invention utilizes a high-pressure pumping system either trailer or truck mounted for mobility. A system capable of generation 1,000 p.s.i. at 100 gallons per minute is desirable; however, far less pressure in quantities of water are required for cleaning and dispensing chemicals. Bypass valves are utilized to secure substantially reduced flow rates. For cleaning a water supply source such as tank **11** is connected to low-pressure side **12** of the positive displacement pump **13** by low-pressure supply line **14**. The high-pressure side **15** of pump **13** is connected to high-pressure line **16** through a rotary three-way valve **17** mounted in the system. Valve **17** normally has an operating lever or handle **18** for selectively positioning the dual passage cylinder **19** to selectively supply fluid to the feed line **20** or to bypass line **21** to return the high-pressure flow to the low-pressure side **12** of pump **13**. Valving arrangement enables bypassing of the high-pressure fluid and permits the pump **13** and its drive motor to operate at a satisfactory r.p.m. to prevent stalling. Connected to feed line **20** is chemical supply line **24**. The chemical supply system utilizes a chemical supply tank **25** equipped with a supply gauge **26**. There is connected in the chemical supply line **24** a chemical pump **27**. In the preferred embodiment, the pump **27** has an adaptation of a 12-volt electric powered boat bilge pump. Chemical supply line **24** should also be equipped with a chemical throttle valve **28** regulating or controlling the chemical supply. Feed line **20** and chemical supply line **24** feed through a common pipe "T" **29** into a continuation of supply line **20**. It was found desirable to construct an additional bypass circuit in the system for control purposes. The additional bypass circuit connects into feed line **20** through a pipe "T" **29**. The secondary bypass line **30** feeds through a secondary bypass throttle valve **31** returning the fluid to the low-pressure side **12** of pump **13**. A continuation of feed line **20**, which may be equipped with a pressure gauge **32**, feeds through a suitable connector (not shown) into power reel mounted hose **34** which is connected to one of a series of specialized nozzles **35**. In the context of this invention the hose **34** is passed through man hole **36** into sewer line **37**. For mechanical safety purposes there may be incorporated into the system relief valve **40** which serves much as a pop valve should excessive pressure develop in the high-pressure side **15** of pump **13**. To equalize or smooth the output of pump **13** a pulsation dampener **41** may be connected into the high-pressure side **15** of pump **13** and to monitor operations, a high-pressure gauge **42** may be utilized.

To more effectively utilize the pumping system illustrated in FIG. **1** and to effectively clean and chemically treat sewer line **37**, a series of specialized nozzles **35** were developed. Reference is made to FIGS. **2**, **3**, **4**, and **5** which illustrate embodiments of two-stage cleaning and chemical dispensing nozzles. These nozzles **35** are constructed with a nozzle body **45**. The rear section **46** of the body **45** is connected to the reel mounted hose **34** by a conventional screw connector **47**, which is constructed with an internal conduit **48**. The rear section **46** may be constructed with propulsion jets **49** FIG. 5 or chemical-dispensing jets **50** FIG. **4** communicating with the internal conduit **48**. These jets **49** and **50** are preferably constructed of removable drilled and threaded pipe plugs or Allen setscrews. The forward section **51** of body **45** includes a body cavity **52** into which is positioned a needle valve **53** which is

normally held in a closed position by spring 54 against seat 55. This needle valve 53 is constructed with a flared shoulder 56 to present an increased area to the fluid in the body cavity 52 under certain operating conditions to be more fully described. For convenience of assembly, the body cavity 52 is enclosed at the forward end by a threaded body plug 57 which includes a breather hole 58. This type of nozzle may be constructed with a one-piece nozzle body 45 as shown in FIG. 2 or a two-piece body portion 45 may be employed utilizing conventional connecting means. Sectionalized construction of FIG. 3 permits wide flexibility of use such as jetting the rear body portion 46 with propulsion jets 49 as illustrated in FIG. 5.

The nozzle illustrated in FIGS. 2, 3, 4 and 5 are primarily designed for utilization in a dead end sewer line 35. When access is available through a distant man hole 36 to an extended hose 34 a chemical-dispensing nozzle of the type illustrated in FIGS. 6 and 7 may be used. This type nozzle employs a skid 70 and a filter 71 in combination with conduit 48. The chemical dispensing jets 50 preferably dispense the chemicals spray to the front as well as the rear. In the skid mounted nozzle, the jets 50 are mounted only in the upper half of the nozzle 35 in that such is the area of normal root growth in a sewer line 35.

Another specialized nozzle has been developed in the course of perfecting the invention and method which is illustrated in FIG. 8. This nozzle also may be utilized for cleaning as well as dispensing the root-killing chemicals. The embodiment of FIG. 8 comprises a nozzle 35 having a body portion 45 which is substantially an integral structure. The nozzle 35 includes a screw connector 47 for attaching the device to hose 34. For adjustment and ease of assembly, this specialized nozzle 35 includes a capscrew 60. The body 45 has an elongated internal conduit 48 and body cavity 52. However, a much modified, three-way sliding valve 61 is utilized in a similar spring 54 loaded manner to needle valve 53 of the embodiments of FIGS. 2 and 3. This nozzle 35 has constructed in its rear section 46 both forward 62 and rearward jets 63. These jets may be utilized in this configuration in a dual capacity of propulsion jets 49 or chemical-dispensing jets 50 as well as either of the jets functioning as cleaning or flushing jets. The spring 54 loaded sliding valve 61 is similar in construction to needle valve 53 in that the flared shoulder 56 is utilized for holding the pistonlike structure in position once the sliding valve 51 is moved by increased pressure. This sliding valve 61 is constructed with a valve conduit 64 including an elongated jet orifice 65 and piston-retaining orifices 66. The structure of the sliding valve 61 also varies from needle valve 53 in that an "O" ring 69 seals the valve 61 to the body cavity 52. Body cavity 52 must also be constructed with a forward vent bleeder hole 67 and an air vent bleeder hole 68, to prevent air or fluid locking in place the sliding valve 61.

The versatility of operation of this nozzle is unusual in that in the rear or low-pressure position only the rear jets 63 operate and in the forward or high-pressure position only the forward jets 62 operate. This controlled shifting function permits jet propulsion into the sewer line 37 and a cleaning or flushing in either direction as well as selectively dispensing the chemicals in either direction. This sliding valve 61 nozzle is exceptionally versatile in use with the cleaning and chemical-dispensing methods visualized in this disclosure.

For the description of the operation of the newly developed method, reference is again made to FIG. 1. Employing high-pressure operation the nozzle 35 the hose 34 is propelled through the sewer line 37. In the equipment employed, the hose reel 34 is hydraulically powered for rotation. In the cleaning operation, the hose 34 may be withdrawn from the sewer under maximum pressure operation. This effectively cleans and loosens the slime and grease deposits and to an extent, removes small root deposits which have penetrated the sewer line 37. With the hose extended, handle 18 of valve 17 is rotated to bypass the water through main bypass line 21. Secondary bypass valve 31 is closed and chemical throttle valve 28 opened. PUmp 27 is activated and the desired charge of slug of chemicals introduced into the hose 34. For example, if 100 feet of sewer were desired to be treated utilizing 1-inch interior diameter hose, 4.4 gallons would fill 100-feet section of the hose. Chemical pump 27 is stopped and valve 28 closed. Water is then reintroduced into the system sufficient to move the slug of chemicals to the nozzle 35 area. Utilizing the two-stage nozzle, pressure is reduced to permit spring 54 to seat needle valve 53 against base 55 and utilizing a reduced pumping rate the liquid is dispensed through chemical jets 50 in the rear section 46. Hose 34 can be withdrawn at a constant coordinated pumping and withdrawal rate and the desired chemicals dispensed in the portion of the sewer 37 desired to be treated. A similar procedure is utilized with the skid 70 mounted chemical-dispensing nozzle of FIG. 6 or the nozzle 35 of FIG. 8 employing a sliding valve 61.

Another alternative advantage of nozzle 35 is in the configuration with propulsion jets 49 in both the forward 45 and rear 46 body portions. Needle valve 53 and spring 54 can be so selected as to remain seated at a pressure of 600 p.s.i. A pressure of above 600 p.s.i. would open the valve 53 and activate the propulsion jets 49 in the forward 45 section. With a doubled fluid delivery rate the pull of the nozzle 35 can be approximately doubled to propel the hose 34 further into a sewer line 37 or up an incline.

Other uses and advantages will be apparent to those skilled in the art form a study of the attached drawings and this detailed description and appended claims. What is desired to be claimed is all equivalent structures and methods of use not departing from the scope of the appended claims.

I claim:

1. An improved jet sewer cleaning device comprising:
   a. a source of water,
   b. a controlled water pumping means,
   c. a low-pressure supply line interconnecting said source of water and said water pumping means,
   d. a high-pressure flexible hose having a receiving end and a dispensing end conductively connected to said water pumping means,
   e. a feed line intermediate and conductively connecting said water pumping means and said flexible hose,
   f. a source of root-killing chemical fumigant for treating the interior of a sewer line,
   g. valve control means for introducing a predetermined amount of root-killing chemical fumigant into said feed line intermediate said water pumping means and said high-pressure flexible hose,
   h. a controlled chemical pumping means constructed and arranged to forcibly inject predetermined amounts of root-killing chemical fumigant through said valve control means into said feed line,
   i. a controlled power means for paying out and reeling in said high-pressure hose, and
   j. a fluid-dispensing nozzle secured to said dispensing end of said high-pressure hose.

2. The invention of claim 1 wherein said fluid-dispensing nozzle comprises:
   a. a skid-mounted nozzle,
   b. a central conduit interconnecting said hose and said nozzle, and
   c. chemical-dispensing jet orifice mounted in said nozzle constructed and arranged to emit fluid in the upper area of said sewer line.

3. The invention of claim 1 wherein said nozzle comprises:
   a. means for securing said nozzle to said hose,
   b. a body cavity having a forward portion and a rear portion internal of said nozzle, said rear portion communicating with said hose,
   c. a pressure responsive spring-loaded valve mounted in said body cavity,
   d. a seat for said valve intermediate said forward portion and said rear portion,
   e. a flared shoulder constructed on said spring-loaded valve said flared shoulder constructed to expose an increased area of said valve to said source of water upon opening of

said valve thereby urging said valve to remain in the opened position once in the opened position,

f. at least one jet orifice projecting from said forward portion of said body cavity,

g. at least one jet orifice projecting from said rear portion of said body cavity, and

h. said valve and nozzle so constructed and arranged as to eject fluid from the rear orifice when the valve is not seated.

4. The invention of claim 1 wherein said nozzle comprises:

a. means for securing said nozzle to said hose,

b. a body cavity having a forward portion and a rear portion internal of said nozzle, said rear portion communicating with said hose,

c. a pressure responsive spring-loaded slide valve mounted in said body cavity,

d. a seat for said valve intermediate said forward portion and said rear portion,

e. a flared shoulder constructed on said slide valve said flared shoulder constructed to expose an increased area of said valve to said source of water upon movement to the forward position thereby urging said valve to remain in the forward position once moved to the forward position,

f. a valve conduit internal of said slide valve,

g. a jet orifice constructed in said slide valve adapted to admit fluid from the valve conduit,

h. at least one jet orifice projecting from said forward portion of said body cavity,

i. at least one jet orifice projecting from said rear portion of said body cavity, and

j. said slide valve and said nozzle so constructed and arranged as to eject fluid from the rear jet orifice when the said valve is seated and the forward jet orifice when the said valve is not seated.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,635,230 Dated January 18, 1972

JOHN A. KIRSCHKE

It is certified that error appears in the above identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 10, "nonsystematic" is corrected to read --nonsystemic--.

Column 2, line 17, "generation" is corrected to read --generating--.

Column 3, line 74, "PUmp" is corrected to read --Pump--.

Signed and sealed this 20th day of June 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents