

(No Model.)

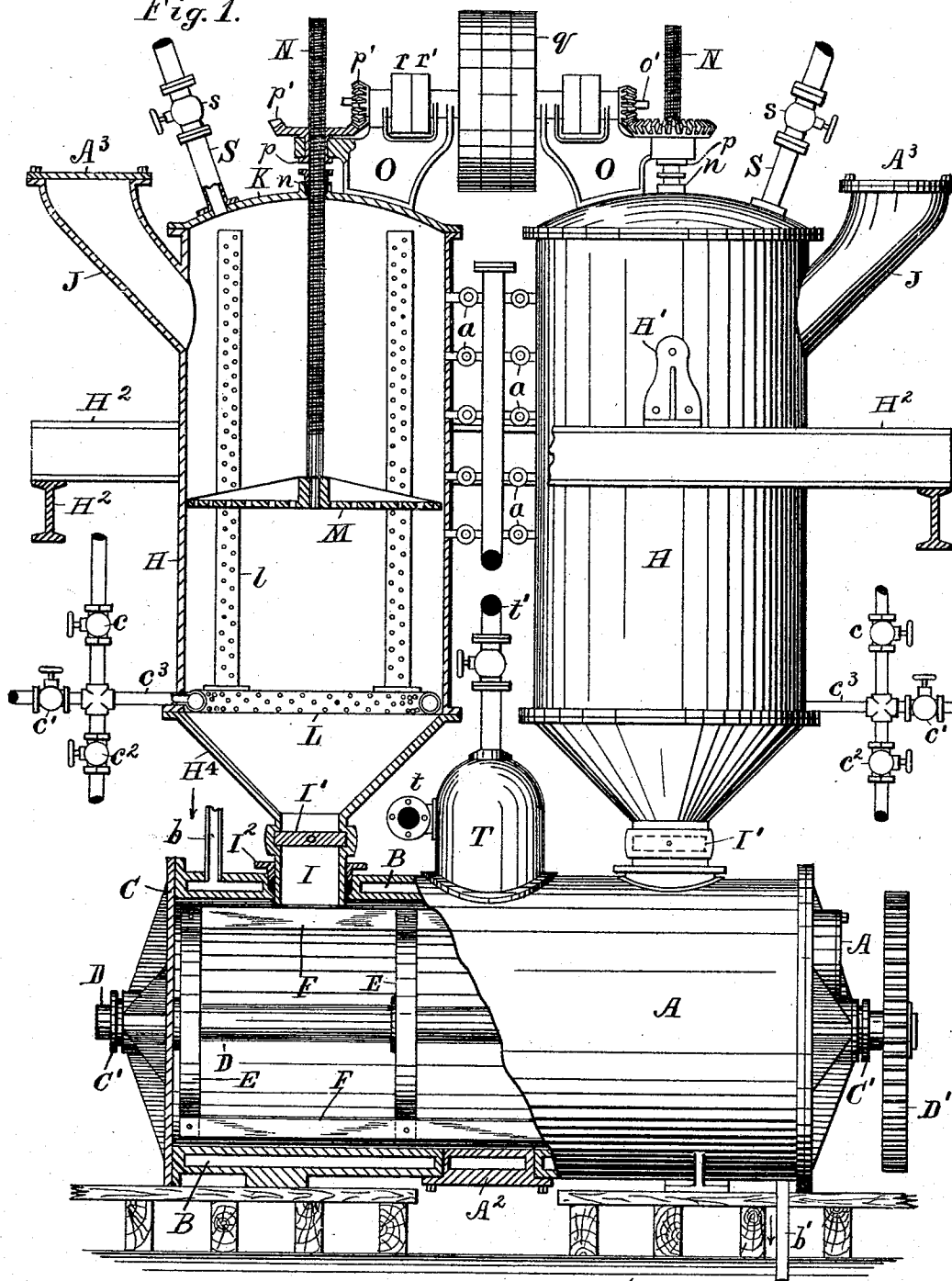
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E. HOLTHAUS.
RENDERING AND DRYING APPARATUS.

No. 543,384.

Patented July 23, 1895.

Fig. 1.



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Edw. H. Kinsley.

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Emil Holthaus, per
Thomas S. Crane, Atty.

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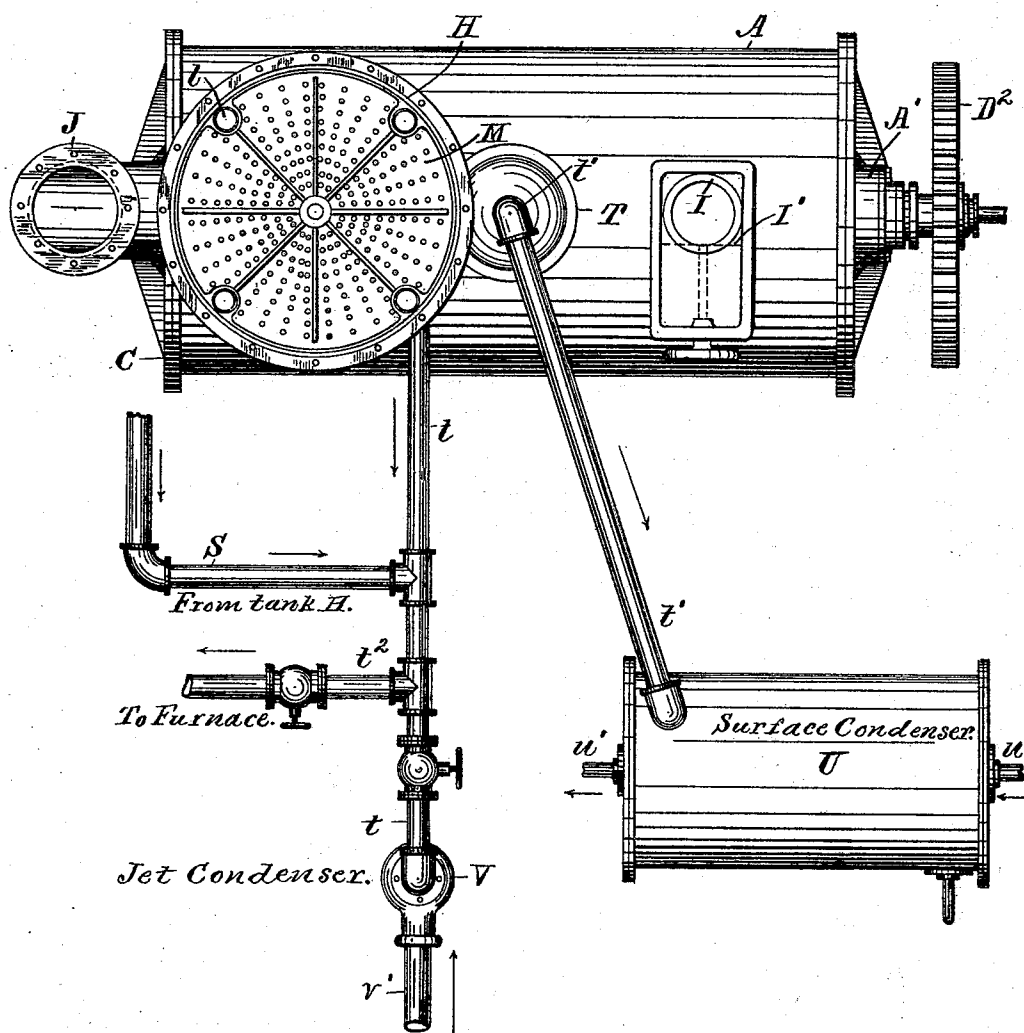
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Fig. 2.



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UNITED STATES PATENT OFFICE.

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

RENDERING AND DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 543,384, dated July 23, 1895.

Original application filed December 12, 1894, Serial No. 531,570. Divided and this application filed April 20, 1895. Serial No. 546,478. (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 Rendering, Pressing, and Drying of Refuse, fully described and represented in the following specification and the accompanying drawings, forming part of the same.

This application is a division of application Serial No. 531,570, filed December 12, 1894, for improvements in rendering, pressing, and drying of refuse.

The object of this invention is to furnish an improved apparatus for rendering offal, garbage, and similar substances, and drying the residue in a continuous operation, so as to recover the grease contained in the garbage and convert the residue into a useful fertilizer. The cooking of the material to extract the grease requires in practice very much more time than is required to dry the residue and fit it for a fertilizer, and a single drying-cylinder of given capacity is thus capable of drying the residue from three or four rendering-tanks of the same capacity. By conducting the rendering operation in a series of tanks of suitable capacity connected with the same drying-cylinder I am enabled to operate the tanks and the drier to greater advantage, and thus treat a larger quantity within a given time in the same drier. By rendering the material in tanks apart from the drier I secure an opportunity to express a great portion of the moisture from the material before it is discharged to the drier, and thus greatly diminish the time and expense of drying the residue. To fit the material for a fertilizer, it is common to mingle a small proportion of mineral acid with the material during the rendering operation, and where the rendering operation is conducted in the drying-cylinder the bolts and fixtures which are incident to the construction of the drying apparatus, and especially to the devices for stirring the material, are corroded by the heated acid. These disadvantages are obviated and the effectiveness of the drying-cylinder greatly promoted by combining a single drying-cylinder with a series of rendering-tanks

having a proper capacity for the cylinder. The rendering-tanks are provided with means for compressing the material to expel the water during the later stages of the rendering operation and with means for conducting away the fumes to be condensed or consumed.

The invention will be understood by reference to the annexed drawings, in which—

Figure 1 is an elevation of the essential parts of the apparatus with one end of the drying-cylinder and one of the rendering-tanks shown in section at the center line where hatched. Fig. 2 is a plan of the same with one of the rendering-tanks removed to the top of the gate to show the arrangement of the latter, and the gearing is removed from the top of the other rendering-tank, as it forms no part of the present invention. Fig. 2 also shows, diagrammatically, means for drawing off the generated gases and vapors.

A designates the drying-cylinder, which is horizontally arranged and provided with means for agitating and heating the contained material. The means for stirring consists of the shaft D, which is extended through stuffing-boxes C' upon the heads C, and provided with scrapers F, attached to spiders E. A cog-wheel D' is shown upon the end of the shaft, which may be rotated by any suitable gearing.

The means for heating the contents of the cylinder consists of the steam-jacket B, which is furnished with steam-pipe b and discharge-pipe b'.

The drying-cylinder is provided with a dome T to collect the vapors at some distance above the level of the material, and pipes t and t' connected, respectively, with a jet-condenser V and a surface-condenser U, as shown in Fig. 2. The jet-condenser is represented with a water-pipe v' to furnish the water of condensation, and the surface-condenser is shown supplied with a pipe u for the same purpose and with a pipe u' to discharge such water. A pipe u² is shown upon the surface-condenser to lead away the condensed fluids. The cylinder is provided with a manhole A' to admit an operator for repairs and with a manhole A² to discharge the dried material.

The rendering-tanks H are shown as vertical cylinders supported by brackets H' upon beams H². Each is connected at the bottom by a funnel H⁴ with a sleeve I, which is provided with a gate I', and fitted at its lower end to a stuffing-box I², formed in the top of the cylinder. The tank drawn in section is shown supplied with perforated pipes L and l for distributing steam into the material and drawing water therefrom. A pipe c³ is inserted in the pipe L and connected by cocks c, c', and c², respectively, with steam, water, and waste pipes. A piston M is fitted to move vertically in each rendering-tank, and is provided with a screw-rod N, extended through stuffing-box n, upon the tank-cover K. An inlet-hopper J, with tight cover A³, is provided near the top of the tank to fill the same and close it tightly, and when the piston is fully raised it is above the inlet of the hopper, and the rod, where it enters the stuffing-box at such point, is devoid of thread to prevent the escape of vapor. A bracket O is mounted upon each tank-cover to carry a gearing-shaft o' and a rotary nut p, which, as well as the shaft, is provided with gears p' to raise and lower the piston M.

The adjacent ends of the shaft o' are provided with fast pulleys q, a loose pulley q' being mounted between the same upon an extension of one of the shafts. Fast and loose pulleys r r', smaller than the pulleys q, are also provided upon each shaft. By applying suitable belts to the pulleys q and r either of the nuts p may be rotated at pleasure. The larger pulleys q are used to lower the pistons at a slow rate, while the smaller pulleys r would be used to raise the pistons at a quicker rate.

A pipe S with cock s is provided upon the cover K at the top of each tank to discharge the fumes to a suitable condenser and when desired to a furnace for consuming the gases.

The operation of the apparatus is as follows: The piston is raised to the top of each tank and one of the tanks is charged with garbage, and a weak solution (as one per cent.) of mineral acid is mixed therewith, and the hopper is tightly closed by cover A³. A suitable proportion of water is then introduced through the pipe c' into the perforated pipes, and the water-cock is then closed and steam-cock c opened, which injects steam into the material from the bottom and all sides of the mass. The garbage is then cooked with steam for a suitable time, as four or five hours, to thoroughly extract the grease, the vapors being drawn off through the pipe S and condensed during such treatment. The grease which rises during such operation to the surface of the mass is drawn off through the appropriate pipe a, and about an hour before the close of the cooking operation the steam-cock c is closed, the waste-cock c² is opened, and the piston M is forced slowly downward upon the mass to press out all the superfluous moisture. The water thus expressed enters

the holes in the pipes L and l and is discharged from the cock c² to a suitable receptacle, from whence it may be pumped into a succeeding charge through the cock c'. The material valuable for fertilizing purposes, which would otherwise be lost in the extracted fluid, is thus returned to the succeeding charge. When the water is suitably expressed from the material, the gate I is opened beneath the said tank and the contents discharged into the drying-cylinder A, where it is continuously stirred for about an hour, when it is ready for discharge from the manhole A³. In Fig. 2 the pipe t is shown connected with a jet-condenser V, which is diagrammatically shown, and the pipe is provided with a branch t² to deliver the gases when desired to a furnace. The pipe t' is shown connected with the surface-condenser U, which is also diagrammatically represented with its inlet and outlet water-pipes u u'. Suitable cocks are shown in the various pipes. A portion of the pipe S is shown in Fig. 3 leading to the jet-condenser and furnace connection, a portion of the pipe S being unavoidably omitted as the cover K, to which it is attached, is not shown in Fig. 2. During the rendering operation the fumes, as already stated, are discharged to the jet-condenser or to a furnace. During the drying operation the vapors which are first generated are condensed by the surface-condenser U, and the gases which are discharged by the destructive distillation of the material are delivered to the jet-condenser V or through the pipe t² to a suitable furnace for consumption. The material in the drier is agitated by the blade or scraper F, attached to the shaft D, the receptacle being simultaneously heated by the steam-jacket B. The material is thus rapidly heated and dried, while the escape of all noxious fumes is avoided by condensing or burning the same. To use the series of rendering-tanks H in connection with the single drier A the tanks are charged alternately at regular intervals and are kept in operation simultaneously, so that their contents may be in readiness for discharge to the drier alternately.

The treatment of the material within each of the rendering-tanks would be as just described, and as both would be charged successively and would be engaged simultaneously upon separate charges it is obvious that the total amount that could be rendered and dried in the cylinder A would be twice as great as if the material were rendered and dried within such cylinder. The rendering-tanks, with the pipes L and l and piston M, are made wholly of cast-iron, and are thus but little affected by the acid used in the rendering operation, while the material is freed from the acid before it is discharged to the drier, and the pipes G and other wrought parts, as the bolts and connections within the drier, are thus preserved from the effect of the acid, which would injure them if the rendering were conducted within the drier.

As one drier can dry the material from three or four rendering-tanks of its own capacity, it is obvious that the number of tanks may be larger than is shown in the annexed drawings. A great advantage is thus attained by combining one drying-cylinder with a series of separate rendering-tanks sustained above the same and tightly connected thereto and providing all the receptacles with means for drawing off the fumes during the treatment.

Fig. 1 of the drawings illustrates an apparatus for operation upon a large scale, in which each rendering-tank would hold from ten to twenty tons of material at one time and would weigh too much to support wholly upon the drier, for which reason it is shown sustained separately by the beams H².

The expansion or slip joint formed between the tank and the drier by means of the tubular outlet I' and the stuffing-box I² permits the expansion of the parts when heated, and thus avoids the strain which would otherwise be thrown upon the joints. The particular means for moving the piston M is not claimed herein, as it is claimed in my co-pending application, Serial No. 531,570, filed December 12, 1894, for rendering, pressing, and drying of refuse, of which application this case is a division.

I am aware that it is old in separate apparatus to use a plunger in combination with a rendering-tank, or to connect a single rendering-tank with the top of a drying-chamber, and I am also aware that expansion-joints are in ordinary use for connecting steam-pipes and analogous conduits. I do not therefore claim the mere use of a plunger for expressing the fluid from the material during the rendering operation, nor the mere connection of a single rendering-tank with the top of a drying-chamber.

My apparatus includes means for rendering and drying the material without any exposure to the atmosphere, and it also provides for the condensation of the vapors and the consumption of the gases which are discharged during the treatment, and I am not aware that any apparatus has ever combined a series of separate rendering-tanks connected

with the top of the same drying-cylinder, and means provided for performing the following operations in a continuous process: first, the rendering of the material in the rendering-tank; second, condensing the vapors discharged from the tank; third, drawing off the grease; fourth, expressing the fluid and separating the same from the rendered material; fifth, discharging the same into a heated drying-cylinder without exposure to the atmosphere; sixth, agitating the material during the drying operation, and, seventh, condensing or consuming the gases discharged from the drier.

Having thus set forth the invention, what I claim is—

The apparatus herein shown and described for treating garbage to extract the grease and dry the residue in a continuous operation within closed vessels, which consists of the drying cylinder A with means for heating the same and agitating the material within the cylinder, a series of separate rendering tanks H arranged above the same and having their bottom outlets I tightly connected with the interior of the cylinder, suitable inlets for charging the tanks with means for tightly closing the same, a movable plunger M in each rendering tank with means for depressing the same to express the fluid from the material when cooked, means for conducting the expressed fluid from the interior of the tank, and a suitable cock, as c², for drawing off such fluid, one or more condensers and suitable pipe connections for drawing off and condensing the fumes from the tanks and drier, and gates for connecting the tanks in succession with the same drying cylinder, whereby successive charges may be rendered in the separate rendering tanks, the moisture expressed therefrom, and the charges dried successively in the same drying cylinder.

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

EMIL HOLTHAUS.

Witnesses:

THOMAS S. CRANE,
L. LEE.