

### Simple and Inexpensive Method of Lifting Sewage Sludge to Sludge Beds or Outfall Sewer

By Alexander Potter, Consulting Engineer, 50 Church Street, New York, N. Y.

It is often impossible to construct a sewage settling tank at such an elevation above the ground that the head of the liquid in the tank itself is sufficient to force the sludge on to the sludge drying beds by gravity.

Where the sludge can not be discharged upon the sludge drying beds by gravity, pumping, of course, must be resorted to, and especially in smaller installations it is very difficult to secure satisfactory results, because either the pump loses its priming or some foreign substance clogs the lower end of the suction pipe, or perhaps in most cases a combination of both these troubles occurs, which makes pumping unsatisfactory in many cases.

#### Vacuum Pump and Receptacle

To overcome the difficulty thus encountered in some forms of settling basins, both deep and shallow, the writer devised a simple method of lifting the sludge above the surface of the water in the settling tank into a receptacle from which it could flow by gravity on to sludge drying beds or into the outlet of the treated sewage, as the case might be.

The figure shows such an installation and an examination of it discloses that the apparatus consists of a riser pipe extending from the bottom of the sludge chamber and discharging into the top of a steel tank 4 ft. in diameter and 4 ft. deep, with a tapered bottom, erected above the surface of the sewage in the settling basin. From the tapering bottom of this tank a pipe is led either to the sludge beds or to the outlet end of the settling tanks. The steel tank thus described is gated on the inlet and outlet ends with an air tight valve. There is located in the building near the steel tank a small rotary vacuum pump direct connected with an electric motor, if electric current is available, or to a small gas or gasoline engine, if electric current is not readily procurable.

The vacuum pump used in several recent installations was a No. 2 Rotary furnished by the Beach-Russ Company of New York. This pump is of the rotary sliding vane type, thus obviating the usual resultant troubles common to the reciprocating type of valve pump. A cylindrical drum is eccentrically placed in a steel elliptical cylinder, the drum consisting of four sliding plates. As each plate passes the inlet port it takes in and traps the air, carrying it around to the point where the drum and cylinder come into contact and presses the air out at that point. There is no appreciable wear due to operation, and the pump will stand considerable abuse.

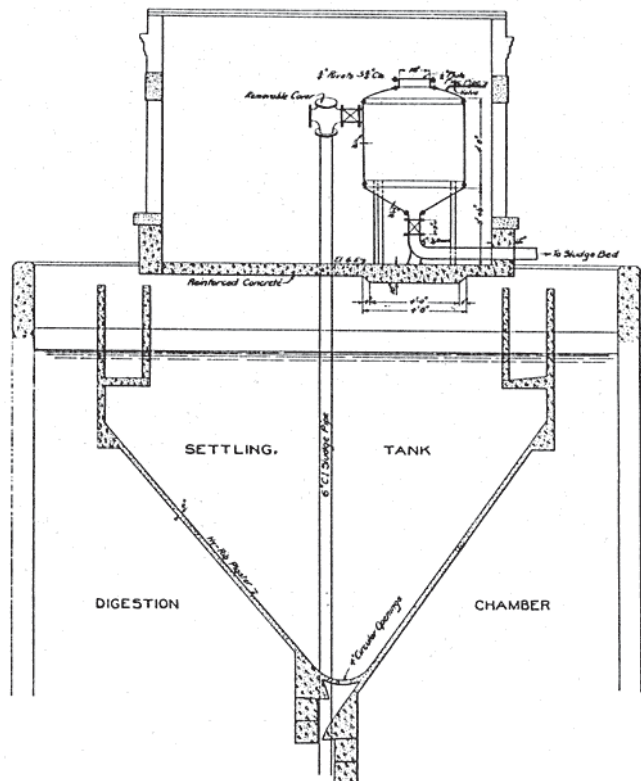
#### Operation of Sludge Lifting Device

To operate the sludge lifting device, the valves are closed on the inlet and outlet pipe and the air exhausted by means of the vacuum pump. A vacuum of 28 ins. is readily procurable, provided the inlet and outlet valves are tight. In this connection it might be stated that while it is easy to procure valves which are tight against 300 lbs. of water pressure, many of these valves are not air tight against much lighter pressures.

When the air has been exhausted, which will probably take ten minutes, the inlet valve is opened slowly at first and the sludge rushes up from the bottom of the sludge chamber until the air pressure within and without the tank is balanced. The outlet pipe can then be opened and the sludge is discharged to the sludge beds or to the outfall sewer.

#### Removing Obstructions

As above stated, the mouth of the pipe extending down into the sludge is often obstructed, sometimes totally, by a piece of water soaked board, a brick or some other foreign substance which normally should not enter the tank, but which causes considerable inconvenience and trouble when a centrifugal pump is being used to lift the sludge. When such a condition occurs with the apparatus herein described the simple manipulation of valves changes the vacuum pump to an air compressor and the steel tank becomes an air receiver.



SIMPLE APPARATUS FOR LIFTING SEWAGE SLUDGE FROM SETTLING TANKS.

When the inlet valve of the tank is opened the compressed air rushes down through the inlet pipe and readily dislodges any obstruction which may be blocking its mouth.

The cost of installing the pump motor and steel receiver to care for the sludge of a city up to 10,000 people is less than \$1,000.