



(No Model.)

4 Sheets—Sheet 2.

J. B. BERLIER.

PNEUMATIC APPARATUS FOR REMOVING NIGHT SOIL FROM CESSPOOLS.

No. 266,416.

Patented Oct. 24, 1882.

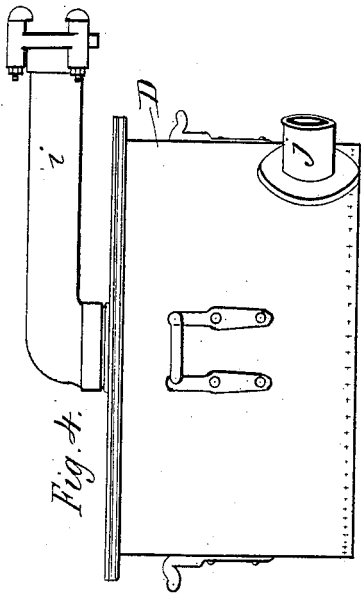
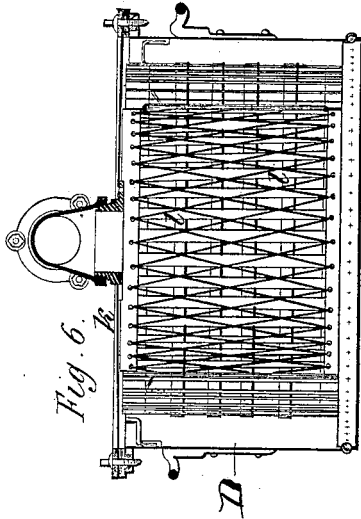
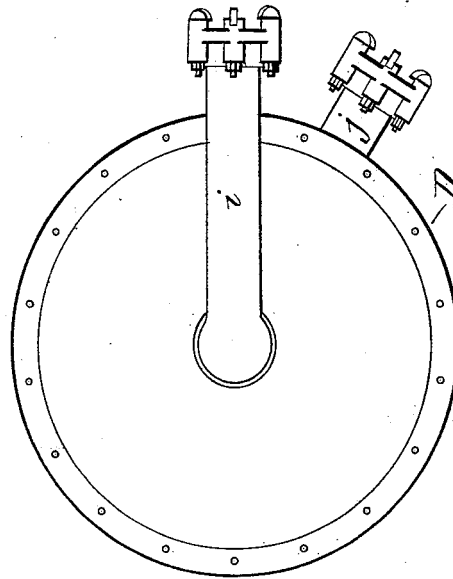


Fig. 5.



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2. *Jean-Baptiste Rolland*

INVENTOR:

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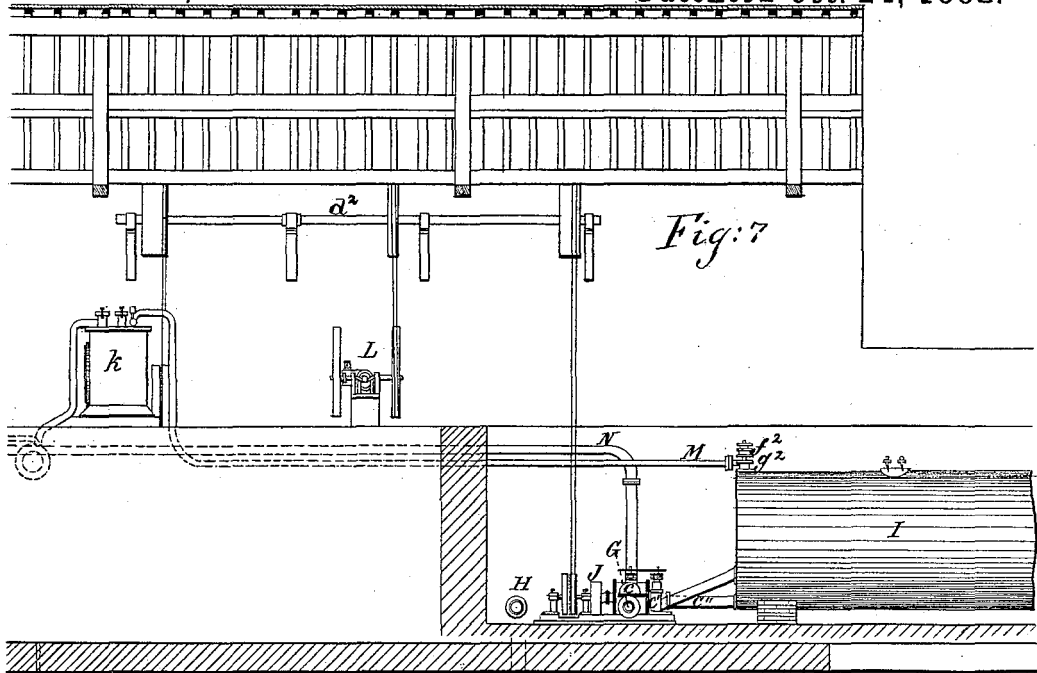


Fig. 7

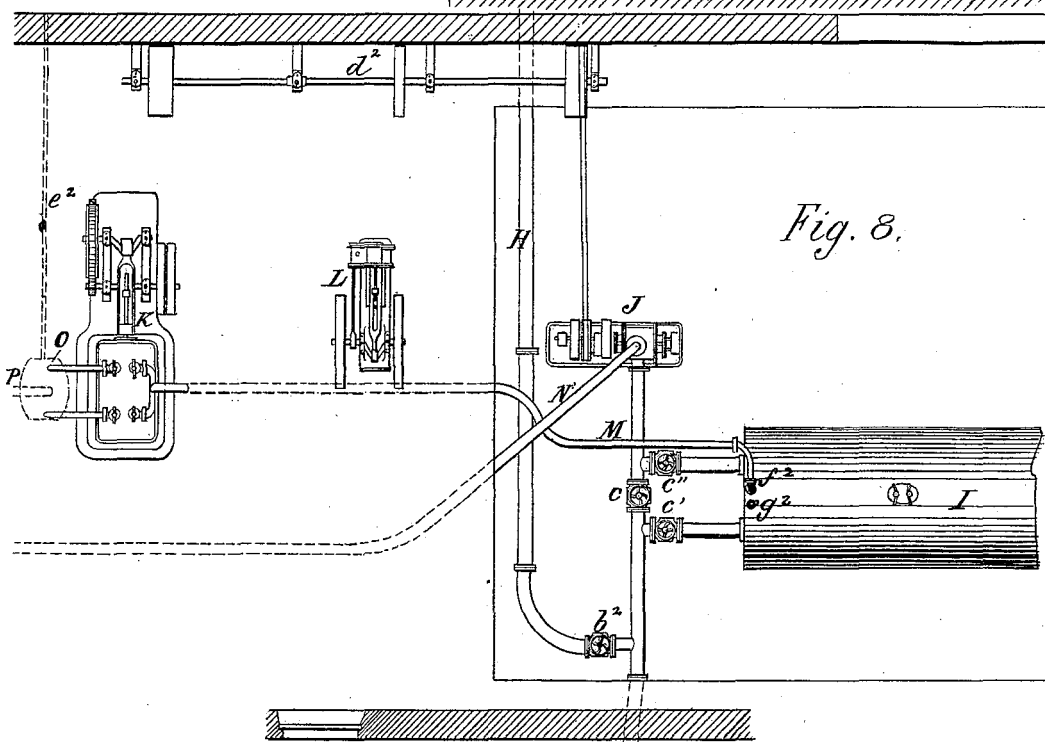


Fig. 8.

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Fig. 10.

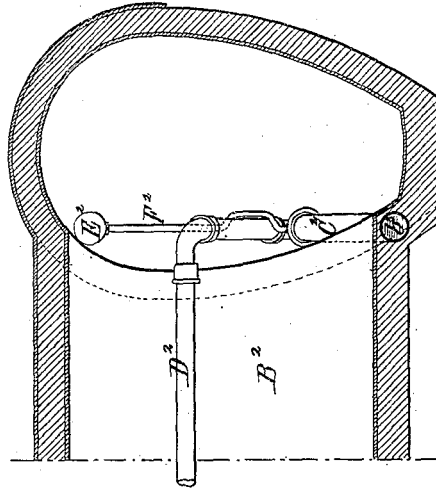
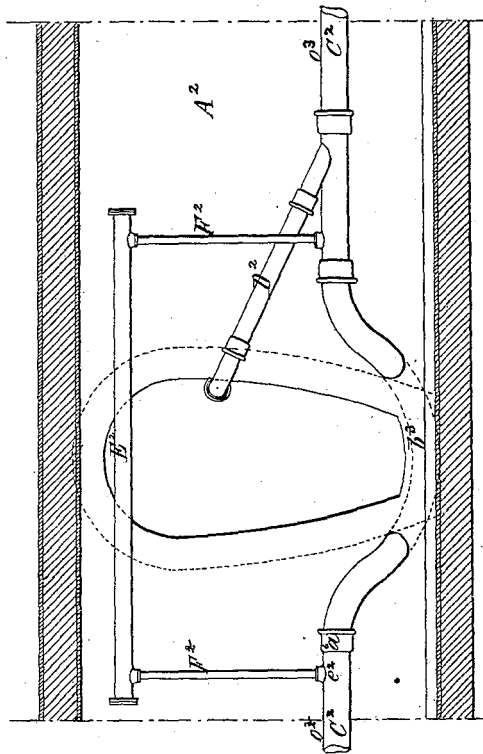


Fig. 9.



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# UNITED STATES PATENT OFFICE.

JEAN BAPTISTE BERLIER, OF PARIS, FRANCE, ASSIGNOR TO THE COMPAGNIE GÉNÉRALE DE SALUBRITÉ, OF SAME PLACE.

PNEUMATIC APPARATUS FOR REMOVING NIGHT-SOIL FROM CESSPOOLS.

SPECIFICATION forming part of Letters Patent No. 286,416, dated October 24, 1882.

Application filed January 12, 1882. (No model.) Patented in France March 14, 1881, No. 141,763.

To all whom it may concern:

Be it known that I, JEAN BAPTISTE BERLIER, of Paris, France, have invented an Improved Pneumatic Apparatus for Removing Night-Soil from Cesspools, applicable also to public urinals and apparatus used therein; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed sheets of drawings, making a part of the same, and that I have received French Letters Patent for said invention, dated March 14, 1881, and numbered 141,763, for the term of fifteen years.

This invention relates to a combination of means and arrangements of apparatus constituting a complete pneumatic system of removing night-soil, whereby the deposit, handling, and carting of night-soil are avoided, and the escape of noxious gas and vapors entirely prevented.

The chief feature of the invention consists in the employment of an extensive system of pneumatic tubing for conveying the night-soil from the cesspool or place where it is deposited to the works, to be converted into chemical products and manure.

In order that the invention may be more readily understood, I have illustrated examples of the various apparatus in the accompanying drawings.

Figures 1 and 2 represent, respectively in longitudinal and transverse section, the sewer or sub-way in which the pneumatic tube is laid, and also illustrating the discharge of the night-soil into said tube through the portable strainer hereinafter described.

The pneumatic tube G is formed of strong pipes, united by spigot and socket joints or otherwise, and either placed in a sewer or sub-way, as shown, or laid in the ground. The tube G is provided at intervals with a branch pipe, F, fitted with a cock, upon which may be placed a gage to indicate the vacuum at different points of the tube, so that any obstruction may be readily localized.

A is a pipe supplying water under pressure for flushing the pneumatic tube, a valve, *a*, at other times intercepting the communication between the two pipes A and G. A special discharge-pipe is provided for carrying off the flushing-water, as will be hereinafter explained.

The night-soil is led into pipe G through the pipe B, which communicates with the portable strainer D through the valve-box C, (represented in vertical section in Fig. 1, and also on a larger scale in Fig. 3,) which is let into the pavement, as shown, and is constructed of a cast-iron casing, *a*<sup>2</sup>, with a strong cast-iron cover, *b*, level with the ground, having a roughened surface and secured by a lock, the key-hole of which is closed by a screw plug. The valve-box incloses a screw-down valve, *c d*, the valve *d* being of india-rubber, by which the thoroughfare through the pipe B is regulated, and also a mouth-piece or short pipe, *f*, placed just below the ground level and closed by a locked cast-iron cover. When connection is to be made the cover *b* of the casing *a*<sup>2</sup> is taken off, the cover of piece *f* of pipe unfastened, the valve *d* screwed up, and the pipe from the strainer D is then connected to the pipe *f*. The casing *a*<sup>2</sup> also contains a two-way cock, *g*, on a small pipe, *h*, branching from the upper part, *e*, of pipe B, for the attachment of a pressure-gage.

The cart or tank containing the night-soil is connected by a hose, E, attached at *i* to the portable strainer D, and the strainer D (which is separately represented on a larger scale in Figs. 4, 5, and 6) is connected, by a pipe attached to it at *j*, to the pipe *f* in the valve-box. The strainer D is made of a wrought-iron casing closed by an air tight cover, *k*, and contains concentric gratings *l* for intercepting foreign matters.

Figs. 7 and 8 represent an elevation and plan of the arrangement of machinery and apparatus for discharging the soil at the works. In these two figures H is the discharge-pipe for the water used for flushing the pneumatic tube, the communication being closed by a valve, *b*<sup>2</sup>, when the night-soil is being exhausted. I is the tank in which the soil is received. *c c'* *c*<sup>2</sup> are valves for controlling the different stages of the operation; J, rotary or force pump communicating with tank I, and also by pipe N with the general depot of night-soil; K, air pump; L, steam-engine for driving the shafting *d*<sup>2</sup>, which works pumps; M, exhaust-pipe connecting air-pump K with tank I; O, tank containing a little water through which the gases are discharged from the air-

pump, passing thence by pipe P to the boiler-  
 furnace, where they are consumed;  $e^2$ , overflow-  
 pipe of tank O. An engine of five-horse power  
 5 kilometers long and eighteen centimeters in  
 diameter. With such a tube a vacuum of  
 twenty-one inches of mercury can be obtained  
 by means of air-pump K in thirty-five minutes.  
 At starting, the air-inlet cock  $g^2$  should be  
 10 closed and the cock  $f^2$  in pipe M opened, the  
 valves  $e$   $e^2$  closed and  $e'$  opened, the operation  
 being then performed in the following manner:  
 The gage on pipe  $g$  in the valve-box C shows  
 the night-man when the pressure is such that  
 15 he should commence operations. Said gage is  
 a suitable pressure-gage, showing while the  
 valve  $d$  is closed how much pressure there is  
 in the pipes B  $h$ . The valve  $d$  in the valve-  
 box and that of the tank are then opened, and  
 20 the soil is exhausted through the strainer D  
 into the tube G, by which it is conveyed into  
 tank I. The engineer at the works watches  
 the level of the soil in the tank I, which is in-  
 dicated by a gage-glass, and when sufficiently  
 25 full the working of the air-pump K is stopped.  
 The cock  $f^2$  is then closed and valve  $e^2$  opened,  
 and the rotary pump J started to pump the  
 soil from tank I to the general depot, the vac-  
 uum being all the while maintained in tank I.  
 30 By this mode of operating the work is per-  
 formed uninterruptedly, the night-soil con-  
 tinuously flowing into tank I, and being simul-  
 taneously pumped thence to the general dep-  
 ot. The exhausting action is so regulated as  
 35 to maintain the same pressure in the tube.  
 The air-pump, however, should be left in com-  
 munication with the tank to remove any air  
 that may leak in. The discharge of the tanks  
 or carts into the pneumatic tube may be per-  
 40 formed in the street without nuisance, as no  
 smell escapes, the gases being rapidly exhaust-  
 ed to the works. The discharge of the soil  
 from the tank I is facilitated by the agitation  
 or state of apparent ebullition due to the ex-  
 45 trication of the air in the mass by the pump  
 and the evaporation produced by the diminu-  
 tion of pressure, whereby the solid matters  
 are maintained in suspension in the liquid.  
 This ebullition has an important influence up-  
 50 on the success of the operation, as it prevents  
 all deposit of the solid matters.

Instead of conveying the tanks filled with  
 night-soil to a certain point to be discharged  
 by the pneumatic tube, as above described,  
 55 the said tube may be laid in the ground or in  
 the sewers in proximity to the houses, and

connected by pipes with the tanks and strain-  
 ers of this invention, which are placed in the  
 house-vaults or beneath public urinals.

I employ novel arrangements for collecting 60  
 the urine, from which various products may  
 be obtained. Figs. 9 and 10 represent an ar-  
 rangement which may be employed when it is  
 required to siphon the pneumatic tube. Fig.  
 9 is a vertical longitudinal section of the main 65  
 sewer opposite a branch sewer. Fig. 10 is a  
 section at right angles thereto through the  
 branch.  $A^2$  is the main sewer, and  $B^2$  the  
 branch opening into it;  $C^2$ , main pneumatic  
 tube, and  $D^2$  branch pneumatic tube connect- 70  
 ing with it;  $E^2$ , pipe for collecting the gases,  
 communicating with the main pneumatic tube  
 by pipes  $F^2$ , said pipe  $E^2$  also serving to bal-  
 ance the pressure of the gases in case of ob-  
 struction of the bend of the siphon. Suppos- 75  
 ing the matters to arrive suddenly from  $o^2$ , and  
 that there is an accumulation of gases at  $a^6$ , a  
 momentary stoppage would be caused; but by  
 the arrangement shown the gases escape at  $e^2$   
 through pipe  $F^2$  and reservoir  $E^2$ , and continue 80  
 their progress toward  $o^3$ , while the matters  
 contained in the bend  $b^3$  of the siphon also re-  
 sume their progress toward  $o^3$ .

I claim—

1. The pneumatic tube G, combined with 85  
 purge-pipe A, cock  $a$ , supply-pipe B, and with  
 apparatus, substantially as described, for cre-  
 ating suction in pipe G, as and for the purpose  
 specified.
2. The strainer D, combined with pipes  $i$   $j$  90  
 and gratings  $l$  and with the pneumatic tube G  
 and pipe B, with which it communicates, sub-  
 stantially as specified.
3. The valve-box C, combined with valve  $e$   
 $d$ , mouth-piece  $f$ , and with the pneumatic tube 95  
 G and pipe B, with which it communicates,  
 substantially as herein shown and described.
4. The combination of the pipe E, strainer  
 D, valve-box C, pipe B, pneumatic pipe G,  
 water-supply pipe A, and valve  $a$  with appa- 100  
 ratus, substantially as specified, for creating  
 a vacuum in the pipe G, as set forth.
5. The combination of pipe  $C^2$ , having bend  
 $b^2$ , with the pipes  $F^2$  and  $E^2$ , for the passage 105  
 of gases where the pneumatic tube is siphoned  
 in case of any obstruction in the bend of the  
 siphon, as described.

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Witnesses:

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