No. 870,027. PATENTED NOV. 5, 1907.

J. F. GROSS.

DRAIN SYSTEM AND APPARATUS.

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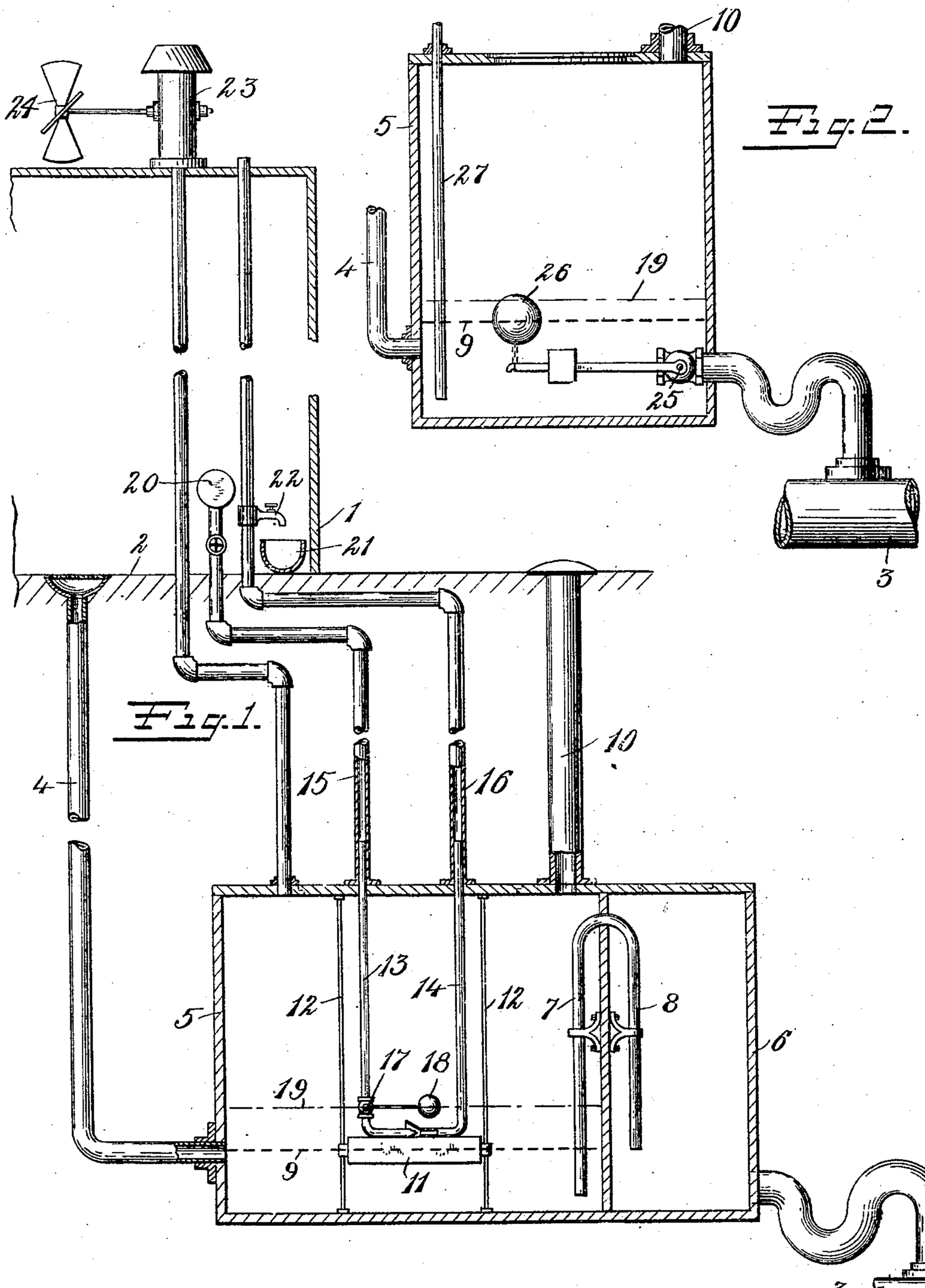

Fig. 1.

Fig. 2.

Witnesses

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DRAIN SYSTEM AND APPARATUS.

No. 870,027. Specification of Letters Patent. Patented Nov. 5, 1907.

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To all whom it may concern:

Be it known that I, JOSEPH F. GROSS, a citizen of the United States, residing at New York, county of New York, State of New York, (post-office address 151 West Thirty-first street,) have invented certain new and useful Improvements in Drain Systems and Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in drainage systems or apparatus.

A great many accidents have more recently occurred consisting of explosions in drains or sewers resulting in injury to adjacent property and persons, for instance, by the upheaval of man-hole covers.

It is my object to prevent such accidents.

The explosions have been carefully investigated and from local conditions it has been determined that they are caused by the pressure of hydrocarbonous vapors. Compounds, such as gasolene, benzene and alcohol, are introduced into the sewers by accident, or otherwise, and, becoming vaporized, furnish highly combustible mixtures with the air which is present. The volatile compounds are often traceable to stations, such as a garage, where they are used for cleaning and for the basis of the combustible mixtures for internal combustion motors or engines. The compounds pass into the sewers through the ordinary drains and sometimes even from the street where they are spilled or leak from storage or transportation tanks. I have found it possible to prevent the passage of such explosive mixture forming compounds into the sewer. This is accomplished by taking advantage of the low specific gravity of such compounds or of their volatility or both. A separator tank, cistern, or other receptacle is provided intermediate the drain inlet and the sewer from which the compound is removed either continuously by a pump, ejector or evaporation or at intervals by buckets, depending upon the size of the receptacle, the quantity of discharge and other conditions variable with different cases and requirements.

Figure 1 is a vertical sectional view showing the installation of my invention. Fig. 2 shows a modification of the separator.

The building 1, has a floor 2, which is drained into sewer 3, through pipe or conduit 4. Between the inlet of the drain 4 and the sewer 3 is a receptacle 5 of any suitable nature which is preferably of considerable size and buried in the earth. In the preferred form of the invention a second receptacle or compartment 6 is provided, the outlet from which is connected to the sewer 4. The two receptacles are connected by a siphon tube having the legs 7 and 8.

Normally the main receptacle contains water to the level 9 shown in dotted lines. When the water level rises to the bend of the siphon tube it begins to discharge into the auxiliary receptacle 6 and thence flows into the sewer. As soon as the liquid falls to the level of the end of the short leg 8 of the tube the siphon action ceases. Hence there will always be a depth of liquid in the main receptacle equal to the height. The lower end of tube 8 is above the bottom of receptacle 5, say, eighteen inches. Should any gasolene, or other volatile liquid pass into the receptacle, it will evaporate or may be otherwise removed through outlet 10.

Most hydrocarbons are lighter than water and will float on the top and hence may be mechanically removed automatically, for instance, by an ejector. The float 11, and parts carried thereby, is of greater specific gravity than the compound which it is desired to prevent entering the sewer and may be vertically guided on the rods 12—12. The ejector is carried by the float and consists of the inlet pipe 13 and the outlet pipe 14, which telescope in pipes 15 and 16 respectively. The valve 17 is controlled by the float 18 which is adapted to rise and fall on the volatile liquid whose level is shown by the dot and dash line 19. The ejector may be operated by compressed air or other pressure, for instance from reservoir 20, and discharge the liquid through outlet 16 as a spray at the roof or the liquid may be recovered in tank 21 through valve 22. When the volatile liquid level falls to the level of the ejector the float 18 automatically shuts off the supply of operating pressure. The liquid may also be removed in the form of vapor for instance by a fan or pump 23 operated by a suitable motor for instance the windmill 24. Any well known means may be provided so that the windmill can turn to receive the most effective pressure of the wind. The suction caused by the fan or air pump will draw air down through the drain pipe 4 (or other pipe) which will thus bubble up through the liquid and expedite the evaporation.

In cases where there is any likelihood of the discharge of any considerable quantity of volatile compound it is desirable that the leg 7 of the siphon extend down close to the bottom of the receptacle 5 so that there will be less chance of the volatile compound siphoning into the sewer. There may in fact be a quantity of, say, gasolene in the receptacle of a depth equal to the difference in elevation of the ends of the siphon before any gasolene can discharge. With a receptacle of reasonable size it is thus possible to permit normal drainage and still prevent the entrance of light compounds into the sewer.

When the ejector is used it is possible to remove oils of low specific gravity which are not volatile and would not be dangerous in the sewers but whose value would make it profitable to recover.

In the form shown in Fig. 2, the outlet from the receptacle 5 to the sewer 3 is controlled by a valve 25

which is closed when the water level is as shown. The float 26 has a greater specific gravity than the compound which it is desired to separate from the water so that increase in the quantity of, say gasolene, will not affect the float. The gasolene may be removed as desired, for instance, by evaporation or suction, through outlet 10, air being admitted through inlet 27. The water will not begin to discharge until the level rises, lifts the float 26 and opens the outlet valve 25. There will always be water in the receptacle up to the level 9. With this form it is absolutely impossible to discharge any light liquid into the sewer.

What I claim is:

1. A separator for a drainage system, comprising a receptacle having a liquid inlet, a siphon for permitting the discharge of water when a predetermined level is reached, a float adapted to ride on the surface of the water, and means mounted on said float for removing a lighter compound.

2. A separator for a drainage system, comprising a receptacle having an inlet for water and a volatile compound, an outlet for said volatile compound in a gaseous state, an outlet for the water comprising a siphon for removing the water from the bottom of the receptacle when the level reaches a predetermined height, a float adapted to ride on the surface of the water, and means carried on the float for removing the liquid volatile compound.

3. A separator for a drainage system, comprising a receptacle having an inlet for water and a volatile compound, an outlet for said volatile compound in a gaseous state, an outlet for the water comprising a siphon for removing the water from the bottom of the receptacle when the level reaches a predetermined height, a float adapted to ride on the surface of the water, and a pipe carried by said float to remove the volatile compound.

4. A separator for a drainage system, comprising a receptacle having an inlet for water and a volatile compound, an outlet for said volatile compound in a gaseous state, an outlet for the water comprising a siphon for removing the water from the bottom of the receptacle when the level reaches a predetermined height, a float adapted to ride on the surface of the water, and means carried by the float in communication with the exterior of the receptacle for removing the volatile compound.

5. A separator for a drainage system, comprising a receptacle having an inlet for water and a volatile compound, an outlet for said volatile compound in a gaseous state, an outlet for the water comprising a siphon for removing the water from the bottom of the receptacle when the level reaches a predetermined height, a float adapted to ride on the surface of the water, and means carried by the float in communication with the exterior of the receptacle to remove the volatile compound, said means being capable of adapting itself to the changing position of the float.

6. In a drainage system, a separator located between the inlet of the drain pipe and the sewer, comprising a receptacle normally containing a minimum quantity of liquid, a siphon for permitting the discharge of water when a predetermined level is reached, a float adapted to ride on the surface of the water, and means mounted on the float but independently operable therefrom for removing a lighter compound.

7. A separator for a drainage system, comprising a receptacle for water and a volatile compound, a siphon extending through the wall of said receptacle to a point near the bottom of the interior thereof, a float, guides therefor, and means carried by said float for removing said volatile compound.

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Witnesses:
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