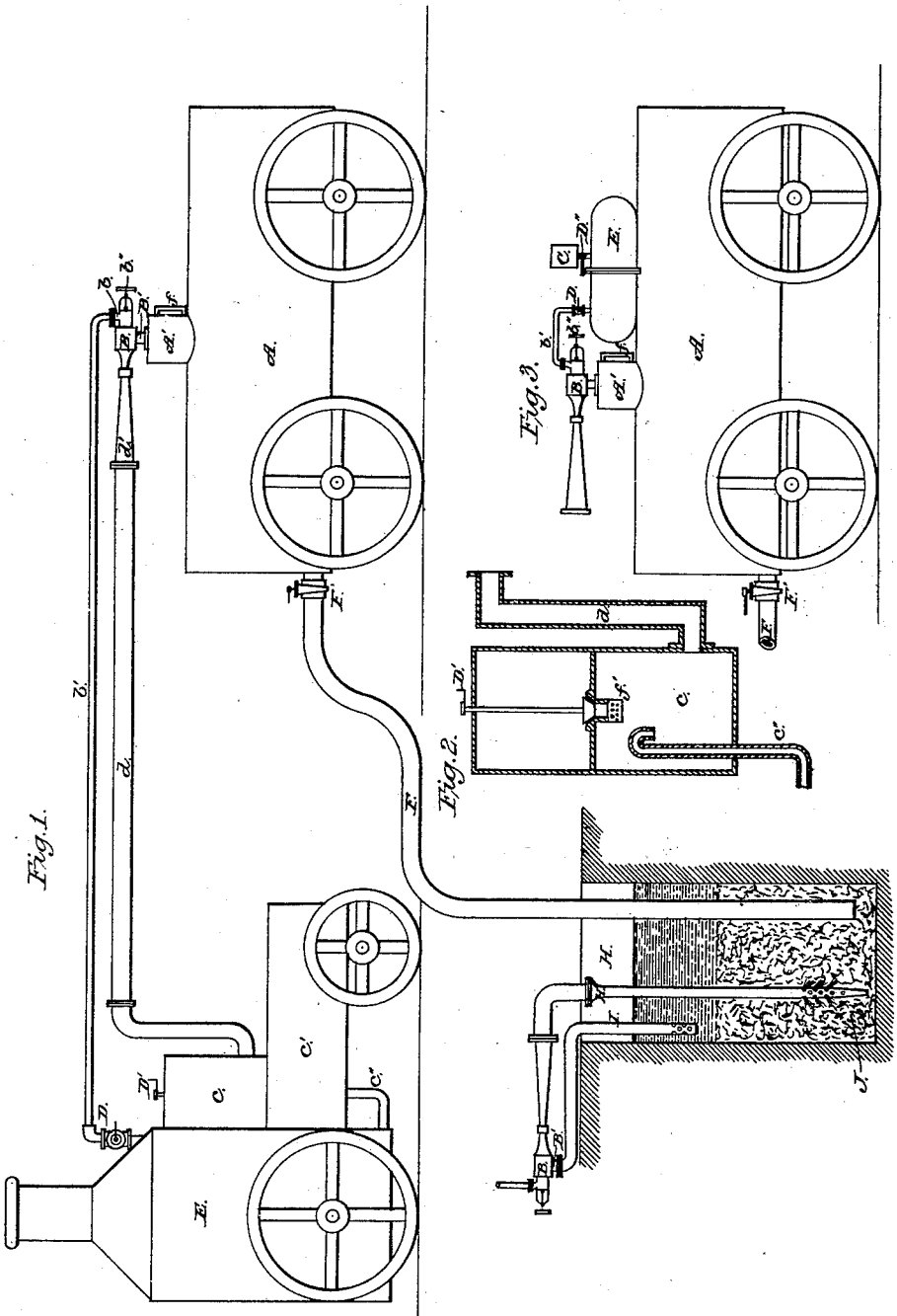
R. S. GILLESPIE.

Night-Soil Apparatus.

No. 168,477. Patented Oct. 5, 1875.



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IMPROVEMENT IN NIGHT-SOIL APPARATUS.

Specification forming part of Letters Patent No. **168,477**, dated October 5, 1875; application filed April 23, 1875.

To all whom it may concern:

Be it known that I, RICHARD S. GILLESPIE, of the city of New York, county and State of New York, have invented certain new and useful improvements in processes and apparatus for the removal of night-soil from privy-vaults, and of the deposits usually found in street-sewers and the man-holes connected therewith, and of other like matter.

The following, taken in connection with the drawings, is a full, clear, and exact description thereof.

Figure 1 is a complete view of the apparatus, privy-vault being shown in section. Fig. 2 is an enlarged sectional view of the jet-condenser. Fig. 3 is a modification of the apparatus, the same letters referring to same parts.

My invention consists in processes and improved means for forming a vacuum in air-tight tanks, in order to draw the contents of sinks, cess-pools, and the like into said tanks, and at the same time and by the same means to prevent the escape of deleterious gases, or to effect the condensation or combustion, or the successive condensation and combustion, of such gases during the operation of scavengering; and also in a process and means for the stirring up from the bottom of the contents of sewers, privies, and like places, when they have become too solid to be removed by the suction of the vacuum, and making such contents sufficiently liquid to be so removed. Heretofore the vacuum in the tank has been obtained by air-pumps, either located at the scavengering station or placed upon the tanks themselves, and actuated by mechanism in connection with the wheels while the carriage is being moved. In such cases, as the tanks are being filled, the vacuum is being reduced, in consequence of which either the tank cannot be wholly filled or the partially-filled tank must be run over a greater or less course to re-form the vacuum, thus consuming time of men and horses, and producing wear of machine and offensive odors from the escape of the gases with which the air-pump is charged. Vacuums have also been formed by filling the tank with water and then pumping out the water, a slow and expensive operation. I apply an ejector operated by any suitable expansive aeriform fluid, such as steam or carbonic-acid gas, for the creation of a vacuum in the tank, by which the vacuum is maintained until the tank is entirely filled, and I secure at the same time, and by the same ejector so operated, a complete destruction of germ life.

It is held by all sanitarians that protoplasms or germs are destroyed by heat, even at 212° Fahrenheit; but the steam or other named agent used in the ejector must of course be higher than this, probably not less than 300°. Not only are animal germs destroyed, but also the deleterious gases which exhale or are drawn from the contents of the tank are either entirely or partially, according to their nature, neutralized or deodorized by the ejecting agent employed.

For the absorption or decomposition of comparatively dense constituents which may be drawn from the tanks, or aqueous vapors in the ejecting agent or in the exhalations from the tank, and which may have resisted the process already applied, I provide a jet-water condenser, through which the hot mixture of the ejecting agent and deleterious gases (and at first air from the tank) may be caused to pass. The remainder of the outflow may be completely deodorized by being passed with and by the ejecting agent from the condenser through the ash-pit, fire-box, and burning coals of a deodorizer proper. The deodorizer may be utilized to generate steam, when that agent operates the ejector, or to generate steam to transport the whole apparatus.

The condenser may be omitted, if desired, and the deodorization effected by the ejecting agent at first, and the deodorizer proper at the last; and whenever the matter to be removed is of a weak consistency, and not excessively fetid, perfect neutralization or deodorization will be effected by the ejecting agents alone, especially when, as is shown, the exterior nozzle of the ejector is extended to a considerable distance for the purpose of maintaining an intimate and continuous commixture of the ejecting and purifying agent with the gases to be neutralized or deodorized.

It sometimes happens that the contents of the sink become too solid to flow into the tank, and it then becomes necessary to put them

into a more liquid form, which I effect by making use of the ejector, and converting it for this purpose into an injector, forcing the delivery-pipe in connection with the instrument into the sink. I draw up water by the injector and force it down into the sink in the usual way in which boilers are fed by this instrument, forcing in water enough to make the contents liquid, and to the very bottom of the sink. In case that the upper part of the sink is liquid, while the bottom part only is solid, I force air by means of injector to the bottom of the sink as a stirrer or mixer to fit the contents to be acted upon by the vacuum. Whether water or air be used for this purpose, I mix them with disinfectants to prevent danger or offense.

To carry out my invention in a practical manner, I construct a portable air-tight tank, A, preferably of wrought-iron and cylindrical form, on top of which is a dome or pipe, A′. Ejector B, for convenience, may be operated upon the top of the tank A; but it may also be operated at a distance from the tank A, provided the connection with the top of the tank A is perfect and continuous. Ejector B consists essentially of an outer pipe and an inner concentric pipe, ending in a jet-nozzle, and having between them an annular space, which communicates with the interior of the tank A, or of a dome, A′, on the tank A, and the inner nozzle and connecting-pipe *b* connect, by *b′*, with the generator E of the ejecting agent, and expanding nozzle *d′* is attached to the outer pipe. By a branch, B′, the ejector B is detachably annexed to the tank A. The annular space of the ejector does not communicate with the outer air. The valve D admits the ejection agent to *b*, and valve *b″* regulates the pressure of the agent according to the force desired. The tank A may be closed by any suitable means when the ejector B is removed. Pipe *d* is connected with nozzle *d′* of ejector B and jet-condenser C, which is placed for convenience on the boiler-truck C′. Valve D′ is for regulating supply of water for the condensation of the outflow from tank A. One end of pipe C″ runs up into the condenser C, the other end terminating in the ash-pit. At bottom of tank A is placed the valve F′, used for induction and eduction. F is a suction-pipe, one end connected with the valve F′, the other end being placed well down into the contents of the vault H.

To operate the apparatus, valves F′ and *b″* are opened. Valves D and D′ are opened simultaneously. The ejection agent now rushes through pipe *b′* into ejector B, and issuing from an inside nozzle into the outer nozzle *d′*, the velocity of which draws the air out of suction-pipe F and tank A, and discharges it through the pipe *d* into condenser C, which consists of an upper water-chamber, a vapor-chamber, a communicating-valve, a nozzle, and suitable inlets and outlets. The outflow is here condensed by a spray of water from jet-pipe *f′*. The remainder passes with the air through pipe C″ into ash-pit, and through the fire under boiler E. In a few seconds a vacuum in tank A is formed, and contents of vault flow through pipe F into tank A with a velocity due to the vacuum. Thereupon the fetid gases and vapors mingle with and are neutralized or deodorized more or less by the ejection agent in *d′*, pass with it through the condenser and deodorizer proper, and escape without offensive smell into the external air. As soon as the material is seen in the glass gage *f* the attendant closes simultaneously the valves D, D′, and F′, pipes F, *d*, and *b′* are disconnected, and the apparatus is again in its normal condition. Ejector B is disconnected and connected to the next empty tank, the operation going on as before.

In some privy-vaults, owing to the porosity of the soil and the material of which they are constructed, the water usually mixed with the fecal matter escapes and leaves it in a tough, tenacious condition. In this condition it is almost impossible to remove it by any form of lift and force pump, or by a vacuum. To prepare the material when in this state, I make use of a hollow perforated cylinder, H′, connecting it with the discharge-orifice of any form of pump or injector, but, for simplicity, prefer to convert the ejector B into an injector, connecting a suction-pipe, I, with branch B′. To operate it, H′ is placed at the bottom of vault; suction-pipe I into water. Steam is now let into the injector B, the current of steam drawing water up pipe I, and discharging it into H′, and through the perforations J J into the mass. If care be taken to shift H′ to different parts of the vault, the material can be softened to any consistency desired. If there is no water on top of material, suction-pipe I is connected with any convenient water-supply. In some cases, air alone, injected by steam, will answer; but I prefer water, as a disinfectant can be readily mixed with it, and the contents of vault thoroughly disinfected.

Fig. 3 is a modification of my apparatus, the boiler being replaced by a carbonic-acid-gas generator, E, placed temporarily or permanently on the tank A. A quantity of carbonate of lime is placed in the generator E, and the reservoir C is filled with sulphuric acid; pipe *b′* is connected with ejector B. To operate this apparatus the valve *b″* is opened, and the valves F′, D, and D′ are opened simultaneously. The sulphuric acid now passes from the reservoir C into the generator E, coming in contact with the carbonate of lime, forming a powerful gas, which has no escape but through *b′* into ejector B. Its action is then the same as when the tank is filled. The valves D, D′, and F′ are simultaneously closed, pipe F disconnected, and it is again in its normal state.

Having thus described my invention and its mode of operation, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of withdrawing sewage, night-soil, and like matter from its receptacle into a transportable vessel, which consists in connecting such matter by an air-tight conduit with an air-tight transportable vessel, and then exhausting the air in the vessel by a jet of an expansive aeriform fluid, such as steam or carbonic-acid gas, substantially as described.

2. The method of withdrawing sewage, night-soil, and like matter from its receptacle into a transportable vessel, and at the same time deodorizing its fetid vapors and gases, which consists in connecting the matter by an air-tight conduit with an air-tight transportable vessel, and exhausting the air from the vessel outwardly through its extended outlet, or through that outlet and through either a shower of water or burning matter, or through an outlet, the water, and burning matter, substantially as described.

3. The method of loosening sewage, night-soil, and like matter preparatory to its removal, which consists in sucking up a stream of air or water, previously disinfected, or not so, and forcing it into the matter to be loosened by a jet of an expansive aeriform fluid, such as steam, carbonic-acid gas, or compressed air or water, substantially as described.

4. The combination of an air-tight transportable vessel, an ejector operated by an aeriform fluid, such as and in the manner as specified, a suction-conduit, and a valve controlling communication between tank and conduit, as and for the purpose specified.

5. The combination of an air-tight transportable vessel, an ejector operated by an aeriform fluid, such as and in the manner described, a suction-conduit, a valve controlling communication between such vessel and conduit, with the extended outlet of the vessel, and or with an outlet, and either a condenser or a deodorizer, or with such outlet, condenser, and deodorizer, for the purpose set forth.

6. The condenser C, consisting of a water-chamber, vapor and gas chamber, communicating-valve, distributing-nozzle *f*, and suitable inlets and outlets, as and for the purpose set forth.

7. The combination of pipe I, within or without the cess-pool, injector B, and pipe H′, as and for the purpose specified.

8. The combination of suction-pipe F, vessel A, ejector B, fluid-generator E, pipe G, and suitable valves for controlling the ejection fluid and the sewage, as and for the purposes described.

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Witnesses:

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