(No Model.)

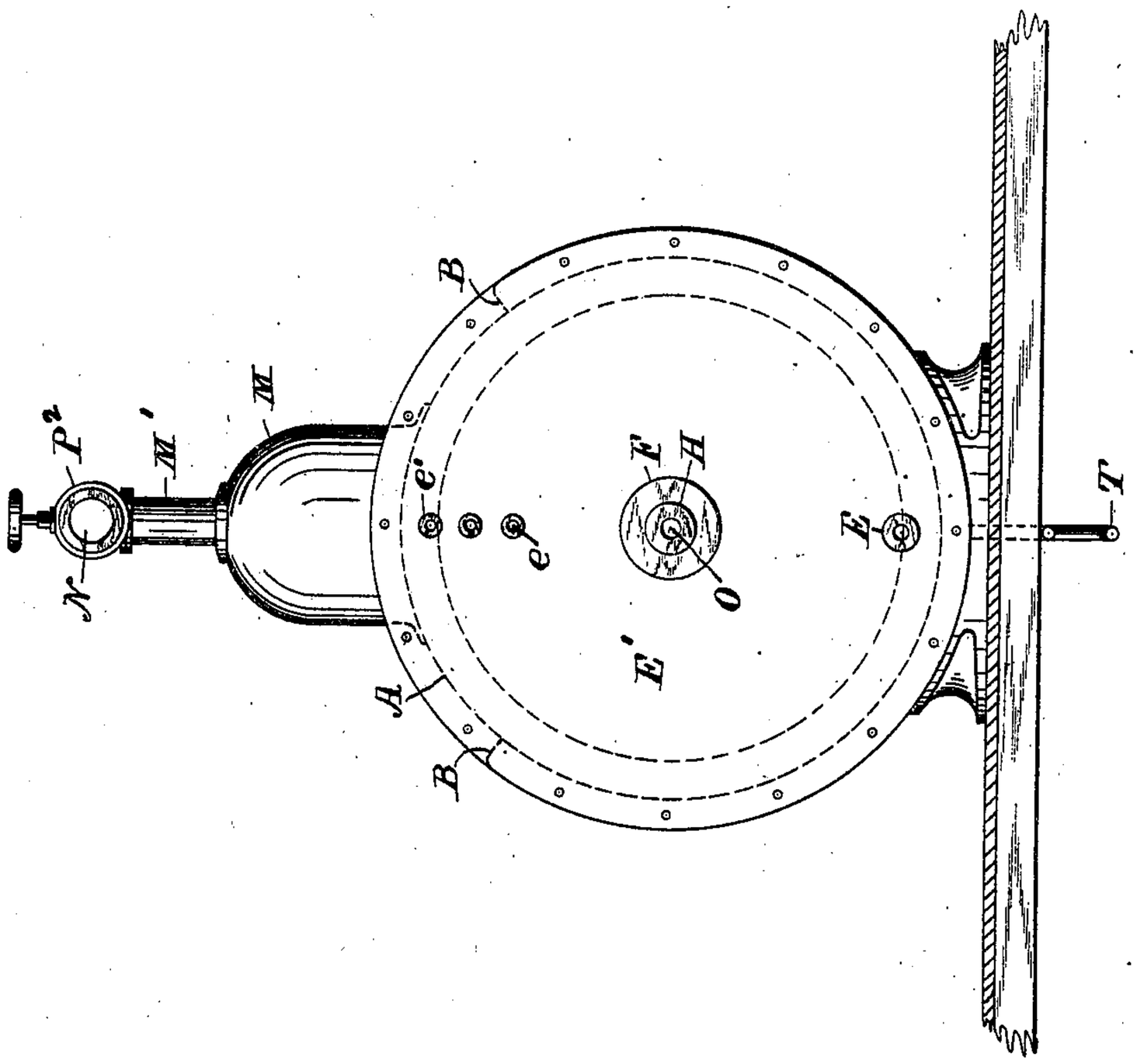
3 Sheets—Sheet 1.

E. HOLTHAUS.

PROCESS OF TREATING GARBAGE.

No. 533,896. Patented Feb. 12, 1895.

Fig. 1.



Attest:
L. Lee.
Edw. Kinsey

Inventor.
Emil Holthaus,
per Thomas S. Crane, atty.

(No Model.) 3 Sheets—Sheet 2.

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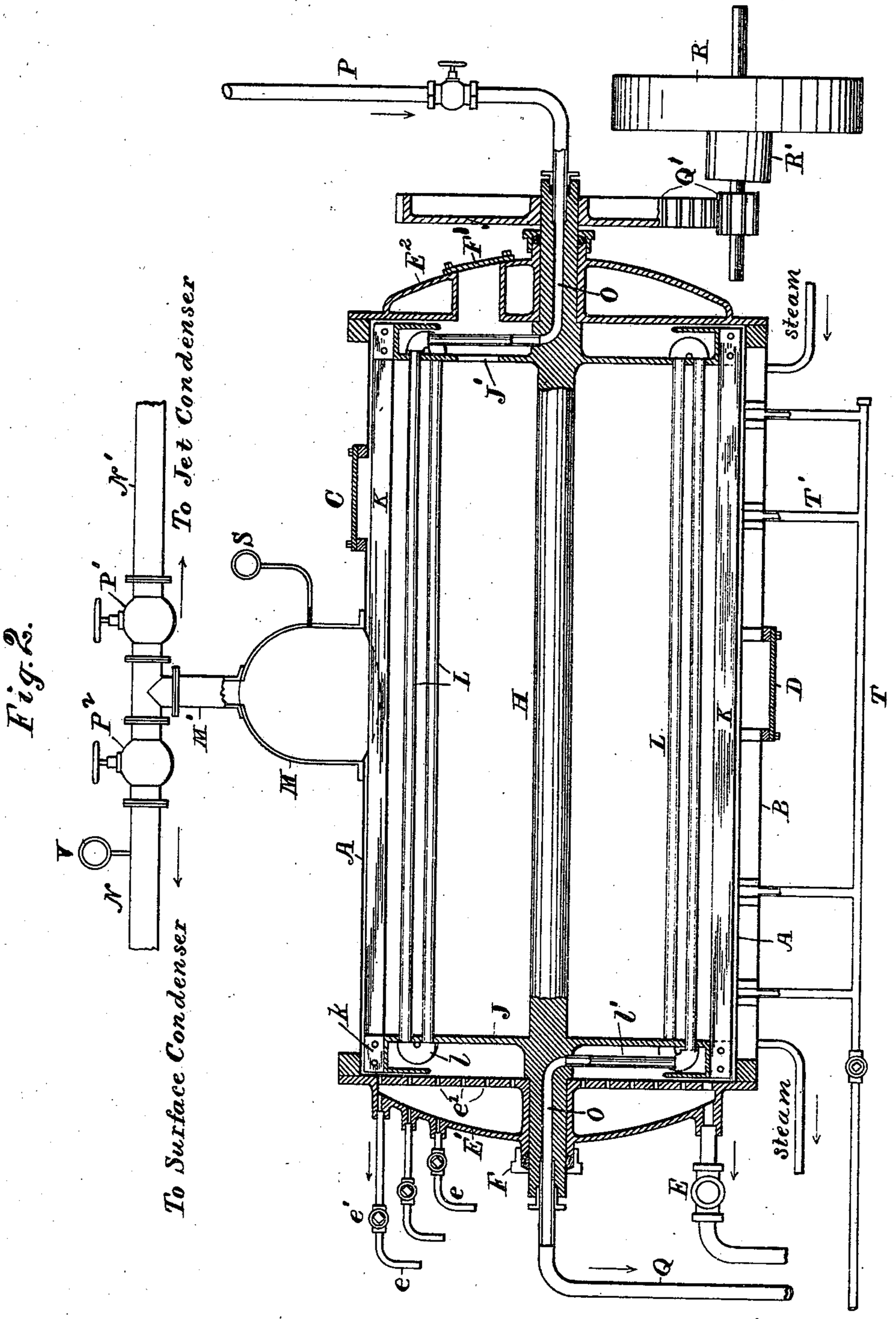

Fig. 2.

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(No Model.)

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E. HOLTHAUS.

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Fig. 4.

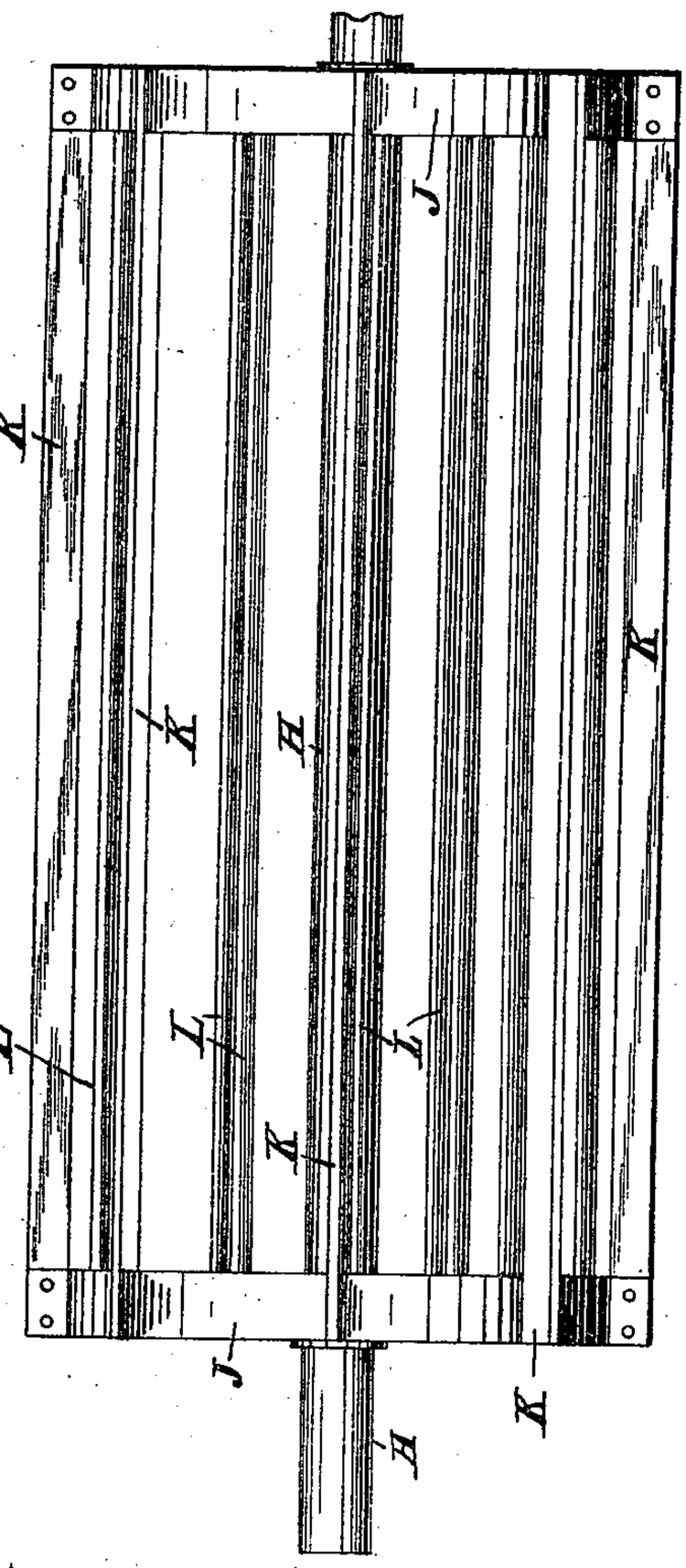
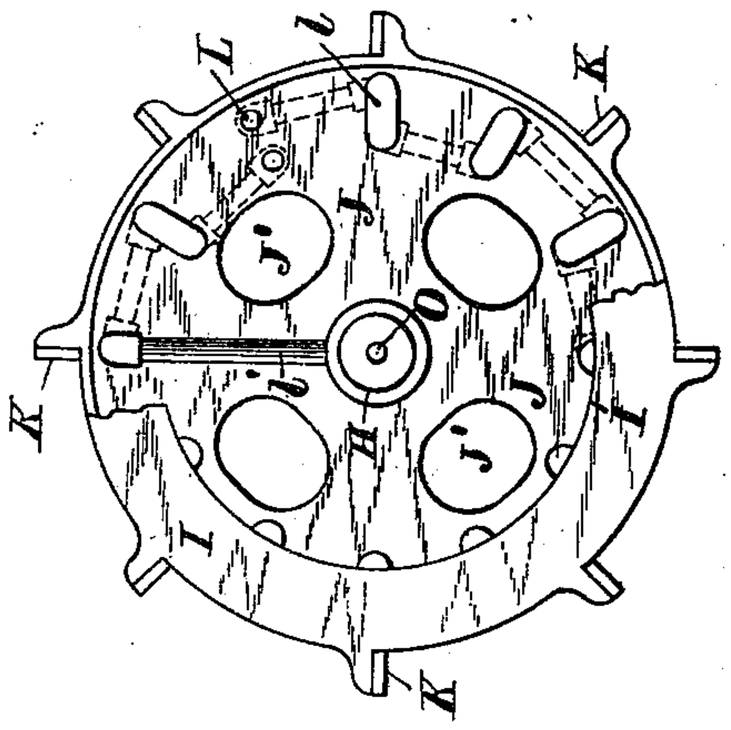


Fig. 3.



Attest:
L. Lee.
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Inventor.
Emil Holthaus,
per Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

EMIL HOLTHAUS, OF CANARSIE, NEW YORK, ASSIGNOR TO CYRUS C. CURRIER, OF NEWARK, NEW JERSEY.

PROCESS OF TREATING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 533,896, dated February 12, 1895.

Application filed May 9, 1894. Serial No. 510,620. (No model.)

To all whom it may concern:

Be it known that I, EMIL HOLTHAUS, a citizen of the United States, residing at Canarsie, Kings county, New York, have invented certain new and useful Improvements in Processes of Treating Garbage, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a process of drying garbage to render the same odorless and transportable and at the same time to recover any ammonia and grease contained therein.

In practicing the process, the garbage is confined in a tight steam jacketed vessel, and the vapors and gases which are produced during the treatment are condensed by suitable apparatus so that nothing whatever is discharged into the atmosphere. A solvent, as naphtha, may be injected to dissolve the grease, and the naphtha recovered for future use by condensing its vapor. The residuum after the removal of the grease and ammonia is thoroughly dried in the same vessel, and is then adapted for transportation or for use in the manufacture of a fertilizer.

The apparatus employed in carrying out my process consists of a steam jacketed shell having suitable heads through which an axle is extended and connected with steam inlet and outlet pipes by swivel joints, the axle having flanges, inside the shell, carrying a series of longitudinal scrapers and a series of heating pipes which are connected with the inlet and outlet of the axle. The bottom of the shell is provided with inlet pipes to supply a solvent, as naphtha, or sulphuric acid, and the shell is connected with a surface condenser for the purpose of recovering the ammonia, or any naphtha which may be used as a solvent in treating the garbage.

A water cock is provided near the bottom of the apparatus to draw off any water, and grease cocks are provided near the top to draw off the liquid grease, and the shell is connected with a jet condenser to absorb the fumes which are generated in drying the material.

The construction of the apparatus will be understood by reference to the annexed drawings, in which—

Figure 1 is an end elevation of the apparatus. Fig. 2 is a longitudinal section, where hatched, at the center line of the apparatus. Fig. 3 is an end view of the shaft with the scraper and pipes attached, the return flange being partly broken away; and Fig. 4 is a side view of the same parts with one end of the shaft broken off for want of space upon the drawing.

A designates the shell, around the lower two thirds of which a steam jacket B extends. The shell has a man-hole C for admitting, and a man-hole D for discharging the material.

The heads are designated E′ and E², and are provided with stuffing boxes F′ through which an axle or shaft H is extended. The ends of the shaft are formed with steam ducts O, and are connected respectively by swivel joints with a steam inlet pipe P and a steam outlet pipe Q. The shaft is provided, close to the ends of the shell, with flanges or disks J, one of which is provided with a series of man-holes J′. The flanges are formed on their periphery with radial lugs *k*, and scrapers K are extended longitudinally from one flange to the other, forming scrapers interior are rotated by the flanges close to the which of the shell.

A series of longitudinal pipes L are extended between the flanges and through holes in the same adjacent to the scrapers K, and the pipes are connected at the ends by return bends *l;* the series forming a continuous heating coil, the opposite ends of which are connected by pipes *i′* with the ducts O, and thus in communication with the steam inlet and outlet as the shaft revolves.

The casing, for a charge of four or five tons, would be six feet in diameter and thirteen feet long, and to give suitable strength to the heads they are shown dome shaped and hollow; and one of the heads is provided at the bottom with a water cock E, and near the top with a series of grease pipes *e* provided with cocks *e′*, the grease pipes being at different levels to facilitate the removal of the liquid grease from the surface of the water within the shell.

The head which is supplied with the discharge pipes is formed upon its inner plate with perforations *e²* to admit the liquid to such pipes. The opposite head E³ is provided

with a man-hole and cover F′ in line with the man-openings J′ in the flange J, thus affording access within the pipes L to adjust or repair the same.

A supply pipe T is connected with the bottom of the shell, through the steam jacket, by pipes T′, to inject a solvent into the material under treatment.

A dome M connects with the top of the shell and is provided with pipe M′ having branches N and N′ to connect respectively with a surface condenser and a jet condenser; the latter being adapted to condense the gaseous fumes discharged from the material in drying the same, while the former is adapted to recover the ammonia or volatile solvent discharged at different stages of the treatment.

The pipes N, N′, are provided respectively with cocks P^2, P′, to connect with the condensers in turn.

The shaft or axle H is shown provided with gearing Q′ connecting it with a pair of driving pulleys R, R′, which are adapted to rotate it respectively at about three revolutions and twelve revolutions per minute.

The apparatus is used as follows: A charge of garbage is inserted through the man-hole C and the casing is filled to a suitable level with water to properly cook the same, all the cocks being then closed, and the shaft with its scrapers K and pipes L being rotated at the slower speed for about five hours. The material is subjected not only to the heat of the steam jacket B, but is continually intersected and broken up by the series of heating pipes L, which are rotated with the scrapers. The heat generates a pressure within the shell of about forty pounds per square inch, which pressure may be regulated by a pressure gage S upon the dome. The cock P^2 is opened from time to time to condense any ammonia that is discharged from the material, and when the cooking is completed, the liquid grease which rises to the surface of the water is drawn off through the pipes *e*, and the water is then wholly discharged from the shell by the cock E. The grease which is not removed by the treatment with water, may then be completely extracted by injecting naphtha through the pipes T′; the material being then treated for another hour, with connection to a surface condenser (not shown) to recover the naphtha, which is wholly vaporized during the process. The cock P^2 is then closed and the cock P′ opened to connect the shell with a jet condenser, (not shown) and the material is then dried by rotating the shaft and scrapers at the higher rate of speed, for about thirty minutes; the jet condenser operating to absorb the fumes which are generated in such drying operation. The progress of the treatment in its different stages is readily tested through a suitable opening in the shell, and the material when thoroughly dried is ready for discharge in an odorless condition.

The water which is mixed with the garbage and afterward drawn from the shell may be mixed with the succeeding charge. For treating the garbage of a city, several of the apparatuses would be required, and the water discharged from one of the shells, as well as the naphtha recovered by the condenser, would be used over again. The valuable substances extracted in the water would thus be utilized and concentrated in the successive charges.

Where it is desired to utilize the material in the manufacture of fertilizers, it may be treated with sulphuric or other mineral acids, and is thus adapted for combination with lime and analogous materials.

It will be understood from the above description, that no vapors or fumes are discharged from the apparatus at any stage of the treatment, and the process is entirely odorless, and all the products of value are preserved.

I have not claimed the apparatus which I have shown herein, but have made it the subject of a separate application, Serial No. 525,062, filed October 6, 1894, entitled "Apparatus for treating garbage."

Having thus set forth the nature of the invention herein, what is claimed is—

1. The process herein described for the treatment of garbage, which consists first, in mixing a suitable quantity of water therewith to cook the same, second, drawing off the fluid grease and the water from the material separately, thirdly, injecting a solvent, stirring the material therewith to dissolve the remainder of the grease, and drawing off and condensing the vapor generated from the solvent, and fourthly, stirring and simultaneously treating the material until dried and condensing the vapor generated during such drying operation, substantially as set forth.

2. The process herein described for the treatment of garbage, in a tight steam jacketed vessel, which consists first, in slowly stirring and heating a mixture of the garbage with water under pressure for a considerable time, as four or five hours, second, drawing off the fluid grease and the water separately from the material, thirdly, injecting a volatile solvent, as naphtha, and slowly stirring the material with the same, and drawing off and condensing the vapor of the solvent to recover the same, and fourthly, rapidly stirring and simultaneously heating the material until dry, and drawing off and condensing the fumes during such drying operation, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL HOLTHAUS.

Witnesses:
THOMAS S. CRANE,
L. LEE.