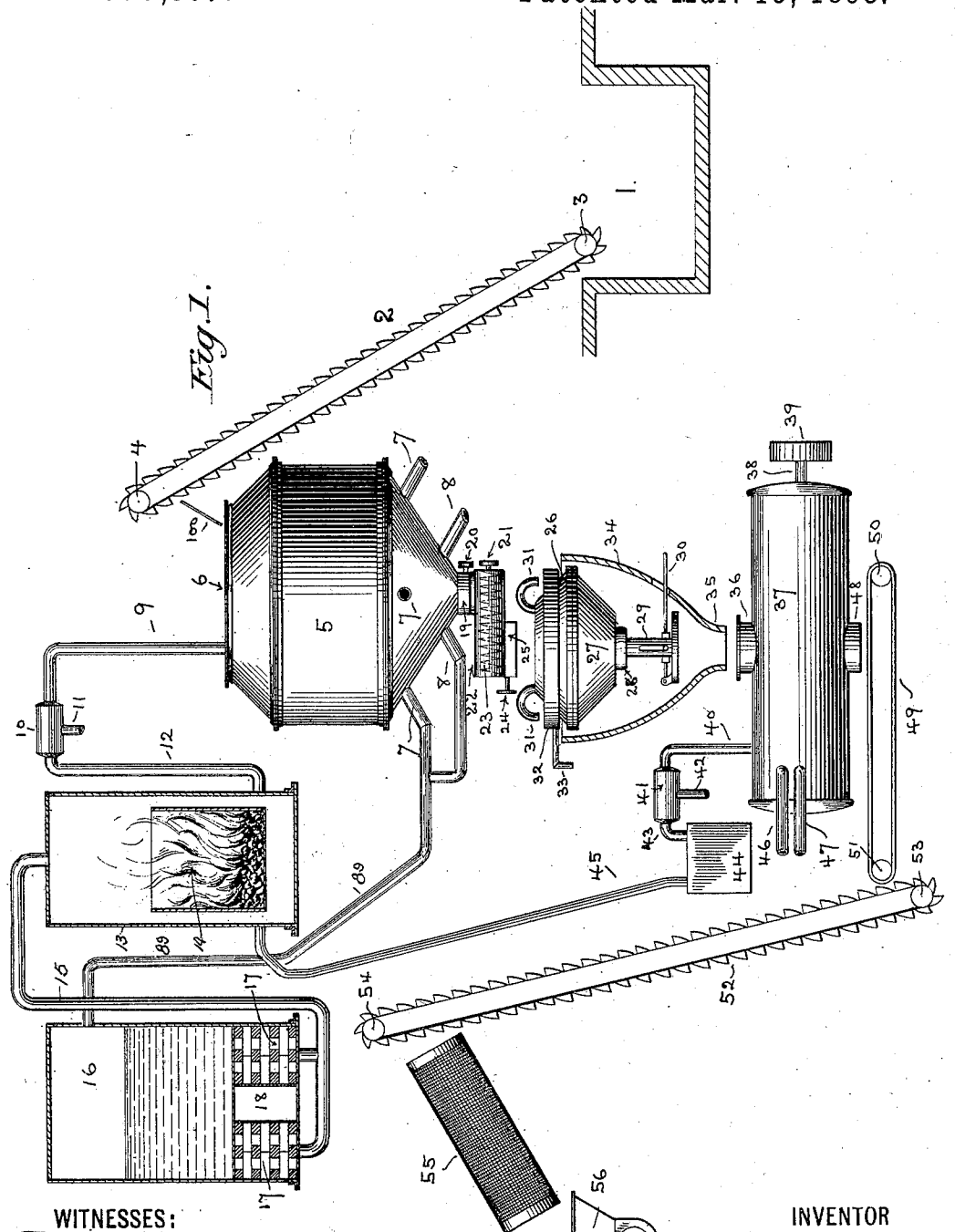
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L. RISSMULLER.

APPARATUS FOR TREATING GARBAGE.

No. 600,597. Patented Mar. 15, 1898.

Fig. 1.



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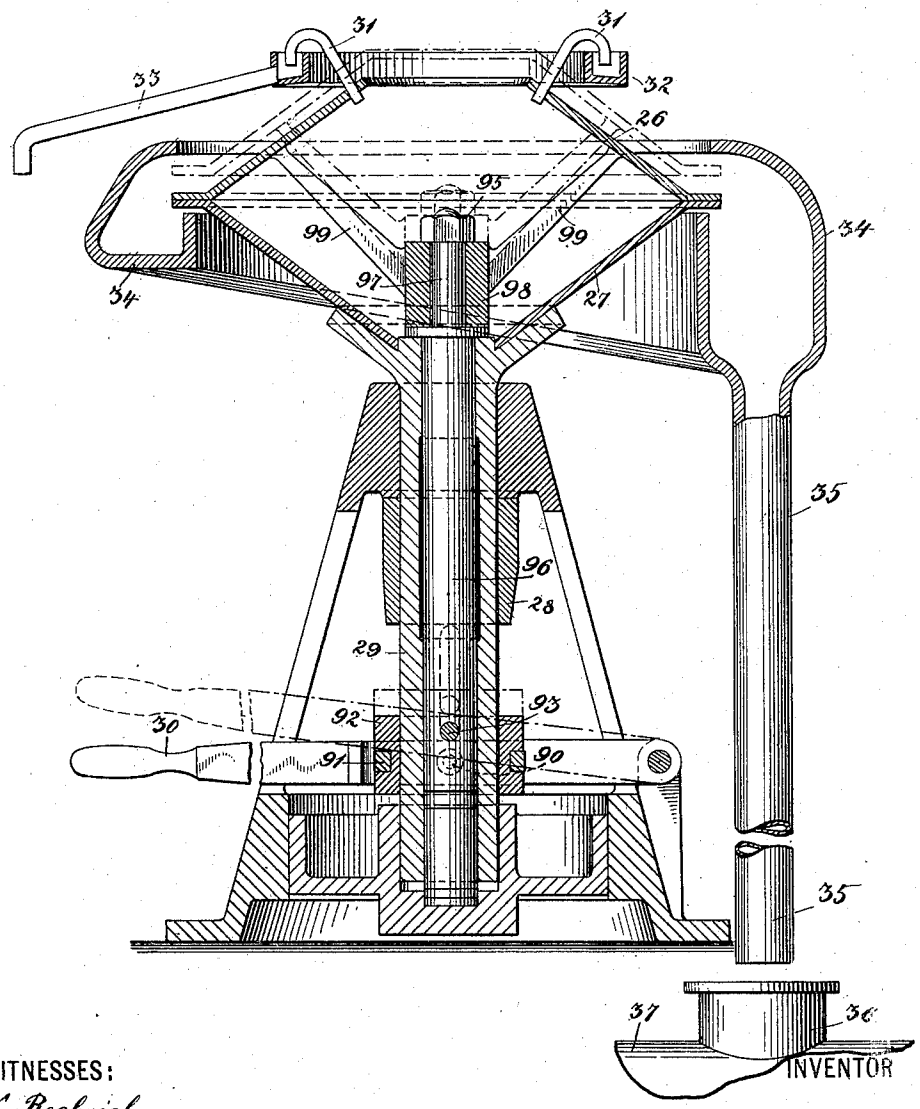
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Fig. 2.



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UNITED STATES PATENT OFFICE.

LUDWIG RISSMULLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE GENERAL AMERICAN REDUCTION COMPANY, OF NEW YORK, N. Y.

APPARATUS FOR TREATING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 600,597, dated March 15, 1898.

Original application filed July 13, 1897, Serial No. 644,454. Divided and this application filed September 29, 1897. Serial No. 653,437. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG RISSMULLER, a citizen of Germany, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Treating Waste Matters, of which the following is a full and accurate description, reference being had to the accompanying drawings, which show a garbage-treatment plant embodying my improvements.

This application is a division of an application filed by me July 13, 1897, Serial No. 644,454, for a method of treating garbage.

It is the object of my invention to provide new and improved apparatus for treating city-garbage, animal or vegetable waste matter, &c., for the purpose of economically separating the greases therefrom and converting the residuum into a fertilizer, and also to utilize the gases evolved during treatment of the waste for the purpose of heating the waste-digester and a drier and for operating the apparatus for handling the waste and its products, and also for operating the centrifugal separator used for removing the greases from the waste.

In the accompanying drawings, Figure 1 shows a diagrammatic view of a plant embodying my invention, and Fig. 2 shows a modified arrangement of the centrifugal separator and surrounding hood.

1 indicates a pit into which the garbage (or other waste animal or vegetable matter) is dumped. The garbage is then fed onto the endless traveling conveyer 2, which passes around pulleys 3 and 4, and the garbage is deflected by a plate 100 into the digester 5, through the manhole 6 thereof. When the digester has been filled, or nearly so, the operation of the conveyer is stopped or the feeding of garbage thereto is discontinued. Any other suitable form of conveyer may be employed, or, if preferred, the garbage may be transferred directly into the digester 5. A sufficient quantity of garbage having been passed into the digester, the manhole 6 is closed, and steam is forced through pipes 7 and 8 into the digester. In most cases it will be found necessary to add sulfuric acid to the mass in the digester, and the interior of the digester is lined with lead or other material capable of resisting acids. The boiling of the garbage is continued until the structure of the garbage has been destroyed and the greases rendered therefrom and the whole converted into a soupy liquid uniform throughout. This brings the greases to a state which enables their complete separation from the non-greasy ingredients.

During the boiling of the garbage the lightly-volatile ingredients are evaporated from the garbage due to the heating of the garbage with or without the use of sulfuric acid, and vapors and gases are also evolved. In order to carry the vapors and gases off, I provide a pipe 9, leading out of the top of the digester and terminating in a condenser 10. The condenser is provided with a pipe 11 for carrying off the distilled water and may lead to a sewer or other point. The gases separated from the vapors are led from the condenser by a pipe 12 into the lower end of a gas-producer 13. This gas-producer contains a body 14 of burning coals or other heating and gas-producing material or other heating structure. The gases pass upwardly through the heated material, and this results in heating the gases to a point where, in combination with the producer-gas, they may readily be used for fuel purposes. The heated gases are led by pipe 15 from the heater 13 and into the regenerating-chambers 17 17 of furnace of the steam-generator 16 and pass up into the combustion-chamber 18. The connections between the regenerating-chambers and the combustion-chamber (not shown) may be of any suitable form. By my invention, therefore, the obnoxious vapors and gases are led out of the digester, the vapors are separated from the gases, and the gases are utilized for fuel purposes. The steam made in boiler 16 may be used to supply the digester or to turn the machinery of the plant or for other purposes. For instance, the steam-space of the generator may be connected by a pipe 89 with the pipes 7 and 8 for leading steam into the digester.

The connections between the digester and condenser, between the condenser and heater and between the heater and the furnace may be quite different from the forms or arrangements illustrated in the accompanying drawings.

Recurring to the digester 5, when the garbage therein has been sufficiently digested a valve 20 (in a neck 19 at the lower end of the digester) is opened. This allows the digested garbage to fill a measuring-chamber 22, comprising a hollow chamber commencing underneath the neck 19 and terminating at valve 24 in the delivery-neck 25. Within the measuring-chamber and running lengthwise thereof there is an endless screw 23, which may be operated by turning the handle 21. By means of this screw the feeding of digested garbage may be controlled when the valve 24 is opened. In practice the inlet-valve 20 is opened until the measuring-chamber 22 is filled, and then said valve is closed. After this outlet-valve 24 is opened and the digested garbage discharged from the measuring-chamber and into the apparatus for separating the greases therefrom.

Instead of the measuring-chamber shown any other suitable form may be employed. The same is true of the screw 23.

The particular form of centrifugal separator which I prefer to employ is that described and shown in my pending application, Serial No. 624,018, filed February 18, 1897, for centrifugal separators.

The details of the arrangement which I prefer to use are shown in Fig. 2 accompanying.

In general the arrangement consists of a separable bowl comprising an upper movable bowl-section 26 and a fixed lower bowl-section 27. The upper section is connected by arms 99 to collar 98, fitted upon the contracted end 97 of a shaft 96. The collar 98 is clamped into position upon the shaft by a nut 95. The lower bowl-section is fitted to the upper end of a sleeve 29, loosely surrounding the shaft 96. A pulley 28 surrounds the sleeve 29 and is driven by a belt. (Not shown.) A crosswise pin 93 near the lower end of the shaft 96 extends through a longitudinal slot in the sleeve and is secured to a longitudinally-movable collar 92, loosely surrounding the sleeve 29. A fixed ring 91 fits a groove in the collar. This ring is provided with a pin (shown dotted at 90) arranged to rock in a lever-arm 30. The upper bowl-section 26 is provided with grease-spinning pipes 31, having their free ends projecting downwardly into an annular trough or pan 32, held in fixed position. The sections of the bowl having been brought tightly together, the valve 24 of the measuring-chamber is opened, and a quantity of digested matter is discharged (assisted by the screw 23) into the rotating bowl of the centrifugal separator. Within the bowl the ingredients of the digested garbage are separated according to their respective specific gravities, being generally divided into three concentric rings, the first comprising the freed and purified greases, the second containing the acids and substances dissolved thereby, and the third comprising the non-greasy heavy solid ingredients. The greases are spun out through pipes 31 31 and are caught by the fixed ring-like pan 32, surrounding, but out of contact with, the upper bowl-section. By means of a pipe 33 the greases are led from said pan into any suitable receptacle. When the greases have been separated from the mass within the bowl, the workman lifts the lever 30 and by means of ring 91, collar 92, and pin 93 raises the shaft 96 and the upper bowl-section 26, thereby opening a continuous peripheral discharge-port. The continued rotary movement of the bowl results in the complete expulsion of all the heavy and acidulated ingredients from the bowl, and the sections are then brought together ready for treating another quantity of digested garbage. The substances expelled from the bowl strike against the inner surface of a mantle 34, which encircles the bowl and extends above the point of separation of the bowl-sections. Said mantle terminates in a delivery-port 35, whereby all the substances expelled by the bowl are brought to the same point.

My method for separation of greases from digested garbage may, however, be practiced with other forms of centrifugal separators than that herein shown and described. For instance, instead of the split-bowl centrifuge controlled by a lever a split-bowl centrifuge which automatically opens at certain pressures of the heavier ingredients may be employed, or, if desired, any other suitable form of centrifugal separator may be used.

The non-greasy ingredients fall into a drier 37 through a manhole 36, being treated (either before or after being discharged into the drier) with some substance which neutralizes the free acids. The drier having been filled, or nearly so, the manhole is closed, and the drier is heated. During the drying operation the contents of the drier are kept in motion by stirrers carried by a shaft 38, driven by a pulley 39. This keeps the material in a granular condition and hastens the drying of the same. The gases and vapors evolved in the closed drier are carried off by a pipe 40 and are led into a condenser 41, wherein the steam is condensed and the water of condensation is led out through a pipe 42. The separated gases are carried by a pipe 43 into a vacuum-pump 44 and from thence by a pipe 45 to the gas-heater 13, hereinbefore referred to.

The drier is heated by means of steam introduced through pipes 46 and 47, and this steam may be taken from the boiler 16 or other point.

When the contents of the drier are considered sufficiently dry, a manhole 48 in the bottom of the drier is opened and the dried material, now ready for use as a fertilizer, is con-

veyed by a belt 49, passing around pulleys 50 and 51, to a second conveyer 52, passing around pulleys 53 and 54. The last-named conveyer delivers the dried ingredients onto a revolving screen 55, the smaller portions passing between the meshes of said screen and the larger portions rolling or passing over the screen into a grinder or crusher 56. After grinding the tailings may be thrown upon the conveyer 52 for rescreening and, if necessary, regrinding.

While I have shown two conveyers for transferring the dried material to the screen, either or both of them may be dispensed with.

I do not claim the method herein described, said method being already claimed in my pending application, Serial No. 644,454, filed July 13, 1897, of which this application is a division. The broad method of treating waste matters, which consists in digesting the waste and then subjecting the same to centrifugal action for the purpose of separating greases therefrom, is described and claimed in my pending application, Serial No. 609,410, filed October 20, 1896.

What I claim is—

1. In a plant for treating waste matters, a closed digester for treating the waste matters, a measuring-chamber in open connection with the discharge-port of the digester, the said measuring-chamber having an inlet port and valve and an outlet port and valve, and a device for regulating the discharge, substantially as and for the purpose described.

2. In a plant for treating waste matters, a digester for receiving and digesting waste, means for discharging definite quantities of waste from the digester, a centrifugal separator adapted to receive the successive quantities of digested waste, and to separate the ingredients of each according to their respective specific gravities, means for continuously operating the centrifugal separator, means for removing the greases separated by the centrifugal separator, and means for discharging the non-greasy residuum therefrom, substantially as and for the purpose described.

3. In a plant for treating waste matters, a closed digester, a measuring-chamber in open connection with the discharge-port of the digester, the said measuring-chamber having an inlet and outlet valve, whereby definite quantities of digested waste will be delivered, as desired, and a centrifugal separator adapted to receive the successive quantities of digested waste and separate the greases therefrom, substantially as and for the purpose described.

4. In a plant for treating waste matters, a steam-generator, a waste-digester, pipe connections from the steam-generator to the digester, pipe connections for leading away the gases and vapors evolved in the digester, a condenser for condensing the vapors, pipe connections for leading away the gases from the condenser, a gas-heater for heating the gases to render them suitable for combustion, and a furnace for heating the steam-generator and in open connection with the gas-heater, substantially as and for the purpose described.

5. In a plant for treating waste matters, a closed waste-digester, a centrifugal separator arranged to receive the waste discharged from the digester and separate greases from the waste, a drier arranged to receive the ingredients discharged from the centrifugal separator after the removal of greases, a steam-generator, and pipe connections between the digester and the furnace of the steam-generator, whereby the gases evolved during the digesting operation are utilized for heating the steam-generator, substantially as and for the purpose described.

6. In a plant for treating waste matters, a closed waste-digester, a centrifugal separator arranged to receive the waste discharged from the digester and to separate greases from the waste, a steam-generator, heating connections from the steam-generator to the digester, and pipe connections from the digester to the furnace of the steam-generator, whereby the gases evolved during the digesting operation are utilized for heating the steam-generator, substantially as and for the purpose described.

In witness whereof I have hereunto signed my name this 16th day of September, 1897.

LUDWIG RISSMULLER.

In presence of—
GEO. W. CLEMENT,
ROBT. L. JOHNSON.