No. 742,224. PATENTED OCT. 27, 1903.

E. S. PECK.

PROCESS OF TREATING GARBAGE.

APPLICATION FILED NOV. 17, 1902.

NO MODEL.

Fig. I

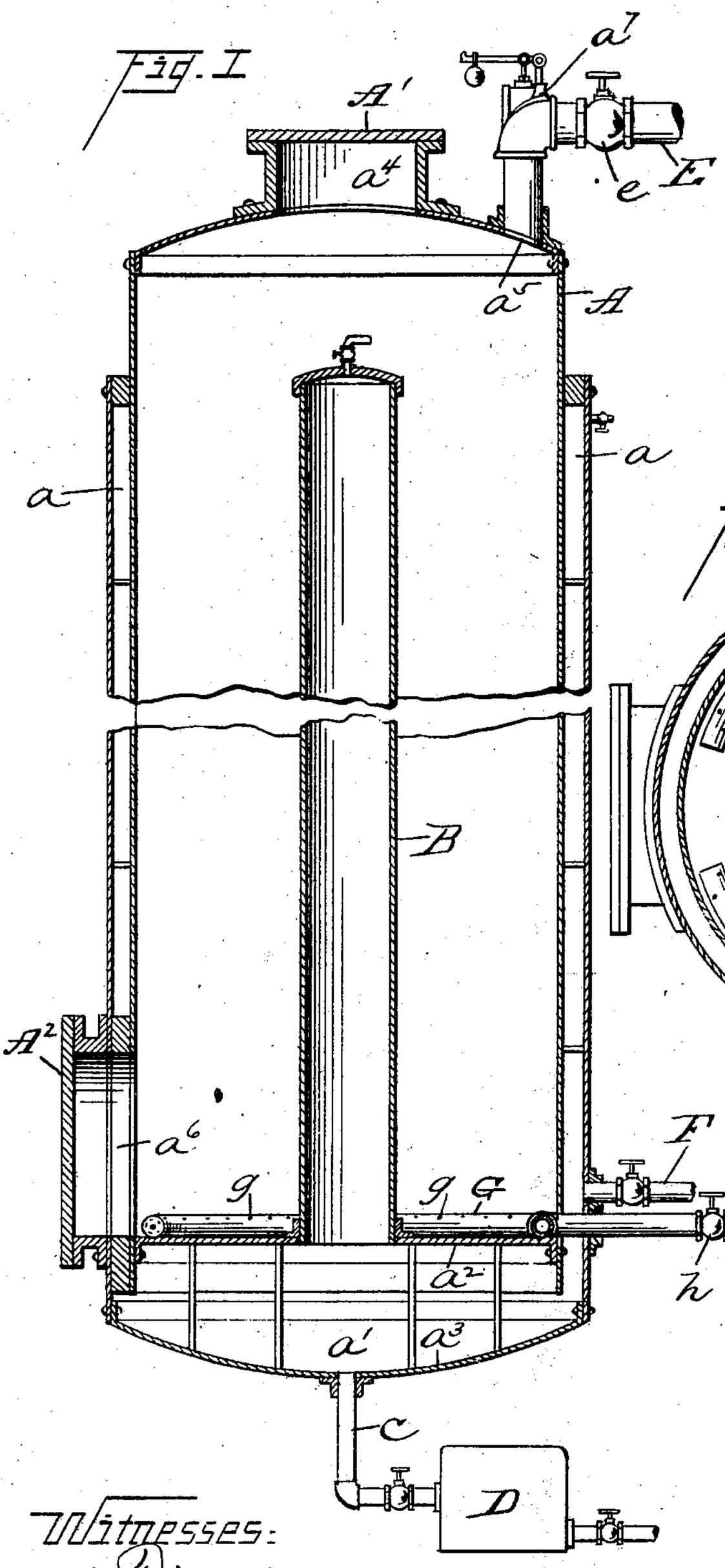
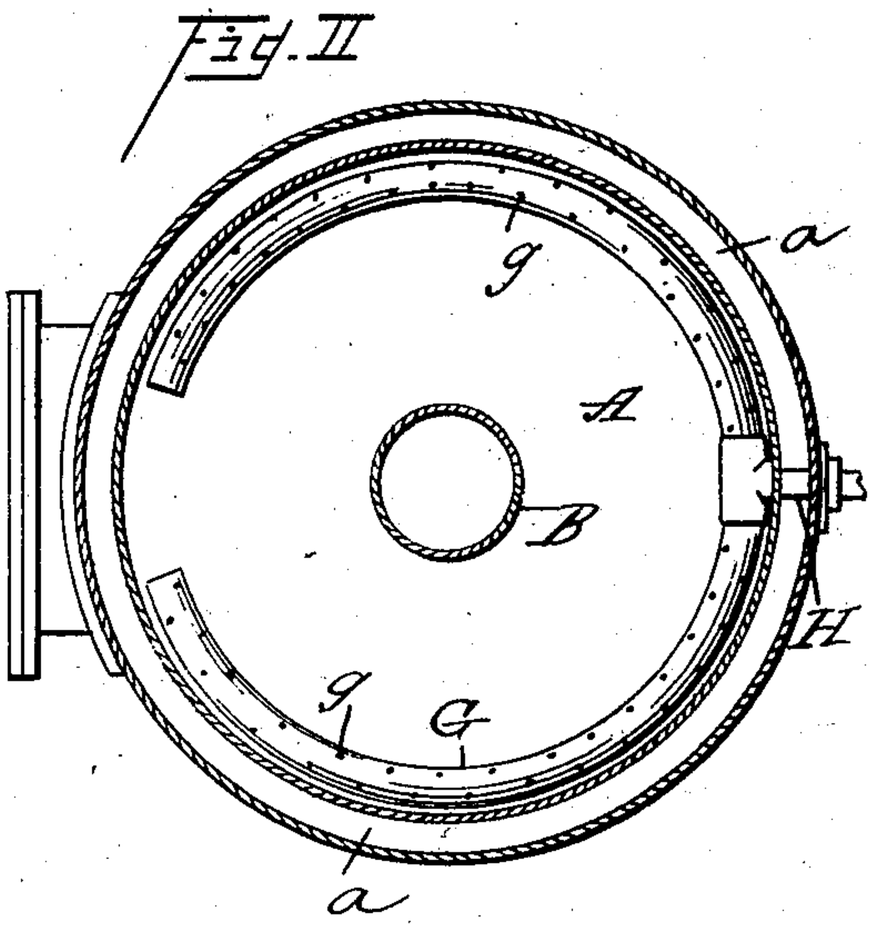


Fig. II



Witnesses:
D. T. Davies
A. E. Merkel.

Inventor
E. S. Peck.
by J. D. Fay
Attorney.

No. 742,224. Patented October 27, 1903.

UNITED STATES PATENT OFFICE.

ERNEST S. PECK, OF NEWBURG, OHIO.

PROCESS OF TREATING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 742,224, dated October 27, 1903.

Application filed November 17, 1902. Serial No. 131,605. (No specimens.)

To all whom it may concern:

Be it known that I, ERNEST S. PECK, a citizen of the United States, and a resident of Newburg, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Processes of Treating Garbage, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My improved process relates to methods of treating garbage, its object being to recover therefrom all the valuable ingredients contained therein in an economical and efficient manner. Heretofore in processes of this character a large part of the desirable material has been lost, due to the imperfect or usually total lack of utilization of those liquid products which contain this material in solution. It is the remedy of this imperfection that is the especial object of this invention.

Said improved process consists of steps hereinafter fully described, and specifically set forth in the claims.

The annexed drawings illustrate one form of apparatus for carrying out my said process, the disclosed form, however, constituting but one of various forms of apparatus which may be used in carrying out the principle of said invention.

In said annexed drawings, Figure I represents a vertical section of said apparatus, and Fig. II represents a horizontal section of same.

A digester is provided and comprises a cylindrical receptacle A, provided with a double shell forming a surrounding jacket a. This jacket communicates with a chamber a', formed at the bottom of the receptacle A between a diaphragm a^2 and a head a^3. Upon the middle of the diaphragm a^2 is supported a steam-dome B, closed at the top and open at the bottom to communicate with the chamber a'. A discharge-pipe C connects with an opening in the bottom of chamber a', which discharges into a steam-trap D. This trap is preferably connected with the boiler used for generating the steam utilized in my process.

The top of the receptable is provided with an opening a^4 and a door A′, forming an air-tight closure therewith, and an opening a^5, which is connected to a pipe or conduit E, containing a valve e for cutting off communication with the interior of the receptacle. This conduit E is connected with a condensing or vacuum pump. (Not shown.)

A steam-pipe F connects with and supplies steam from a suitable source and at a suitable pressure to the interior of the jacket a. An air-tight door A^2 is provided for removing the solid matter from the receptacle's interior and forms an air-tight closure with an opening a^6. A safety-valve a^7 is placed at a convenient location, such as in the conduit E, as shown, and arranged to blow off at about fifty pounds pressure. Beneath the receptacle A and communicating with the same by means of a coil G, provided with perforations g g, is the pipe H, connected to a suitable source of hot air or superheated steam, whereby the latter may be forced up through the contents of the receptacle. The said pipe H is provided with a valve h, whereby communication between the receptacle A and the said pipe may be cut off.

In carrying out my process valve h is closed to shut off communication between the receptacle A and the pipe H, and valve e is closed so as to cut off communication through the conduit E. The digester is thus rendered air-tight. Garbage and a quantity of water are introduced into the digester through the opening a^4. In order to hasten the cooking operation, steam is preferably passed upwardly through the garbage in order to heat the same independently of the jacket. This prior cooking by direct heat greatly facilitates the subsequent process of cooking the garbage by radiated heat and reduces the time of completing such cooking operation. Steam being admitted into the jacket a and the dome B, the garbage is now thoroughly cooked by radiated heat while thus excluded from the atmosphere. This cooking converts part of the uncombined and combined water into vapor, the remainder becoming very highly heated. When the cooking has progressed sufficiently, the valve e is opened, whereupon the vaporous content of the digester is exhausted from its interior by means of the condensing or vacuum pump. Such vaporous content, as well as all of the free water, which now is given an opportunity to volatilize by reason of the constant vacuum produced in

the receptacle by the continuous withdrawing of the vapors and by reason of the high temperature maintained in the receptacle by the steam which is still heating the jacket, is thus permanently removed and carried away from the receptacle without removing any of the solid matter contained therein. By "free water" I mean the liquid contents of the receptacle which contain none of the oleaginous matter nor of the garbage, which water would normally drain off slowly from the tankage and which does not adhere to the garbage with enough pertinacity to require mechanical pressure to separate it from the same. My method of exhausting expeditiously and effectively removes this part of the liquid content. Communication is now opened between the receptacle and the pipe H by means of the valve *h*, and pure superheated steam which is free from all extraneous gases, such as those that are contained in products of combustion and which therefore exert no deleterious effects upon the garbage, is forced through the cooked mass from bottom to top, such superheated steam, saturated with moisture absorbed from the cooked mass as it passes up through it, being drawn off the top of the receptacle by means of the condensing or vacuum pump. By the phrase "free from all extraneous gases" I mean that it is fresh steam which is thus passed up through the cooked mass and not steam that may have been contaminated in various ways—such as, for instance, first passing it through the furnace. By thus passing a heated gas up through the cooked mass much moisture which has been in intimate contact with the solid matter is removed from the receptacle, and which, because of such intimacy of contact, has failed to be drawn off by the previous action of the pump. Should the pressure in the receptacle rise during the cooking above fifty pounds, the safety-valve blows off and part of the vaporous content escapes and is so removed automatically. The solid matter or "tankage," as it is now called, is then removed and compressed into what is technically known as "cheese." The expressed liquid resulting from this compression is recovered, allowed to stand in a suitable receptacle, and the oleaginous matter skimmed off the top and preserved. The remaining liquid, which is approximately at the density of stick, due to the thorough removal of moisture by the means above described, is then poured upon the cheese, which absorbs it, and the resultant product is dried in a suitable drying apparatus. A fine mealy homogeneous product results which represents, substantially, the total initial weight of the garbage less its combined water and the oleaginous content and which has a greater weight and value than those products resulting from processes in which liquid is permitted to drain off during the cooking operation and in which much valuable material is thus lost.

I have found that by the use of my above-described process nearly all of the valuable oleaginous matter is recovered, only a very small per cent. of it remaining in the tankage.

By the term "garbage" I mean to include not only kitchen refuse, both animal and vegetable, but also slaughter-house and packing-house offal and refuse and offal of analogous character.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means herein disclosed provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention—

1. The improved subprocess for treating garbage which consists in cooking raw garbage in a closed air-tight receptacle by radiated heat, and in then passing a pure heated gas through the tankage resulting from such cooking process.

2. The improved subprocess for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by radiated heat, permanently separating and carrying away from such receptacle vaporous and free-water content by exhaust, and in then passing a pure heated gas through the tankage resulting from such cooking process.

3. The improved subprocess for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by radiated heat, maintaining the heat and permanently separating and carrying away from such receptacle its vaporous and free-water content by exhausting both the normal vapors and also continuously exhausting those vapors that result from the water which is volatilizing by reason of the high temperature maintained in the receptacle by the radiating heat, and in then passing a pure heated gas through the tankage resulting from such cooking process.

4. The improved subprocess for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by heat radiating from and toward the center, maintaining the heat and permanently separating and carrying away from said receptacle its vaporous and free-water content by exhausting both the normal vapors and also exhausting those vapors that result from the water which is volatilizing by reason of the high temperature maintained in the receptacle by the radiated heat, and in then passing a pure heated gas through the tankage resulting from such cooking process.

5. The improved subprocess for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by radiated heat, and also independently by direct heat, maintaining the heat after cooking and permanently separating and carrying away from such receptacle its vaporous and free-water content by exhausting both the

normal vapors and also continuously exhausting those vapors which result from the water which is volatilizing by reason of the high temperature maintained in the receptacle by the radiating heat, and in then passing a pure heated gas through the tankage resulting from said cooking process.

6. The improved process for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by radiated heat, maintaining the heat after cooking and permanently separating and carrying away from such receptacle its vaporous and free-water content by exhaust, passing a pure heated gas through the tankage resulting from said cooking process, removing the tankage and compressing it to remove the remaining liquid, removing the oleaginous matter from the expressed liquid, recombining the expressed liquid and the compressed tankage, and drying the resultant product.

7. The improved process for treating raw garbage which consists in cooking such garbage in a closed air-tight receptacle by radiated heat, separating from said receptacle its vaporous and free-water content by exhausting both the normal vapors and those vapors that result from the water which is volatilizing by reason of the high temperature maintained in the receptacle by the radiating heat, passing a heated gas through the tankage resulting from said cooking process, removing the tankage and compressing it to remove the remaining liquid, removing the oleaginous matter from the expressed liquid, recombining the expressed liquid and the compressed tankage, and drying the resultant product.

8. The improved process for treating raw garbage which consists in cooking said garbage by radiated heat and independently by direct heat, maintaining the heat after the cooking is completed, separating from said receptacle its vaporous and free-water content by exhausting both the normal vapors and those vapors that result from the water which is volatilizing by reason of the high temperature maintained in the receptacle by the radiating heat, passing a heated gas through the tankage resulting from such cooking process, removing the tankage and compressing it to remove the remaining liquid, removing the oleaginous matter from the expressed liquid, recombining the expressed liquid and the compressed tankage, and drying the resultant product.

9. The improved process for treating raw garbage which consists in cooking such garbage by radiated heat and independently by direct heat, maintaining the heat after the cooking is completed, separating from said receptacle all of its vaporous and free-water content by exhausting both the normal vapors and also those vapors that result from the water which volatilizes by reason of the high temperature maintained in the receptacle by the radiated heat and the low pressure caused by the exhaust, passing a heated gas through the tankage resulting from said cooking process, removing the tankage and compressing it to remove the remaining liquid, removing the oleaginous matter from the expressed liquid, recombining the expressed liquid and the compressed tankage, and drying the resultant product.

Signed by me this 11th day of November, 1902.

ERNEST S. PECK.

Attest:
D. T. DAVIES,
A. E. MERKEL.