

May 13, 1952

C. C. HUDSON
PUMPING SYSTEM

2,596,151

Filed Feb. 27, 1948

2 SHEETS—SHEET 1

Fig. 1

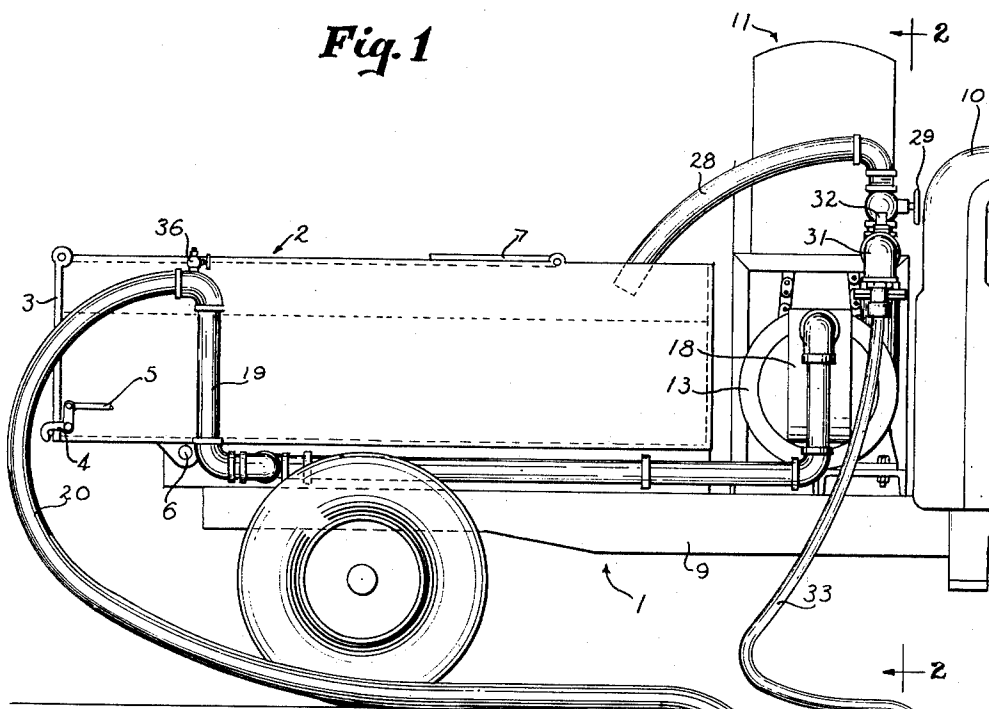
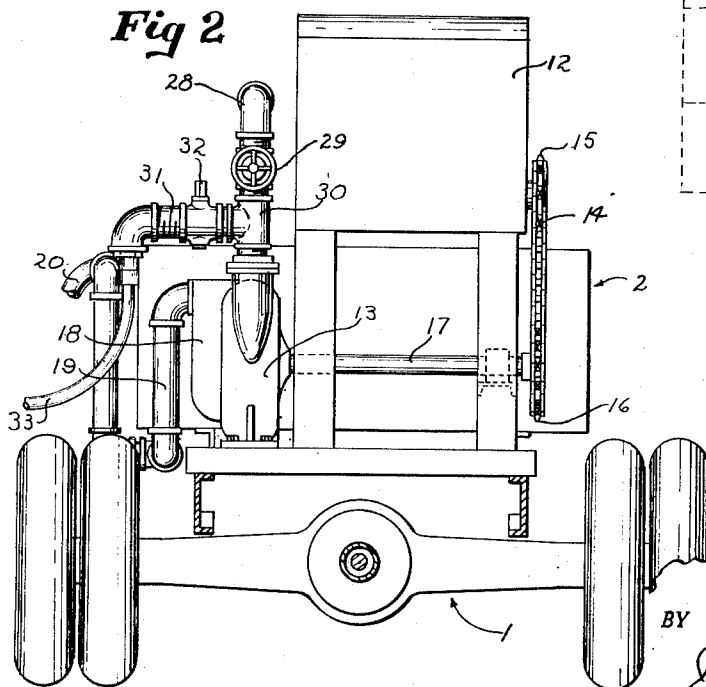


Fig 2



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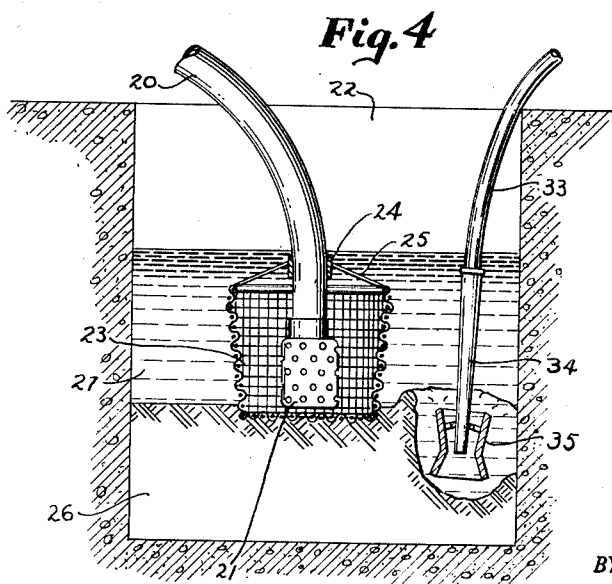
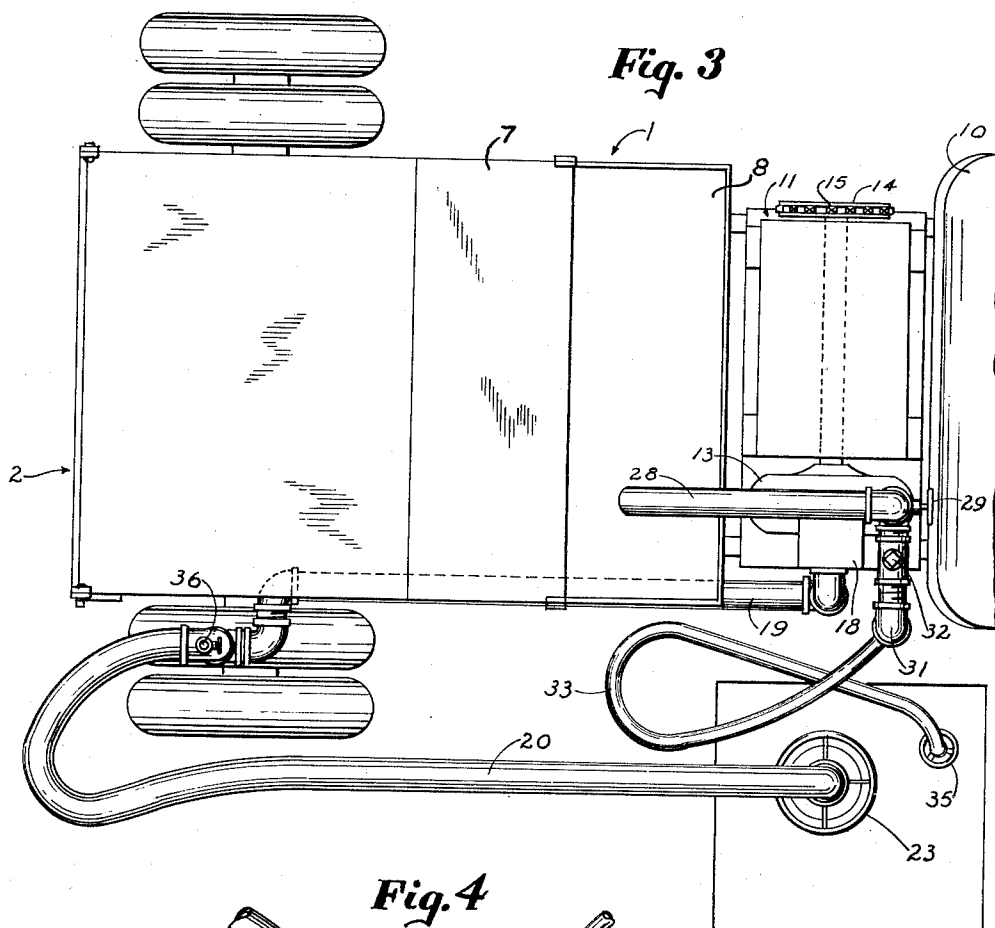
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UNITED STATES PATENT OFFICE

2,596,151

PUMPING SYSTEM

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1 Claim. (Cl. 210-44)

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This invention relates to improvements in mud pumping systems and more particularly to pumping systems for removing mud, sewage and other materials from a sump, and is especially well adapted as a clean-out system for removing mud and sludge that accumulate in a drain sump such as is used in connection with automobile washing racks.

Heretofore the removal of mud and sludge from sumps has been a laborious and unpleasant task, and without special equipment the sump frequently was not thoroughly cleaned.

With the present pumping system the sump may be cleaned free of mud and sludge in a simple and inexpensive manner and without the necessity for workmen going into the sump pit for the cleaning job. It is seldom, if ever expedient or desirable for the refuse to be dumped as it is pumped out, and it is for this reason that the present pumping system is shown in connection with a mobile container, preferably a dump truck, so that the refuse may be transported and dumped at any suitable place remote from the sump pit.

The primary object of this invention is to provide a sump cleaning system that is simple in construction, effective in operation and simple to use.

Another object of this invention is to provide a mechanical cleaning system for sumps that will effectively clean the sump, which cleaning is very difficult to do by manual labor.

Another object of this invention is to provide a sump cleaning mechanism whereby the solid material that is collected therein is agitated into solution with water so that the solid material that is entrained therein may be pumped from the sump. If the water is not already present in the sump in may be introduced therein by means of the pumping system that is used for the removal of the fluid and solids from the sump.

An embodiment of this invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevational view of the invention shown as applied to a truck with a portion of the vehicle broken away;

Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1, looking in the direction indicated by the arrows;

Fig. 3 is a top plan view of the invention; and

Fig. 4 shows an elevational view in section of the sump with the suction and agitating lines of the pumping system positioned therein.

With more detailed reference to the drawing,

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the numeral 1 designates generally a motor truck upon which a body is pivotally mounted, and which is generally known as a dump body 2. The dump body 2 is of a type which the front end is adapted to be raised for dumping the material therefrom that has been pumped thereinto. This dump body 2 has a hinged door 3 at the rear thereof which door is adapted to be opened to allow the material to flow from the rear end of the dump body while the front end of the body is raised. The door 3 is provided with a latch 4 which may be operated from a remote point by means of a rod 5, that is, the operator of the truck can open the door 3 for dumping the material therefrom while the operator remains in the cab of the truck.

The dump body 2 is pivoted on an axis 6 and may be raised to dumping position by any conventional means, such as by hydraulic jack cylinders (not shown). The material pumped into the dump body is usually in the form of heavy mud, and it is therefore preferable to have the dump body of the covered or closed type. To gain access thereto from the top, the dump body is provided with a door 7, which may be kept closed during transportation to prevent the mud from splashing out.

Mounted upon the truck frame 9, immediately rearward of the cab 10 is a motor pumping unit generally designated at 11, and which unit consists of a motor 12 which is adapted to drive a pump 13 through a chain 14 connected between sprockets 15 and 16, the latter of which is secured to pump shaft 17.

The pump 13 is preferably of the "self-priming" type in which a fluid-leg 18 is maintained within the pump above the suction opening thereof.

A pipe 19 connects with an inlet opening in fluid-leg 18 on the suction side of the pump and the other end of the pipe 19 has a hose connected thereto, in fluid tight relation. The hose 20 has a strainer 21 connected to the suction end thereof. This hose 20 is adapted to extend into a sump 22 in such manner as to withdraw fluid mud therefrom. A mesh or screen basket 23 is removably attached to the hose 20 by a clamp 24, which clamp is adapted to clamp about the hose and connect to the basket 23 by means of rods 25. This mesh basket 23 is adapted to rest upon the upper surface of the solids 26 as they have settled in the sump 22. This will cause the strainer 21, at the end of the hose, to be suspended in the liquid 27 in the sump, or if liquid is not present, it can be supplied thereto by

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the pumping system. With the mesh basket in place about the screened end of the hose, the hose is protected from large, solid portions of refuse being drawn therein to clog the hose and impair the functioning of the pumping of the material from the sump. The material is withdrawn through suction hose 20, pipe 19 and into centrifugal pump 13. The pump 13 is provided with a relatively large discharge line 28, which line discharges the mud from the pump. The discharge from the line 28 is controlled by a valve 29 positioned therein. However a T 30 is positioned between valve 29 and the pump 13 and has a pipe 31 leading therefrom, and in which pipe 31 a stop-cock 32 is positioned. The pipe 31 is reduced in diameter and a hose 33 is connected thereto which is also considerably reduced in diameter with respect to the hose 20 and the hose 28, so that when a large volume of material is discharged from the pump 13 through hose 33 a greater pressure is exerted on the liquid and a higher velocity imparted thereto, which enables the liquid that is pumping from the sump to be recirculated and directed from the nozzle 34 in jetting relation through Venturi jet 35, back into the sump to agitate the solid material therein so that it will be mixed with the liquid being withdrawn and recirculated. This makes possible the complete mixing of the solid matter with the liquid, which solid matter either becomes entrained in the liquid or enters into solution and thus be readily removed from the sump through hose 20 and pipe 19 into the pump, to be discharged through pipe 28 into the dump body tank 2.

After the liquid and solid matter have been so thoroughly agitated and intermixed by the introduction of liquid into the sump under high pressure, and such solids as are soluble go into solution and others become entrained in the liquid, the valve 29 is opened and the stop cock 32 is closed, then the mixture may be pumped out of the sump into the dump body tank 2. The strainer 21 may be adjusted in the mesh basket 23 at any desired position, so as to remove the mixture from the sump, or, under certain conditions, the basket may be dispensed with and the material pumped directly through the strainer, depending on the type of material being pumped, a highly soluble material being less likely to clog the system than material containing hard to dissolve or mix solids.

In the operation of the pumping system in cleaning out a sump of an automobile wash rack or the like, the truck is driven into close proximity to the sump to be cleaned, and the suction hose 20 and basket 23 are lowered therein below the liquid level 27 in the sump, with the basket 23 resting on the surface of the solid material as it is settled in the sump. The pumping unit 11 is then actuated by starting the motor 12, and the liquid to be withdrawn is pumped through suction hose 20 and into pump 13 with the valve 29 closed and stop 32 open, the water is discharged through small diameter hose 33, through nozzle 34 to mix and agitate the solids 26 with the liquid until the material within the sump is thoroughly mixed with the liquid, and with the nozzle 34 drawing additional mud through the Venturi jet 35 all the solids within the sump 22 are agitated, and such material as is soluble goes into solution and such material as is not soluble is in suspension and is pumped out from the sump through hose 20 until such time as the recirculation may be stopped. The mud is then pumped

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through discharge line 28, when the valve 29 is open and the stop 32 is closed, into tank 2 so that it can be hauled to a convenient place of disposal.

After the mud has been pumped from the sump, it is necessary for the hose 20 and the hose 33 to be removed from the sump in order that these may be placed upon the truck for transportation. It is desirable to maintain the pipe 19 full of liquid to insure a full prime for the pump 13 to start each job. However, if the hose 20 is left in the sump 22, the mud will be siphoned out of pipe 19. To prevent this a vent cock 36 is provided which is adapted to break the vacuum on pipe 19 and hose 20, thereby preventing the siphoning of the mud from the pump 19 due to the fact that the lower end of the hose 20 would be lower than the pipe 19.

By breaking the vacuum this also vents the hose to permit the draining of the remaining liquid from the hose 20, as frequently this suction hose is as much as four inches in diameter and as much as twenty-five feet long, and is quite heavy when filled with mud and by draining the mud therefrom it can be more readily handled by the operator.

It will be readily appreciated that by cleaning wash rack sumps in this manner, as well as cess pools and oil traps and other sumps which contain a mixture of solids and liquids or to which liquid may be added and into which the solids may become entrained or be held in suspension, the material can be readily removed therefrom by the use of this present system.

After the mixture containing the solid matter has been pumped from the sump and deposited into the dump body 2 of the truck, the suction end of the hose 20 may be placed in the upper portion of said dump body, which in effect is a mobile container and the excess liquid pumped therefrom, and discharged through the hose 33, or the liquid can be used for further washing of the sump 22, or it can be discharged at any convenient place without the necessity of hauling it to the dumping place of the solid material. However, if desired, and the solid material becomes too thick to dump readily, the suction hose may be placed in the dump body 2, and by the action of the nozzle 34 and Venturi jet 35 the material within the sump will be mixed with liquid and agitated as has been the material within the sump, and thus become of a consistency to be dumped readily from the truck.

Having thus described the invention, what is claimed is:

A mobile apparatus for removing liquids and solids from a pit comprising a power driven pump mounted thereon, said pump having a suction line and two discharge lines connected thereto, said suction line being adapted to extend into a pit from which liquids and solids are to be removed, said suction line having a portion thereof extending above the inlet of said pump and which portion carries a valve for venting said suction line for breaking a syphoning action when said pump is not in use, one of the discharge lines of said pump being adapted to direct the material being discharged into a container mounted on said mobile unit, the other of said discharge lines having a Venturi mixing nozzle thereon with the discharge of said line in close proximity to the reduced cross-sectional area of said Venturi mixer so when said mixer is lowered into a pit containing liquids and solids, turbulent mixing action will be accorded to said solids and said

liquids, said container being pivotally mounted at the rear portion of said mobile unit for raising and lowering said container, said container having a pivotally mounted discharge door adapted to close the rear end of said container in substantially fluid tight relation, latch means for releasing said door for the discharge of said material from said container.

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