

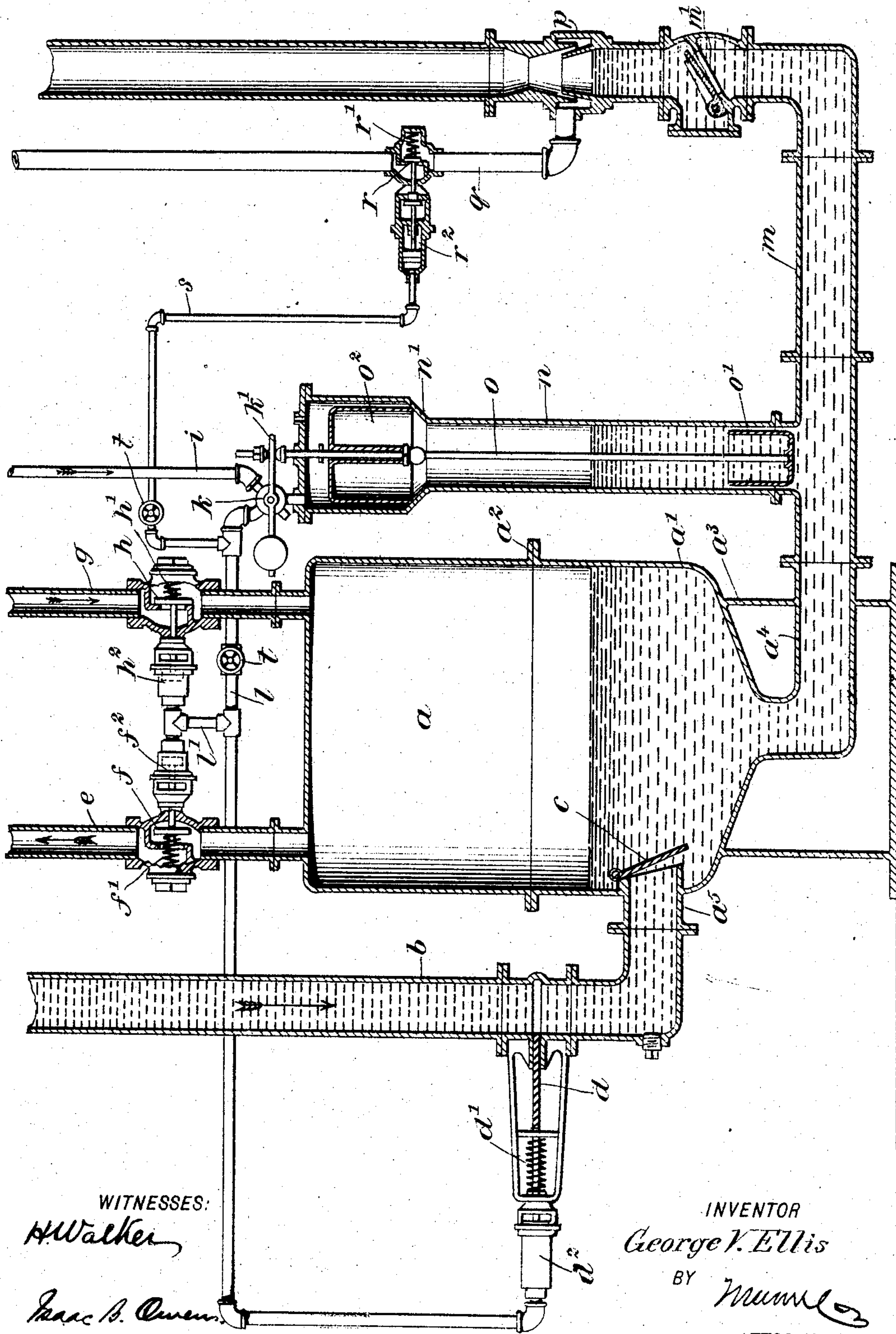
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PATENTED OCT. 18, 1904.

G. V. ELLIS.  
SEWER LIFT.

APPLICATION FILED JAN. 11, 1904.

NO MODEL.





# UNITED STATES PATENT OFFICE.

GEORGE VICTOR ELLIS, OF NEW YORK, N. Y., ASSIGNOR TO THE ELLIS COMPANY, OF NEW YORK, N. Y.

## SEWER-LIFT.

SPECIFICATION forming part of Letters Patent No. 772,710, dated October 18, 1904.

Application filed January 11, 1904. Serial No. 188,593. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE VICTOR ELLIS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sewer-Lift, of which the following is a full, clear, and exact description.

This invention relates to an apparatus intended especially for use in sewerage systems to eject the sewage from a temporary receptacle therefor located below the sewer-level.

The invention is useful in various other connections, as will be apparent to skilled mechanics. For instance, it may be employed in marine vessels to eject water therefrom lying at a level below the water-line of the vessel.

The invention comprises a certain novel arrangement by which when the sewage reaches a predetermined level in the reservoir or tank a valve is automatically opened and by the action of steam, air, or other compressed fluid the contents of the tank will be forced out thereof. In the preferred form of the invention, which is illustrated in the drawings, provision is made for exerting an air-pressure directly on the sewage to force it out of the tank and for setting in operation a steam-ejector which sucks out the sewage. Either, or indeed both, of these devices may be employed at will.

This specification is an exact description of one example of my invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure represents a vertical section of the invention.

The tank or receptacle is preferably formed in two cast sections  $a$  and  $a'$ , securely connected together by a flanged joint  $a^2$  and the lower section having an integral skirt forming a base  $a^3$ , from which passes a discharge-pipe  $a^4$ , also cast integral with the parts  $a'$  and  $a^3$ . Joined suitably to an integral thimble  $a^5$ , projecting from the base-section  $a'$  of the tank, is the inlet-pipe  $b$ . The said thimble  $a$  is provided with a clack-valve  $c$ , seating to prevent the return of the sewage to the inlet-

pipe  $b$ , and the inlet-pipe is provided with a gate  $d$  of any suitable form, arranged to move transversely across the pipe  $b$  completely to close it.

$d'$  indicates a spring which serves to open the gate  $d$ , and  $d^2$  indicates a fluid piston and cylinder having connection with the stem of the gate, so that upon charging the cylinder with a fluid under pressure the spring  $d'$  will be overcome and the gate  $d$  moved into closed position. These devices  $d$  and  $d'$  are the same in general principle as the automatic valve-operating devices disclosed in my prior patent, No. 681,048, for automatic starting apparatus granted August 20, 1901.

$e$  indicates a vent-pipe passing from the top of the tank and commanded by a valve  $f$ , to which is applied a spring  $f'$ , tending to open the valve. With the stem of the valve is connected a cylinder and piston  $f^2$ , so arranged that upon charging the cylinder with fluid under pressure the spring  $f'$  will be overcome and the valve  $f$  will be seated. These parts  $f'$  and  $f^2$  also are essentially the same as the automatic valve-operating devices disclosed in my prior patent referred to. Leading to the upper part of the tank is the fluid-pressure pipe  $g$ . This pipe according to the preferred embodiment of my invention is arranged to conduct compressed air into the top of the tank to bear on the sewage therein and force the sewage from the tank through the discharge-pipe  $a^4$ , as will be hereinafter fully set forth. The pipe  $g$  is commanded by a valve  $h$ , to which is applied a spring  $h'$  tending to close the valve.

$h^2$  indicates a cylinder and piston connected to the stem of the valve  $h$  and arranged so that when the cylinder is charged with fluid under pressure the spring  $h'$  will be overcome and the valve  $h$  will be opened.

$i$  indicates a pipe supplying a fluid under pressure, preferably compressed air, to a three-way cock  $k$ , which is preferably of the type of the cock  $f$  disclosed in my prior patent above referred to. From one port of the cock  $k$  a pipe  $l$  passes to the cylinder and piston  $d^2$ , this pipe having a branch  $l'$  leading to the cylinders and pistons  $f^2$  and  $h^2$ , so that



when the pressure of the pipe *i* is communicated to the pipe *l* and branch *l'* the gate *d* and valve *f* will be at once closed and the valve *h* will be opened, thereby closing the supply-pipe *b* and vent *e* and admitting the pressure of the pipe *g* to the tank *a* to force out the liquid contents thereof.

The discharge-pipe *a'* is joined to a continuation *m*, passing horizontally and thence upwardly and having a clack-valve *m'* therein to prevent backflow. Rising from the pipe *m* between the valve *m'* and the tank is a vertical elongated tank or stand-pipe *n*, in which is arranged a rod *o*, carrying at its lower end a fixed bucket *o'* and at its upper end an inverted bucket or bell *o''*, the latter having a limited sliding movement on the rod and when not water-borne being supported by a shoulder *n'*, formed on the upper portion of the stand-pipe or tank *n*. The rod *o* projects through the top of the stand-pipe or float-tank *n* and is connected to a counterbalanced lever *k'*, fastened to the stem of the valve *k*. Normally the valve *k* stands with the pipe *l* in communication with the exhaust-port of the valve. As the liquid sewage rises in the stand-pipe or float-tank *n* and lifts the bell or float *o''* the valve *k* will be thrown to place the pipe *l* in communication with the pipe *i*, and the pressure of the latter pipe will then act on the sewer-lift, as before explained. As the water falls in the stand-pipe *n* the bell *o''* will seat itself on the shoulder *n'* and relieve the rod *o* of its weight, and owing to the counterbalance on the lever *k'* the valve *k* will be retained in its position until the water falls below the level of the bucket *o'*, whereupon the weight of the water remaining in the bucket will overcome the force of the lever *k'* and return the valve to its normal position—*i. e.*, that in which the pipe *l* communicates with the exhaust of the three-way cock.

Located in the discharge-pipe *m* is an ejector or other pump *p*, with which communicates a steam-pipe *q*. The steam-pipe *q* is commanded by a valve *r*, seated by a spring *r'* and having a cylinder and piston *r''* connected with its stem, so that upon charging the cylinder the valve will be opened. Leading to the cylinder and piston *r''* is a pipe *s*, branching from the pipe *l*, and both of said pipes are fitted with globe-valves *t*, by which either pipe may be opened or closed at will. By closing the pipe *s* and opening the pipe *l* the apparatus may be operated by compressed air from the pipe *g* and by opening the pipe *s* and closing the pipe *l* the apparatus may be operated by the steam-ejector *p*.

It should be observed that while I prefer to employ air-pressure in the pipe *g* and steam in the pipe *q* other fluids under pressure may be used instead at will.

Various changes in the form, proportions, and minor details of my invention may be resorted to at will without departing from the

spirit and scope thereof. Hence I consider myself entitled to all such variations as may lie within the intent of my claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a tank, a discharge-pipe passing therefrom, an ejector located in the discharge-pipe, means for applying fluid-pressure to the ejector, a valve controlling said means, an inlet-pipe leading to the tank, a valve controlling the inlet-pipe, a vent-pipe passing from the tank, a valve controlling the same, a fluid-pressure pipe leading to the tank, a valve controlling the fluid-pressure pipe, and means for operating all of the valves, said means being controlled by the height of the liquid within the tank.

2. The combination of a tank having a liquid inlet and outlet, a vent-pipe communicating with the tank, a fluid-pressure-supply pipe communicating with the tank, a valve commanding the vent-pipe, a valve commanding the fluid-pressure-supply pipe, means exerting a pressure on said valves in one direction, means for applying a fluid-pressure to the valves to actuate them in the other direction, and controlling means for said fluid-pressure-applying means.

3. The combination of a tank having a liquid inlet and outlet, a vent-pipe communicating with the tank, a valve commanding the vent-pipe, means exerting a constant pressure on the valve to hold it open, a fluid-pressure-supply pipe leading to the tank, a valve commanding the supply-pipe, means for exerting a constant pressure on the valve to seat it, means for applying the fluid-pressure to said valves to close the vent-valve and open the supply-valve, and means for controlling said fluid-pressure-supply means.

4. The combination of a tank having an inlet and outlet, a vent-pipe communicating therewith, a valve commanding the same, a fluid-pressure-supply pipe leading to the tank, a valve commanding the fluid-pressure-supply pipe, means for exerting a constant pressure on the valves in one direction, means for applying fluid-pressure to the valves to operate them in the other direction, a valve commanding the inlet to the tank, means exerting a constant pressure on the valve to actuate it in one direction, means for applying a fluid-pressure to the valve to operate it in the other direction, and controlling means for the said means for applying fluid-pressure to the valves.

5. The combination of a tank, having an outlet, an inlet-pipe leading to the tank, a valve commanding the inlet-pipe, means exerting a constant pressure on said valve to open it, a vent-pipe communicating with the tank, a valve commanding the same, means exerting a constant pressure on said valve to open it, a fluid-pressure-supply pipe leading to the tank, a valve commanding the supply-pipe, means



exerting a constant pressure on the valve to close it, means for applying fluid-pressure to all of the valves to operate them in the direction opposite to that in which they are operated by the said means exerting a constant pressure on the valves, and devices for simultaneously throwing said means for supplying fluid-pressure into action.

6. The combination of a tank having an inlet and outlet, a valve commanding the inlet, means exerting a constant pressure on the valve to actuate it in one direction, a vent-pipe communicating with the tank, a valve commanding the vent-pipe, means exerting a constant pressure on the vent-pipe valve to actuate it in one direction, a fluid-pressure-supply pipe leading to the tank, a valve commanding said pipe, means for exerting a constant pressure on the valve to actuate it in one direction, means for applying fluid-pressure to all of said valves to actuate them contrary to the said means for exerting constant pressure thereon, pipe connections leading the fluid-pressure to said means for exerting fluid-pressure on the valves, a cock interposed in said connections and having a vent-port, and means for operating said cock.

7. The combination of a tank having an inlet and outlet, a fluid-pressure-supply pipe leading to the tank, a valve commanding the supply-pipe, means exerting a pressure on the valve to operate it in one direction, means for applying fluid-pressure to the valve to operate it in the other direction, a valve commanding the inlet to the tank, means exerting a pressure on the valve to operate it in one direction, means for applying fluid-pressure to the said valve to operate it in the other direction, connections leading the fluid-pressure to said means for applying fluid-pressure to the valves, and means for controlling said connections simultaneously to admit the fluid-pressure to the valves.

8. The combination of a tank, a discharge-pipe leading therefrom, a pump communicating with the discharge-pipe to force the liquid through the same, means for communicating fluid-pressure to the pump, a valve controlling said means, an inlet-pipe leading to the tank, a valve controlling the inlet-pipe, a vent-pipe passing from the tank, a valve controlling the vent-pipe, a fluid-pressure pipe leading to the tank, a valve controlling the fluid-pressure pipe, and means for automatically operating all of said valves.

9. The combination of a tank, a discharge-pipe leading therefrom, a pump communicating with the discharge-pipe to force the liquid through the same, means for communicating fluid-pressure to the pump, a valve controlling said means, an inlet-pipe leading to the tank, a valve controlling the inlet-pipe, a vent-pipe passing from the tank, a valve controlling the vent-pipe, a fluid-pressure pipe leading to the tank, a valve controlling

the fluid-pressure pipe, means for automatically operating all of said valves, and means for manually cutting out of operation either the means for operating the pump-valve or the means for operating the other valves.

10. The combination of a valve, means for exerting a constant pressure on the valve to actuate the valve in one direction, a vessel, a valve-operating float in the vessel, said float being supported therein in its lowermost position, connections between the float and the valve, said connections allowing a certain movement of the float independently of the valve, and means for returning the valve against the action of the said means for exerting a constant pressure thereon.

11. The combination of a valve, means for exerting a constant pressure on the valve to actuate the valve in one direction, a vessel, a valve-operating float in the vessel, said float being supported therein in its lowermost position, connections between the float and the valve, said connections allowing a certain movement of the float independently of the valve, and means for returning the valve against the action of the said means for exerting a constant pressure thereon, said means for returning the valve comprising a bucket in connection therewith and located in the vessel below the float.

12. The combination of a valve, means for exerting a constant pressure on the valve, tending to open the same, a vessel, a valve-opening float in the vessel, the float being supported in the vessel in its lowermost position, connections between the float and valve, such connections allowing a movement of the float independently of the valve, and means for returning the valve to closed position against the action of the said means for exerting a constant pressure thereon.

13. The combination of a valve, means for exerting a constant pressure on the valve, tending to open the same, a vessel, a valve-opening float in the vessel, the float being supported in the vessel in its lowermost position, connections between the float and valve, such connections allowing a movement of the float independently of the valve, and means for returning the valve to closed position against the action of the said means for exerting a constant pressure thereon, said means for returning the valve comprising a bucket connected therewith and located within the vessel below the float.

14. The combination of two tank-sections joined together, a base formed integral with the lower tank-section and extending from the lower part of the tank-section downward to sustain the tank, and a discharge-pipe formed integral with the lower tank-section and with the base and passing from the tank at a point within the base downward and thence outward through the walls of the base.

15. The combination of a tank, having an



outlet-pipe passing from the bottom thereof, a stand-pipe rising from the outlet-pipe, the outlet-pipe lying below or in plane with the bottom of the tank, means for forcing liquid  
5 from the tank through the outlet-pipe and means for automatically controlling the first-named means, the controlling means comprising a float and a bucket, the former being located on the upper part of the stand-pipe  
10 and the latter in the lower part of the stand-pipe adjacent to the outlet-pipe.

16. The combination of a tank, an outlet-pipe passing from the lower part thereof, a stand-pipe communicating with the outlet-  
15 pipe and located alongside of the tank, means for forcing the liquid from the tank through the outlet-pipe, and means for automatically controlling the first-named means, said controlling means comprising a float in the upper  
20 part of the stand-pipe and a bucket in the lower part of the stand-pipe adjacent to the outlet-pipe.

17. The combination of a tank adapted to receive a liquid and having an outlet-pipe  
25 passing laterally from the bottom thereof, a stand-pipe running from and communicating with the outlet-pipe, the stand-pipe lying alongside of the tank, means for applying fluid-pressure to the liquid to remove it from the  
30 tank, and means for automatically controlling the first-named means, said controlling means having a part lying in the stand-pipe and actuated by the liquid therein.

18. The combination of two tank-sections

joined together, a skirt projecting downward  
35 from the lower tank-section and forming a base to sustain the tank, and a discharge-pipe extending from the bottom of the tank horizontally through the skirt, the said bottom  
40 section of the tank, the skirt and the discharge-pipe being integral for the purpose specified.

19. The combination of a tank, an open unobstructed outlet-pipe passing therefrom, a  
45 stand-pipe communicating with the outlet-pipe and extending alongside the tank, means for allowing fluid-pressure to be exerted in the tank, and means for automatically controlling the first-named means, the controlling  
50 means having a part lying in the stand-pipe and actuated by the liquid therein.

20. The combination of a tank, means for supplying a fluid-pressure to the tank to force out its contents, a pump communicating with  
55 the tank to draw out its contents, means for supplying a fluid-pressure to the pump, automatic controlling means for both of the said fluid-pressure-supply means, and means for manually cutting out of operation either of  
60 said fluid-pressure-supply means.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE VICTOR ELLIS.

Witnesses:

WM. L. MERCER,  
JOHN G. STETZ.