Dec. 19, 1961 R. F. SCHMIDT ET AL 3,013,665

EDUCTOR WITH AUXILIARY PUMP-OUT ARRANGEMENT

Filed Oct. 21, 1959 2 Sheets-Sheet 1

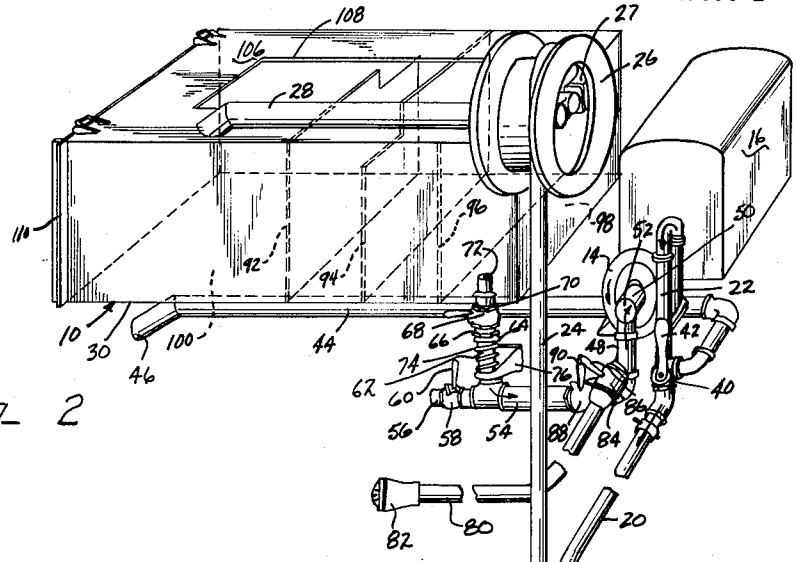


Fig. 2

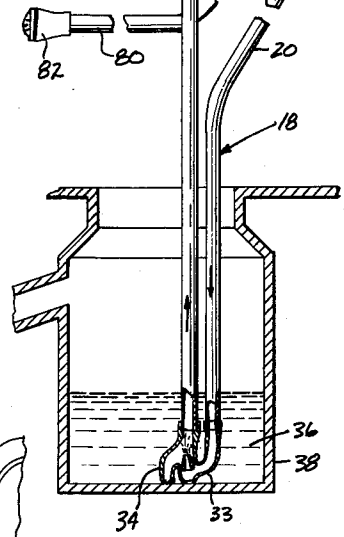
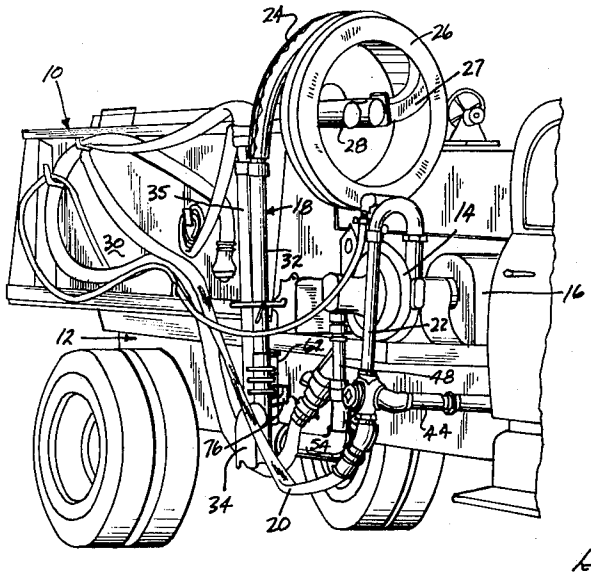


Fig. 1



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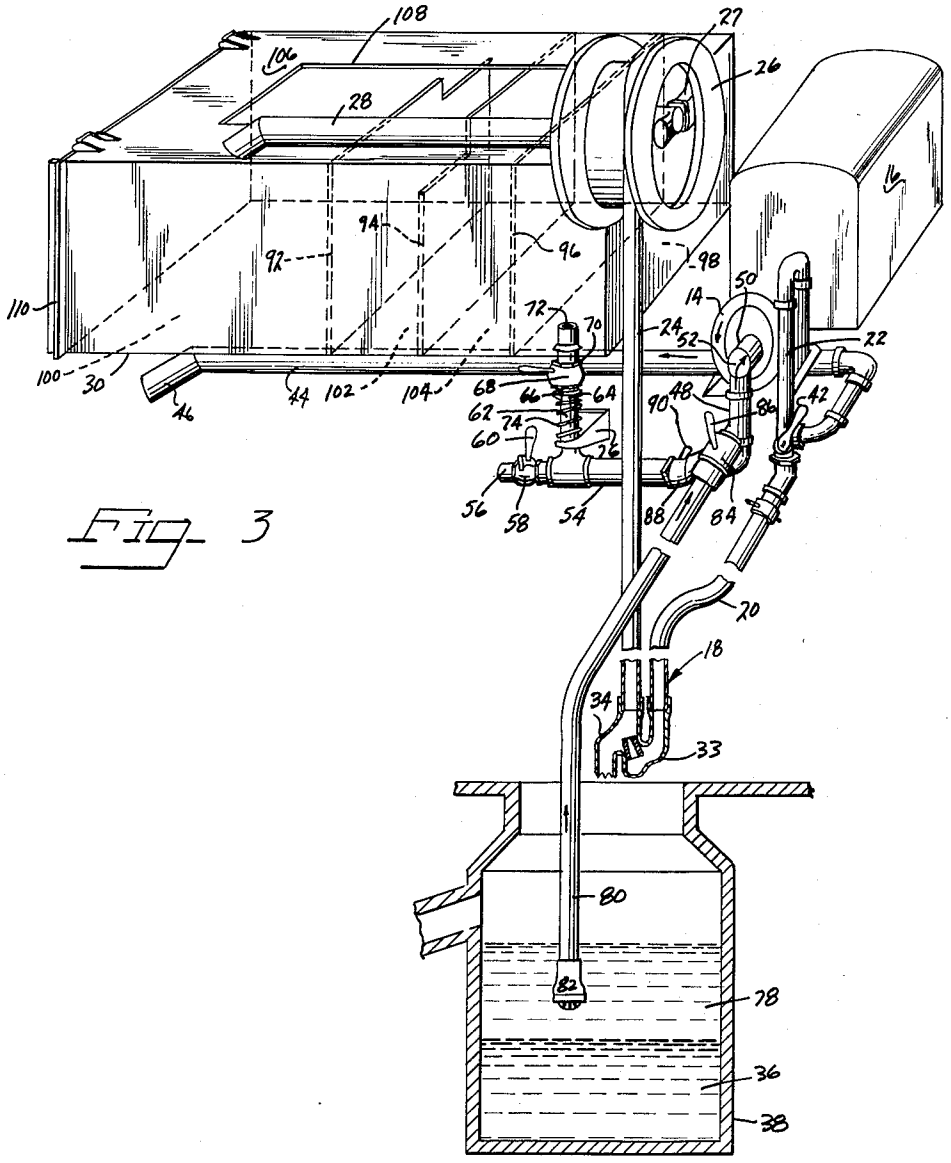


Fig. 3

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EDUCTOR WITH AUXILIARY PUMP-OUT ARRANGEMENT

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This invention relates to a hydraulic pumping unit, and more particularly to a vehicle-mounted eductor unit for educting material from catch basins or other receptacles and which successively removes an initial layer of water from such receptacles and a lower layer of sludge or the like.

Heretofore, separate pumping means have been required for preliminary pumping-out of depressions, manholes or junction chambers as described and for educting the underlying sludge materials into the receiving chest of the eductor. The present invention eliminates this requirement and affords a unitary mechanism wherein the same pump that is used for educting material from catch basins into the tank of the unit is also used for pumping out the water in the depressions down to the level of the muck that must be pumped into the receiving chest.

The eductor unit of the invention thus includes eductor means having a high pressure hose connected to a pumping unit and connected with a sump discharge pipe by pump discharge directional valve means and a flexible eductor hose adjustably mounted on a reel for feeding materials to an eductor tank or receiving chest by eductor jet pump means formed at the lower ends of the high pressure hose and the flexible eductor hose, in accordance with R. C. Evans, United States Letters Patent No. 2,010,538, filed December 4, 1933, dated August 6, 1955. As set forth in the said Evans patent, clarified liquid from the receiving chest may be recirculated through valve-controlled conduit means through the pump and the high pressure discharge hose. In order to provide coacting auxiliary pump-out means for removal of the liquid above the semi-solid materials, a flexible suction hose is connected to the conduit means together with valve means for closing communication from the eductor tank or chest to the suction hose and opening communication between the suction hose and the pump during the sump or fluid removal cycle afforded by the eductor unit of the invention.

Accordingly, it is an object of the present invention to provide an eductor unit which is capable of effecting removal of fluid materials from a depression such as a catch basin or the like, and thereafter removing settled materials from the depression, with a single pump.

Another object of the invention is to provide an eductor unit as described in which a sump pump hose and a jet pump hose assembly are operated from a single pump as controlled by valve means therefor.

Yet another object of the invention is to provide an eductor unit as described which is compact and easily handled, and which accomplishes a plurality of operations which previously had required two units.

Other objects and advantages will become apparent as the description proceeds in accordance with the drawings, in which:

On the drawings:

FIGURE 1 is a perspective view of an eductor according to the present invention mounted on a suitable vehicle;

FIGURE 2 is a perspective view of the eductor of the invention in operative relation to a receptacle for removing sludge and the like materials therefrom; and

FIGURE 3 is a view corresponding to the view of FIGURE 2 and showing the eductor in position for withdrawing fluid from the receptacle.

As shown on the drawings:

The eductor means 10 of the invention is shown as mounted on a vehicle 12 and includes a pump 14 operated by a motor 16 and a hydraulic elevator 18 having a flexible pressure discharge hose 20 connected to a pump discharge pipe 22 and a flexible eductor hose 24 which is wound around a reel 26 with the upper end thereof connected through a curved hollow arm 27 and through the hub of the reel to a tank inlet pipe 28 leading from the reel to the rear end of a settling tank or chest 30. As set forth in the aforementioned United States Patent No. 2,010,538, the hose 20 is connected to a metal pipe 32 having a jet pump 33 at the lower end thereof for introducing fluid under pressure into a suction hood 34 suitably secured to the lower end of a metal pipe 35 on the hose 24 to form an eductor head joining the metal pipe 32 and the metal pipe 35 whereby muck and similar material 36 may be removed from a catch basin or the like 38.

The pump discharge pipe 22 has a curved upper portion bolted to an opening in the pump casing and the casing is supported upon a supplemental frame mounted on the eductor frame as set forth in the said United States Patent No. 2,010,538. The pump discharge pipe also has a pump discharge directional valve 40 controlled by a handle 42.

In accordance with the invention, a sump discharge pipe 44 is connected to the pipe 22 for discharging fluid from the pump when the handle 42 is in the position of FIGURE 3, as herein after further described, and described, and desirably the pipe 44 extends beneath the bottom of the tank 30 to a downwardly inclined end 46.

The center of the pump casing has an opening which communicates with a pipe 48 having an L-shaped head portion 50 bolted to the said center portion and preferably provided with a removable end cap 52 for access to the pipe. The pipe 48 in turn connects with a horizontal pipe 54 which is provided with a drain nozzle 56 at its free end. A valve 58 is controlled by a handle 60 located adjacent the nozzle 56 to either shut off any drain from the pipe or to allow the same to drain as desired.

A short pipe 62 is connected to the transverse pipe 54 and, as described in the said Patent No. 2,010,538, is provided with a preferably beveled head (not shown) which is normally pressed against a sealing ring (not shown) located in a groove in a metal hood 64 formed in a short pipe section 66 which is connected to a valve housing 68. The valve housing 68 is in turn connected by a hollow threaded member 70 to a standpipe 72 secured in a suitable opening in the bottom of the tank 30.

The end of the pipe 62 is normally forced against the sealing ring, as described in the said patent, by means of a suitable coil spring 74 surrounding the pipe and supported at its lower end upon a bracket 76. The upper

end of the spring 74 engages beneath the beveled head of the pipe 62 and forces the head against the sealing ring so that the settling tank can be readily tilted without affecting the pipe.

In accordance with the invention, and to afford preliminary removal of an upper layer of liquid 78 from the catch basin 38 by the pump 14 which operates the jet pump 33, a flexible suction hose 80 is connected to the pipe 48 as shown, and is provided with a suitable sump head 82 at its lower end. A valve 88 is provided for selectively closing the transverse pipe section 54 by means of a suitable handle 90, and a valve 84 is provided having a handle 86 movable to the position shown in FIGURE 3 for opening the hose 80 to remove the water 78 from the catch basin, at which time the valve handle 42 also is in the open position shown in FIGURE 3.

When it is desired to remove the lower layer of sediment 36 from the catch basin 38, the tank 30 is desirably filled about two-thirds full, where a 1,200 gallon capacity tank is used, and the valves 68 and 88 are thereupon opened and the valve 84 is closed, so that water from the tank 30 may be recirculated to operate the jet pump 33 when the elevator 18 has been placed in the basin 38, as shown in FIGURE 2. Recirculation of fluid is then continued until the tank is substantially filled with the sediment, at which time pumping will automatically be terminated.

The tank or chest 30 embodies a plurality of apertured baffles 92, 94 and 96 affording successive flow of fluid to a forward tank portion 98 for retaining clarified fluid to be recirculated to the pump 14 as described. Thus, the sludge is deposited by the tank inlet pipe 28 in a rear compartment 100, which retains the bulk of the solid material, further settleable material being successively deposited in the intermediate compartments 102 and 104.

The tank is preferably provided with a cover 106 having an opening 108 for receiving rocks or the like, and is adapted to be tilted around its pivotal connection with an eductor frame as set forth in the said United States Patent No. 2,010,538 for removal of the solid material therefrom. For this purpose the rear wall of the tank is formed by a hinged discharge door 110, also as set forth in the said patent.

There has thus been provided an extremely effective and simple device which embodies sediment-eduction means and an auxiliary pump-out means for removing fluid which may overlie the sediment in a unitary structure utilizing the same pump means for both pump-out operations and sediment eduction.

Although we have herein set forth and described our invention with respect to certain specific principles and details thereof, it will be understood by those skilled in the art that these may be varied without departing from the spirit and scope of the invention as set forth in the hereunto appended claims.

We claim as our invention:

1. An eductor unit adapted to be mounted on a vehicle or the like comprising a settling tank, a pump having a suction side and a positive side, a hydraulic elevator connected to said tank and said pump and including jet means for eduction of sediment and the like having a conduit leading from the positive side of said pump and a conduit leading to said tank, means for adjusting the position of said hydraulic elevator, sump head means including a conduit connected to the suction side of said pump and means controlling flow through said pump and affording selective operation of said jet means and said sump head means.

2. An eductor unit adapted to be mounted on a vehicle or the like comprising a settling tank, a pump, a hydraulic elevator connected to said tank including an eductor line, a high pressure line connected to said pump and an eductor head joining the eductor line and the high pressure line, reel means for said eductor line connecting said eductor line to said tank, conduit means connecting said tank and said pump to afford return of clarified fluid from said tank to said pump, a sump suction hose connected to said conduit means, discharge means for said pump affording discharge of fluid introduced into said conduit means from said sump suction hose, and means controlling flow through said pump and affording eduction of sediment or the like through said hydraulic elevator to said tank or pump-out of fluid through said sump suction line to said discharge means, selectively.

3. An eductor unit comprising a settling tank, a pump, a hydraulic elevator including an eductor line connected to said tank, a high pressure line connected to said pump, an eductor head joining the eductor line and the high pressure line for sediment eduction, and reel means for said eductor line on said tank, pump suction conduit means connecting said tank and said pump, valve means in said pump suction conduit means to afford selective return of clarified fluid to said pump, a sump suction hose connected to said pump suction conduit means, valve means for said sump suction hose affording selective communication thereof with said pump through said pump suction conduit means, discharge means for said pump affording discharge of fluid introduced into said pump suction conduit means from said sump suction hose and valve means for said pump affording flow from said pump to said high pressure line or to said discharge means, selectively.

4. An eductor unit adapted to be mounted on a vehicle comprising a settling tank, a pump, a hydraulic elevator including an eductor line connected to said tank, a high pressure line connected to said pump, an eductor head joining the eductor line and the high pressure line for sediment eduction and reel means for said eductor line, a pump suction conduit connected to said tank and to said pump, a sump suction hose connected to said pump suction conduit, valve means affording flow of clarified fluid from said tank to said pump through said pump suction conduit or pump-out of fluid through said sump suction hose and said pump suction conduit to said pump selectively and discharge means for said pump and valve means affording flow from said pump to said high pressure line or to said discharge means selectively.

5. An eductor unit adapted to be mounted on a vehicle comprising a settling tank, a pump, a hydraulic elevator including an eductor line connected to said tank, a high pressure line connected to said pump, an eductor head joining the eductor line and the high pressure line, and reel means for said eductor line mounted on said tank, a pump suction conduit connecting said tank and said pump to afford return of clarified fluid to said pump from said tank, a sump suction hose connected to said pump suction conduit, discharge means for said pump, a valve for said discharge means affording flow of fluid from said pump through said high pressure line or through said discharge means selectively, a valve controlling flow through said pump suction conduit prior to said sump suction hose and a valve controlling flow from said sump suction hose to said pump suction conduit whereby clarified fluid from said tank may be recirculated through said high pressure line when said valve for said pump suction conduit is open and said valves for said sump suction conduit and said discharge means are closed and fluid from said sump suction hose may be pumped out when said valve for said pump section conduit is closed and said valves for said sump suction hose and said discharge means are open.

6. An eductor unit adapted to be mounted on a vehicle comprising a settling tank, a pump, a hydraulic elevator including an eductor line connected to said tank, a high pressure line connected to said pump, an ejector head joining the eductor line and the high pressure line and reel means for said eductor line, a pump suction conduit connecting said tank and said pump to afford re-

turn of clarified fluid to said pump, a sump suction hose connected to said pump suction conduit for drawing fluid from a catch basin or the like prior to removal of sediment therefrom by said ejector head, valve means affording flow from said tank to said pump or from said sump suction hose to said pump selectively including a valve in said pump suction conduit prior to said sump suction hose and a valve for said pump suction hose prior to said pump suction conduit, a discharge conduit leading from said pump and affording discharge of fluid introduced into said pump suction conduit from said pump suction hose, said valve means including two-way valve means affording flow from said pump to said high pressure line or to said discharge conduit selectively whereby fluid may be recirculated from said tank to said high pressure line when said valve in said pump suction conduit is open and said two-way valve means closes said

discharge conduit for said pump and said valve for said sump suction hose is closed or from said sump suction hose to said discharge conduit when said valve in said pump suction conduit is closed, said two-way valve means is closed for said high pressure line and said valve for said sump suction hose is open.

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