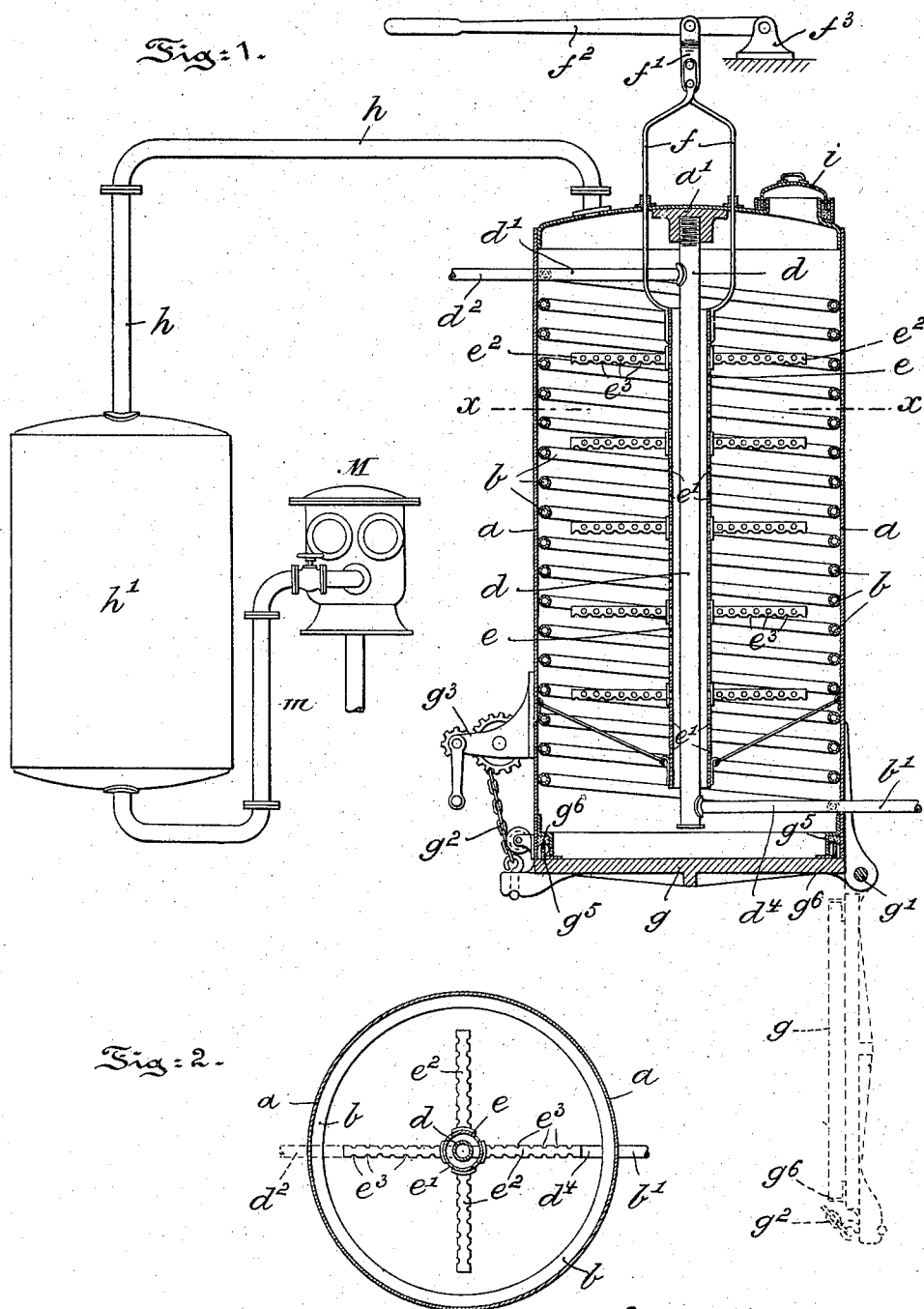


(No Model.)

W. S. RICHARDSON.  
APPARATUS FOR TREATMENT OF GARBAGE.

No. 567,724.

Patented Sept. 15, 1896.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR TREATMENT OF GARBAGE.

SPECIFICATION forming part of Letters Patent No. 567,724, dated September 15, 1896.

Application filed March 4, 1896. Serial No. 581,723. (No model.)

*To all whom it may concern:*

Be it known that I, WINFIELD S. RICHARDSON, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for the Treatment of Garbage in the Manufacture of Fertilizing Agents, of which the following is a specification.

My invention has relation to apparatus for the conversion of garbage and similar matter into fertilizing agents or components, whereby the garbage is digested by means of quicklime and superheated steam; and in such connection it relates particularly to the construction and arrangement of apparatus therefor.

The principal objects of my invention are, first, to provide a simple and efficient apparatus whereby garbage and similar waste matter may be quickly and cheaply converted into valuable fertilizing agents or components; second, to provide an apparatus for the conversion of garbage and similar fatty waste matter, in which the garbage is arranged in layers alternating with layers of quicklime or its equivalent, and the mixture thus formed thoroughly heated by means of superheated steam, and, third, to provide in an apparatus of the character described a boiler or caldron traversed vertically by a steam-pipe and jacketed on its interior, the vertical steam-pipe being surrounded by a perforated shell or sleeve provided with perforated radiating arms extending toward the wall of the boiler, and with means for moving the shell and arms during treatment of garbage or similar matter.

My invention consists of an apparatus for converting garbage or other matter into fertilizing agents, constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 represents in side elevation, partly

sectioned, an apparatus embodying main features of my invention and illustrating diagrammatically the various auxiliaries and connections for the apparatus, and Fig. 2 is a horizontal section on the line *xx* of Fig. 1 of the boiler or caldron.

Referring to the drawings, *a* represents a boiler or caldron, the interior of which is jacketed by a steam-coil *b*. The center of the boiler *a* is traversed by a vertically-arranged steam-pipe *d*, provided with a connection *d'* at its upper end and with a steam-coil *b* and an inlet-pipe *d<sup>2</sup>*, leading to a source of superheated-steam supply. The pipe *d* is also provided at its lower end with a connection *d<sup>4</sup>* to the steam-coil *b*, and said steam-coil *b* and connection *d<sup>4</sup>* have an outlet *b'* discharging to a hot-water well or other source of superheated-steam supply. (Not shown.) The pipe *d* is preferably screwed at its upper end into the top *a'* of the boiler or caldron *a*, or may be otherwise secured thereto and partially supported thereby.

Surrounding the pipe *d* is a sleeve or open-ended shell *e*, perforated along its entire length, as at *e'*, and provided with a series of radiating tubes *e<sup>2</sup>*, also perforated, as at *e<sup>3</sup>*. The sleeve or shell *e* and its arms *e<sup>2</sup>* are vertically movable in the boiler *a* and upon the pipe *d*, and for the purpose of moving said shell and arms the shell is preferably connected by means of a yoke *f* with a link *f'*, adapted to be raised and lowered by means of a pivoted lever *f<sup>2</sup>*, suspended in a suitable bearing *f<sup>3</sup>* above the boiler or caldron *a*.

The bottom of the boiler *a* is closed by a door *g*, which is hinged, as at *g'*, and adapted to be opened or closed by means of a chain *g<sup>2</sup>* and winch *g<sup>3</sup>*, substantially as illustrated in Fig. 1. The bottom of the boiler or caldron *a* is provided with a suitable metal sealing-ring *g<sup>5</sup>*, which forms, with a similar ring *g<sup>6</sup>* on the door *g* when said door is closed, a watertight seal for the bottom of the boiler.

From the top of the boiler *a* extends a pipe *h*, leading to a suitable condenser *h'*, connected to and under the influence of a vacuum or exhaust pump *M* by means of a pipe *m*, of any ordinary or well-known construction.

To carry out my invention of treating gar-

bage or similar matter, the door at the bottom of the boiler *a* is first closed and then a layer of lime, such as quicklime or its equivalent, is introduced into the boiler through an opening or door *i* at the top thereof. Upon this layer of lime is dumped a predetermined quantity of garbage, the preferred ratio by weight being one ton of garbage to two hundred pounds of lime, more or less. Alternate layers of lime and garbage or similar matter are then introduced until the boiler *a* is filled. The top door *i* is then closed and superheated steam conducted to the vertical pipe *d* and coil *b*. The garbage or similar matter is then subjected to the combined action of the heat from the steam pipe and coil and to the action of the limelayers for from three to five hours, more or less, the volatile products thereby driven off being exhausted into the condenser *h'* through the pipe *h*. After the combined action of heat and lime for the time indicated, the moist garbage or similar matter will be found to be dried, the bones and other calcareous matter thoroughly cleansed from the fatty and other impurities, and the whole mass thoroughly disintegrated and adapted to be dumped through the bottom of the boiler. The mass after it leaves the boiler is preferably screened to remove the bones, the resultant mass being granular and a valuable fertilizing constituent. The quicklime being a powerful disinfectant and deodorizer, the garbage under treatment is freed from disagreeable and noxious odors. The quicklime also absorbs a certain percentage of the moisture in the garbage and combines with the various nitrates, chlorids, oleates, &c., set free during the digestion or disintegration of the garbage. The condenser *h'* receives the ammoniacal and oily vapors, which are condensed and collected in any suitable manner.

If desired, the whole mass while being subjected to heat may be agitated by raising and lowering the shell *e* and its arms *e'* in the manner hereinbefore explained, and when the mass after treatment clogs up the interior of the boiler, it may be removed by simply agitating the shell and its arms. The shell and arms conduct the heat from the steam-pipe and distribute the same uniformly through

the mass, to cause the mass to be thoroughly permeated by the heat.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus of the character described, comprising a boiler in which the material to be treated is introduced, a steam-coil jacketing the interior of said boiler, a pipe connected at either end with said coil and traversing an approximate center of said boiler, a perforated shell or sleeve provided with perforated arms and means for moving the shell or sleeve and arms during treatment of matter in said boiler, substantially as and for the purposes described.

2. In an apparatus of the character described, a boiler in which material to be treated is introduced, a steam-coil jacketing the interior of said boiler, a pipe connected at either end thereto and traversing vertically the center of said boiler, said coil and pipe being connected with a source of superheated-steam supply, a perforated shell surrounding said pipe, a series of perforated tubes connected with said shell and projecting radially therefrom, and means for actuating said shell and arms on said pipe, substantially as and for the purposes described.

3. In an apparatus of the character described, a boiler, a steam-coil jacketing the interior thereof, a vertical pipe connected at either end with said coil and traversing the center of said boiler, said pipe and coil being connected with a suitable source of superheated-steam supply, a perforated shell surrounding said vertical pipe and vertically movable thereon, one or more series of perforated open-ended tubes projecting radially from said shell, means for moving said shell and arms, a condenser and an exhaust-pump connected to said boiler, substantially as and for the purposes described.

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

WINFIELD S. RICHARDSON.

Witnesses:

THOMAS M. SMITH,  
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