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W. E. RUPP

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APPARATUS FOR CLEANSING SEPTIC TANKS

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3 Sheets-Sheet 1

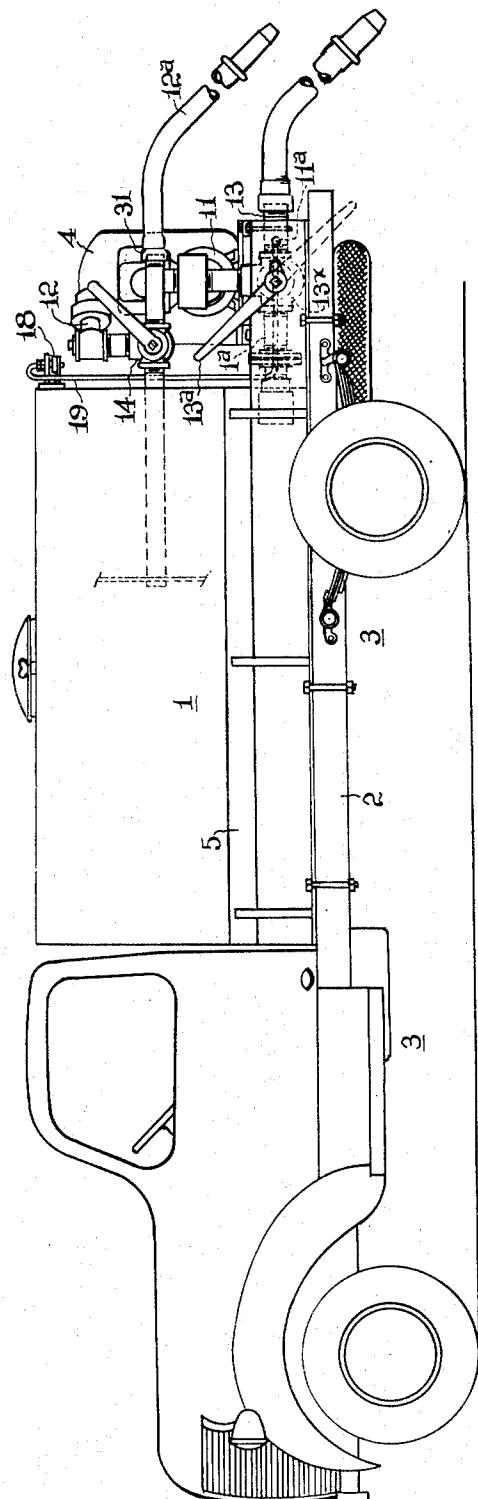


FIG. 1

INVENTOR.
Warren E. Rupp
BY
Geo. B. Titter
ATTORNEY

May 12, 1953

W. E. RUPP

2,638,224

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3 Sheets-Sheet 2

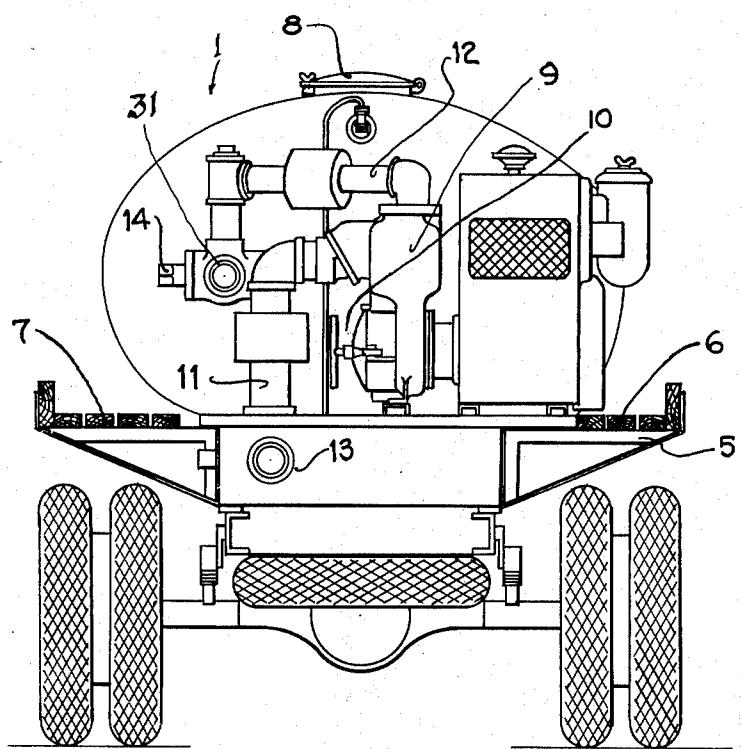


Fig. 2

INVENTOR.
Warren E. Rupp,

BY

William J. Gieseler,
ATTORNEY.

May 12, 1953

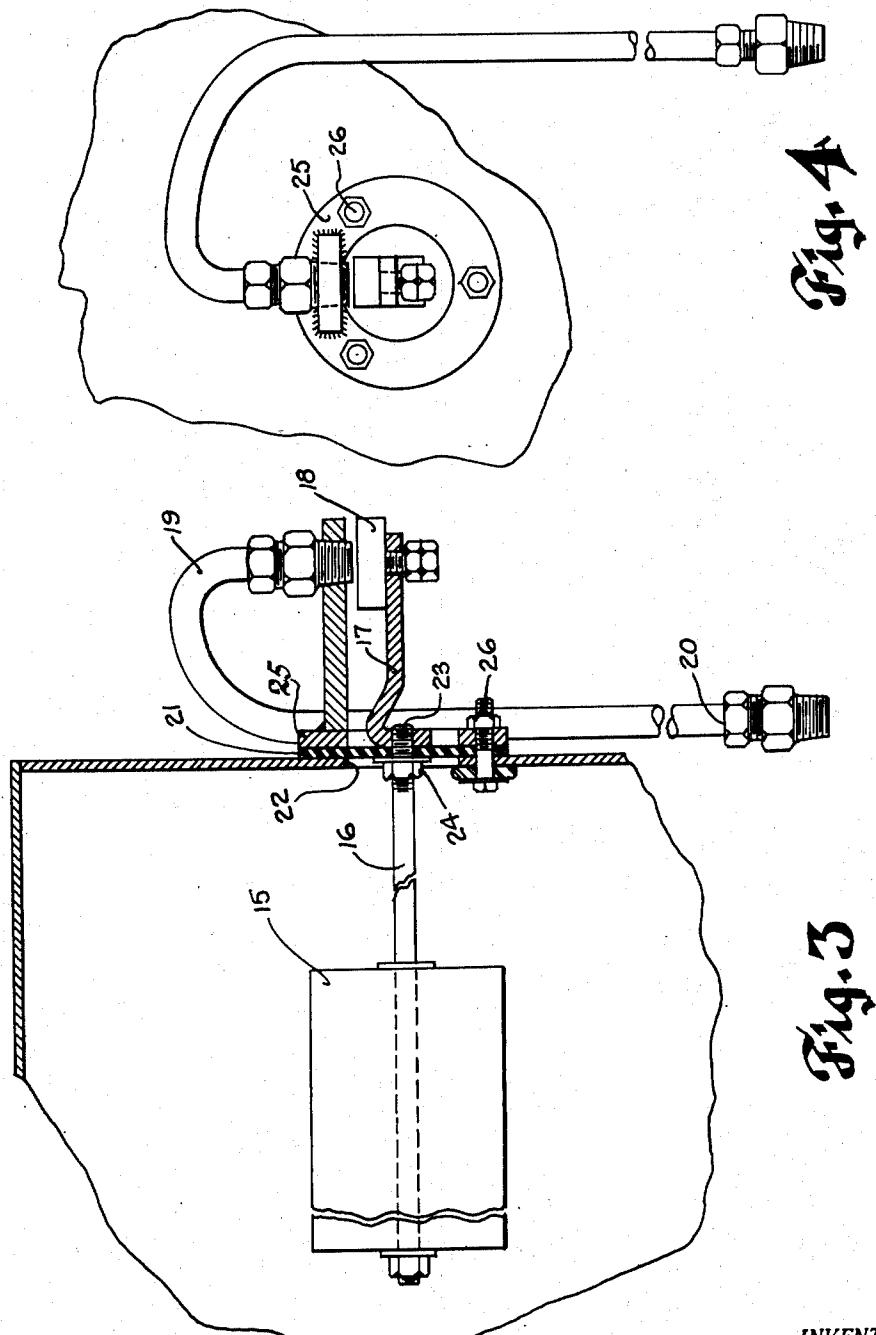
W. E. RUPP

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APPARATUS FOR CLEANSING SEPTIC TANKS

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3 Sheets-Sheet 3



INVENTOR.
Warren E. Rupp,

BY

William J. Cussler,
ATTORNEY.

UNITED STATES PATENT OFFICE

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APPARATUS FOR CLEANSING SEPTIC TANKS

Warren Edmund Rupp, Mansfield, Ohio, assignor to The Gorman-Rupp Company, Mansfield, Ohio, a corporation of Ohio

Application May 29, 1947, Serial No. 751,298

4 Claims.

(Cl. 210—52)

1

This invention relates to an apparatus for the odorless and sanitary cleansing of septic tanks. In addition to the use stated, it can serve for cleansing cisterns, catch basins, flooded excavations of various types, and where a supply of water is available the apparatus may be converted into a fire-fighting apparatus for use in suburban and rural communities.

It is also adapted for use in street flushing or for wetting fresh laid cement and similar uses, where a reservoir of liquid and a liquid pressure discharge line are of advantage.

The primary use of the apparatus, however, is for cleansing septic tanks in a manner which is safe and sanitary and wherein the operation can be conducted in a relatively short time as compared with the conventional operations at present in use.

The special features of the apparatus comprise a valve control system which permits the withdrawal of a mixture of liquid and solid matter from a septic tank, re-supplying the mixture under pressure through a nozzle into the tank for simultaneously agitating and disintegrating sewage and foreign matter in crust form constituting the top layer of the mixture in the tank and dislodging solid matter adhering to walls thereof, continuing such circulation until all of the liquid and solid matter is transformed into a homogeneous semi-liquid mass, in which the solid matter is in suspension, and discharging the mass into a container for conveying to a place of treatment or disposal.

By reason of the solid material handled by the pump having a tendency to adhere to the passageways adjacent the impeller, it has been found desirable to provide a pump of special construction wherein a removable inlet area of the pump passageway adjacent the impeller is provided, whereby such passageways may be bodily removed and freed of obstructive material and whereby reconditioned wearing surfaces may be supplied adjacent the impeller blades, thus maintaining the apparatus in continuous operation under conditions of heavy duty service, so that it may be maintained in operation over extensive periods of time without excessive maintenance costs.

An additional feature of the apparatus comprises a safety device which prevents the overfilling of the apparatus or the development of excessive pressure, which would bring destructive forces into action within the apparatus or within the pump structure. The safety device providing an automatic control of the pump as

2

dangerous conditions are approached during the normal action of the apparatus.

The invention includes a unitary apparatus for cleansing septic tanks wherein the liquid removed from the tank is re-circulated and used as a pressure jet for disintegrating solid masses of the material and maintaining the effective operation of the pump until the septic tank is completely cleansed and the liquid and the solid matter in the receiving tank are conditioned into a consistency suitable for the pump to handle and thereafter continuing the circulation of the mixture until the work of cleansing the receiving tank is fully completed.

15 The apparatus is also adapted for gravity discharge or pressure discharge of the material within the receiving tank. The use of pressure discharge providing means for a single unit being employed effectively with a minimum loss of time in maintaining a number of septic tanks in sanitary condition throughout a community, thus reducing the health hazards which are met with when the sanitary service is not carried out at sufficiently regular intervals.

20 25 The apparatus includes a safety device, as has been stated, to prevent the development of excessive pressure and to control the pumping operation upon the approach of conditions which are likely to develop destructive forces. This feature of the apparatus comprises an air vent which is normally closed by means of a valve controlled by a float on a lever projecting into the receiving tank. When the float is actuated by the rise of the liquid level within the receiving tank it opens the valve normally covering the air vent and air then will pass through the air vent and be conducted through the air tube to a position on the entrance side of the inlet passageway leading to the pump. The air when discharged at this point will break the sealing effect of the fluid adjacent the impeller, thus destroying the suction of the pump. At the same time, the air discharged at such point will serve to release the fluid which may be present in the inlet hose or pipe line and thus permit the removal of the inlet line without having the weight of the water or mixture of liquid and solid material which may be present in the inlet line. The safety device thus automatically prevents the establishment of unfavorable operating conditions and permits the ready removal of the inlet line at any time when it may be necessary.

30 35 40 45 50 The apparatus is preferably mounted on a truck, and preferably carries a separate engine for the pumping apparatus, distinct from the en-

gine which drives the truck. This permits the recirculation of the material out of and into the receiving tank, while the apparatus is moving on the highway, and also permits the ready discharge of the material from the receiving tank under high pressure, while the truck is in motion.

To the accomplishment of the foregoing and related ends, said invention consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but several of various forms in which the principle of the invention may be used.

Fig. 1 is a side elevation of an apparatus embodying the principle of the invention;

Fig. 2 is an end elevation, as seen from the right hand side of Fig. 1;

Fig. 3 is an enlarged detail view showing the automatically operated pump control safety device, and

Fig. 4 is an end elevation of the device as shown in Fig. 3, as seen from the right hand side.

As is clearly shown in Fig. 1, the apparatus comprises a receiving tank or receptacle 1, of large capacity, mounted upon the platform 2 of a truck 3, the truck having its own engine and control mechanism of conventional design.

The receiving tank or receptacle 1 is provided with an independent engine and pump unit 4 preferably positioned rearwardly thereof. The pump, which is indicated at 9, may thus be continuously operated by its engine while the truck is moving under its own power. The receiving tank is supported on a suitable frame 5, mounted on the truck platform, and catwalks 6-7 are provided at each side of the truck, extending the length of the tank so that the operators may move freely about the apparatus when necessary. Such catwalks may also support additional lengths of hose when so required. Centrally of the tank, an airdome and cover 8 is provided to permit the displacement of air from the tank when it is being filled.

The pump 9 utilized in the apparatus is preferably a centrifugal pump provided with an impeller chamber preferably substantially similar to that shown in the co-pending application of Herbert E. Rupp, filed September 5, 1946, Ser. No. 694,930, now Letters Patent No. 2,461,925, dated February 15, 1949, and having a separable impeller casing 10 (as shown in my co-pending application Ser. No. 751,297, filed May 29, 1947), whereby access may be had to the impeller and whereby solidified material may be removed therefrom, when it interferes with the pump operation. The pump is provided with an inlet or suction line 11 connected with an intake 13, and a discharge line 12, with a three-position control valve 13x operated by a lever 13a and disposed at the connection of the intake 13 with the inlet line, and a two-position control valve 14 on the discharge line. Through the proper positioning of the valves, the mixture of liquid and solid matter, after cleaning of the septic tank, may be directed through the pump and the pump discharge line 12 into the receiving tank 1.

An important feature of the device comprises a safety device to prevent tank overflow. This device is shown more particularly in Figs. 3 and 4, and comprises a float 15 within the tank 1 and supported on a lever arm 16, having an extension arm 17, carrying a sealing pad 18, adapted to close the inlet port of an air conduit 19, having

its free end 20 connected with the suction line 11 of the pump, as shown at 11a. The float is supported on the rearward wall of receiving tank 1 by means of a flexible connection provided by a rubber diaphragm 21 firmly secured thereto and covering an opening 22, through which the lever arm projects. The end of the lever arm 16 is screw-threaded and mounted within a threaded aperture 23, formed through a downwardly turned portion of the lever extension arm 17. A lock nut 24 holds the lever arm 16 firmly against the rubber diaphragm 21, which, as indicated, serves as a seal over the opening into the tank and also provides a flexible pivot support for the float. The diaphragm is firmly held in liquid tight relation to the opening 22 through the end wall of the tank 1, by means of an annular plate 25, provided at spaced intervals with securing bolts 26 engaged through suitable bolt holes extending through the end wall of the tank. The rubber diaphragm thus provides both a sealing means for the opening through the end wall of the tank and a flexible pivot support for the float. It will be obvious that as the liquid level rises within the tank, the float will move the extension lever 17 downwardly and that the sealing pad 18 will be moved away from the end of the air conduit 19 and thus will freely admit air through the latter and into the intake suction line of the pump. This obviously will cause the pump to lose its vacuum effect on the intake suction line and will stop the pumping action and prevent an overflow, or the development of excessive pressure within the tank.

As herein indicated, the operation of cleaning a septic tank is commenced by forcing a liquid stream jet against the solidified matter adhering to the walls or floating within the tank so as to agitate and disintegrate the solid matter therein and mix the latter with the liquid and bring the contents of the tank into a semi-liquid mixture suitable to be drawn into the intake line of the pump and circulated by the latter.

The jet is supplied by a section of hose 12a, which may be secured to the discharge line 12 of the pump adjacent the valve 14, where a fitting 31 is provided upon which the terminal fitting of the jet hose is engaged in firm screw-threaded engagement. The valve 14 is then turned to a position permitting the material drawn from the septic tank to be passed through the pump and discharged through the fitting 31 into the tank 1 for re-supply under pressure to the septic tank, this operation being continued until the liquid and solid matters are uniformly mixed and the tank cleansed. By resetting the valves 13x, 14, and continuing the operation of the pump 9, the mixture may be circulated to and from the tank 1; such circulation may be continued to maintain the mixture in a fluid or semi-fluid condition during driving of the truck to a selected area and then discharged from the tank 1 through the discharge line 12, or it may be discharged by gravity flow direct from the tank through the pipe 1a and intake on suction line 13 with the valve 13x set in the appropriate position.

Since the pump is provided with a separable impeller chamber, should the deposit of solid material within the pump accumulate to such an extent as to interfere with the operation of the pump, the separable section may then be removed and the solid matter cleared from the pump passageways of the separable section which normally are positioned closely adjacent the impeller. It will be observed that all parts of the

apparatus are readily accessible and that the latter may be maintained at full efficiency with a minimum of attention.

When the apparatus is used in small suburban communities, as previously stated, it is adapted for many additional uses besides the cleaning of septic tanks. Thus it may be used for emergency fire fighting, for street flushing and for dewatering flooded basements.

When used for a septic tank cleaning apparatus, it is superior to any of the conventional apparatus for septic tank cleaning at present in use, as the truck tank is closed and sealed so as to be fully sanitary in every respect, and is also practically odorless by reason of the tank being a closed container, and the passageways being sealed by valves which are accurately fitted and prevent leakage or loss of control of fluid flow in any direction.

Other modes of applying the principle of my invention may be employed instead of those explained, change being made as regards the mechanism and method herein disclosed, provided the means stated by any of the following claims or the equivalent of such means be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. An apparatus of the class described having, in combination, a mobile truck, a liquid holder thereon, a power driven centrifugal pump disposed adjacent said holder and having suction and discharge pipes, the inlet and outlet ends of which are adapted to be projected into a tank, a discharge pipe leading from the bottom portion of said holder and having connection with said suction pipe, a valve in said connection, said valve, when in one position, being arranged to connect said suction pipe with the inlet side of said pump and when in another position being arranged to connect said last mentioned discharge pipe with the inlet side of said pump, a separate pipe connected with the discharge side of said pump and extending into said holder, a valve in said separate pipe, said last mentioned valve, when in one position, being arranged to control the flow of material from said pump to said holder and when in another position being arranged to control the flow of material from said pump to said first mentioned discharge pipe, an inlet air supply pipe the discharge end of which is connected with said suction pipe outwardly of said first mentioned valve therein, a valve for closing the inlet end of said air supply pipe, and a float in said holder, operatively connected to said last mentioned valve and arranged to operate the latter to open position due to the rise of the material in said holder.

2. A vehicle having a platform, a holder for a liquid or semi-liquid mounted on said platform, a centrifugal pump having a driving means mounted on said platform adjacent said holder, a hose adapted to be extended into a tank for withdrawing liquid therefrom, connected with the suction pipe of said pump, a pipe connected with the discharge side of said pump and adapted to extend into the tank for discharging liquid under pressure thereto to disintegrate and agitate solid matter in the tank to effect a mixture thereof with the liquid therein and supplied thereto for withdrawal from and resupply under pressure to the tank, a conduit having a connection with said discharge pipe, leading to said holder, a valve in said connection for controlling the flow of liquid and liquid mixed

with solid matter to the tank or to said holder, a conduit leading from the lower portion of said holder and having a connection with said suction pipe, and a valve in said last mentioned connection for controlling the flow of liquid and liquid mixed with solid matter from the tank or from said holder to said pump for pressure discharge through said discharge pipe.

3. A vehicle as claimed in claim 2 wherein the valve in the last-mentioned connection is of the three-way type arranged to close the suction pipe between said connection and said pump and permit gravity flow of the materials from said holder for discharge therefrom through said suction pipe outwardly of said connection.

4. An apparatus of the character described having, in combination, a mobile truck, a holder for material on said truck, a power driven centrifugal pump and driving means therefor mounted on said truck adjacent said holder, a suction pipe for said pump, a hose having connection with said suction pipe and adapted to extend into the tank to be cleaned, a discharge pipe for said pump leading into said holder, a hose having a connection at its inner end with said discharge pipe and adapted to extend into the tank to be cleaned, said pump being arranged to withdraw materials through said suction pipe and discharge the latter through said discharge pipe into said holder, a valve in said last mentioned connection arranged to cut off flow through said discharge pipe to said holder and connect it to the adjacent hose, a separate discharge pipe leading from the bottom portion of said holder and having connection at its outer end with said suction pipe, and a valve in said last mentioned connection, said last mentioned valve, when in one position, being arranged to connect the adjacent hose to said suction pipe and cut off flow of material through said separate discharge pipe and when in a second position to cut off flow from the adjacent hose and connect said separate discharge pipe to said suction pipe and when in a third position to connect said separate discharge pipe to the adjacent hose.

WARREN EDMUND RUPP.

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