

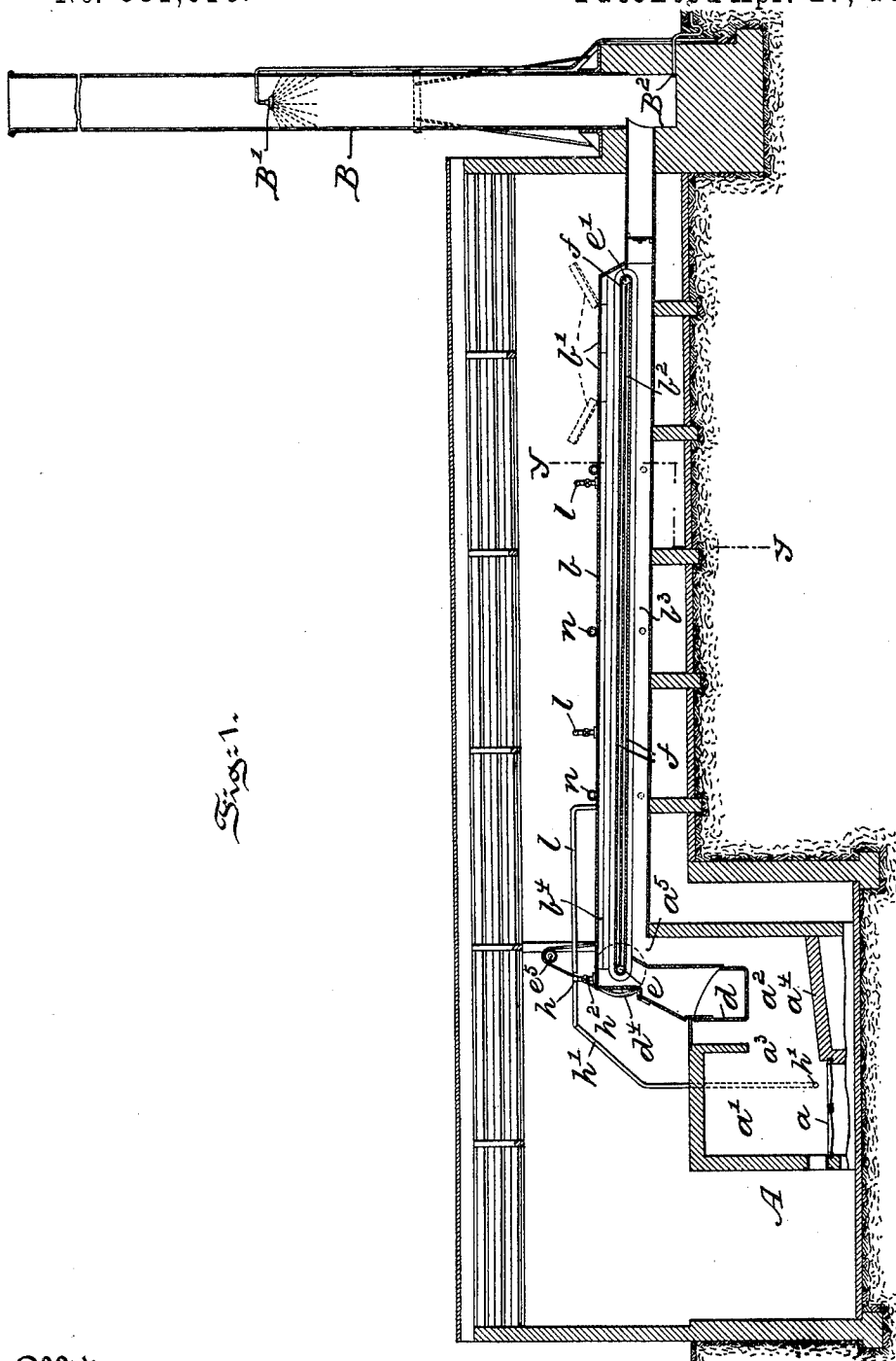
(No Model.)

3 Sheets—Sheet 1.

W. S. RICHARDSON.  
APPARATUS FOR TREATING GARBAGE, &c.

No. 581,616.

Patented Apr. 27, 1897.



Witnesses:  
Thomas M. Smith.  
Richard C. Maxwell.

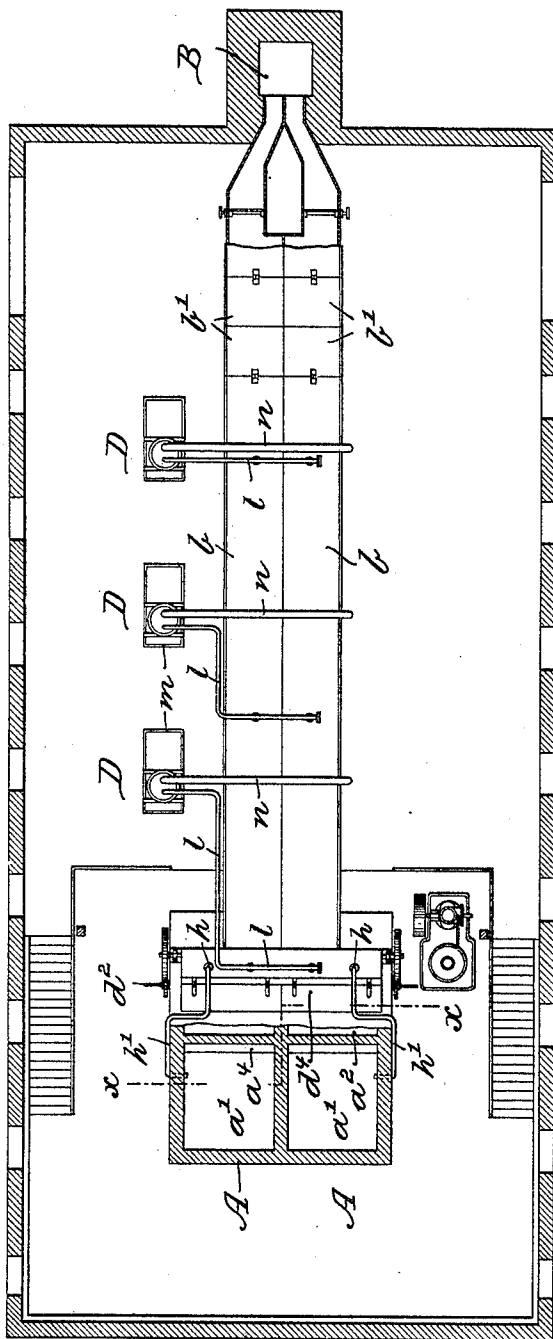
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*Figs. 2.*



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(No Model.)

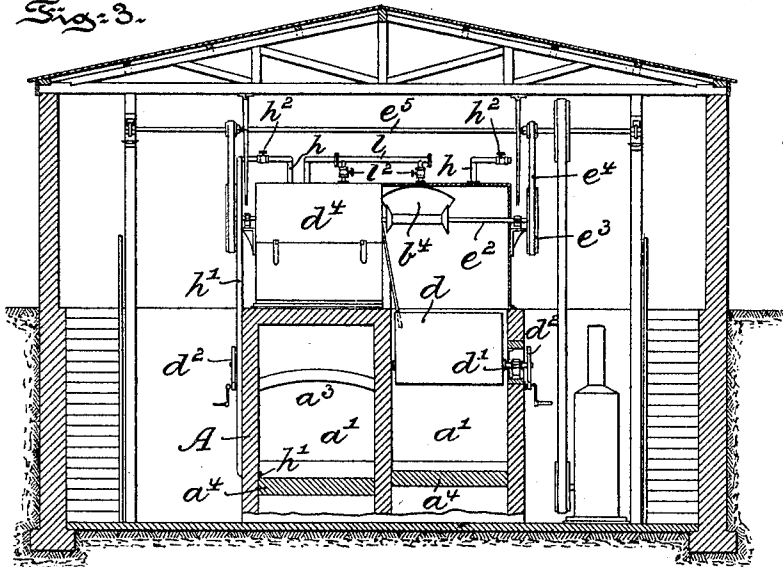
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Fig. 3.



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# UNITED STATES PATENT OFFICE.

WINFIELD S. RICHARDSON, OF CAMDEN, NEW JERSEY, ASSIGNOR TO THE  
NATIONAL WASTE UTILIZATION COMPANY, OF SAME PLACE.

## APPARATUS FOR TREATING GARBAGE, &c.

SPECIFICATION forming part of Letters Patent No. 581,616, dated April 27, 1897.

Application filed December 7, 1896. Serial No. 614,748. (No model.)

*To all whom it may concern:*

Be it known that I, WINFIELD S. RICHARDSON, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Apparatus for the Treatment of Garbage or other Waste Material, of which the following is a specification.

My invention has relation to an apparatus for the treatment of garbage or other waste material, and in such connection it relates particularly to the construction and arrangement of the apparatus whereby the material is dried and coked therein, the valuable and noxious gases, vapors, or the like are recovered from the coked matter, and the same and certain gases utilized, as fuel, in the coking of further matter.

The principal objects of my invention are, first, to provide an apparatus for the treatment of garbage and other waste matter comprising a furnace having a long flue or oven connecting the same with a stack and with an endless conveyer adapted to travel in the flue to receive the matter to be treated and to expose the same while in the flue to the heated gases from the furnace; second, to provide in such an apparatus, in connection with the flue and a traveler-conveyer, a muffle or receptacle arranged at one end of the flue and adapted to receive and discharge the matter after treatment to the furnace; third, to provide in such an apparatus, in connection with the furnace and its flue, a stack into which the flue discharges and a sprayer or atomizer located within the stack and adapted to discharge against the inner walls of the stack a thin film of water or vapor; fourth, to provide in such an apparatus, in connection with the furnace, the flue and the conveyer traveling therein, a pipe or series of pipes leading from the flue to the furnace and adapted to convey the gases arising from the conveyer in the flue directly to the furnace to be used as fuel therein.

My invention, stated in general terms, consists of an apparatus for treating waste matter constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and general scope of my inven-

tion will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a longitudinal central section of an apparatus embodying main features of my invention. Fig. 2 is a top or plan view of the apparatus, partly broken away. Fig. 3 is a cross-sectional view on the line  $xx$  of Fig. 2.

Referring to the drawings, A represents a furnace of ordinary construction, having the grate  $a$  and the fire-chamber  $a'$ . Back of the chamber  $a$  is arranged a chamber  $a^2$  for the reception of fuel, and this chamber  $a^2$  communicates with the chamber  $a$  through an opening  $a^3$ . The floor  $a^4$  of the chamber  $a^2$  is sloping or inclined and is designed to permit of the gradual movement of the fuel to the fire-chamber  $a'$ . At the upper portion of the chamber  $a^2$  is provided an opening  $a^5$ , communicating with a horizontally-arranged flue or oven  $b$ . Within the chamber  $a^2$  is also located a muffle or receptacle  $d$ , adapted to be turned or dumped by means of the shaft  $d'$  and winch  $d^2$  or other preferred means.

Within the horizontal flue or oven  $b$ , at either end thereof, are located the driving-sprockets  $e$  and  $e'$ , one of which,  $e$ , is driven by a shaft  $e^2$ , pulley  $e^3$ , and belt  $e^4$  from the main driving-shaft  $e^5$ . Over the sprockets  $e$  and  $e'$  is adapted to travel an endless conveyer chain or band  $f$ , of any suitable construction and adapted to receive and carry the material to be treated. This conveyer is so arranged that on turning the sprocket  $e$  it will discharge its contents into the muffle  $d$ , as indicated in Fig. 1.

At that end of the flue opposite to where the conveyer  $f$  discharges a suitable opening normally closed by doors  $b'$  is provided for the purpose of discharging the garbage or other waste material to the conveyer  $f$ . The flue or oven  $b$  is separated by a partition or flooring  $b^2$  into two horizontal compartments, in the lower one,  $b^3$ , of which the hot gases from the furnace A are conducted, and the empty portion of the conveyer  $f$  travels in this lower compartment. In the upper compartment  $b^4$ , which by preference does not communicate with the lower compartment  $b^3$ , the

filled portion of the conveyer travels from the doors  $b'$  until the conveyer discharges into the muffle or tilting hopper  $d$ . The lower compartment  $b^3$  discharges into a stack or chimney B. Within this chimney B and at or near its upper end is provided a rose or sprayer  $B'$ , arranged to discharge against the inner walls of the stack B a thin film or spray of water to protect the same from the corrosive action of certain waste gases arising from the treated material, which may be discharged to the stack, as hereinafter fully explained. The sprayer  $B'$  also serves to collect and precipitate certain chemicals into the waste and flue gases, which precipitates and liquid from the sprayer may be drawn off from the base of the stack through the pipe  $B^2$ . The sprayer also prevents in a large measure the escape from the stack of various stenches arising from the treatment of the waste material or substances.

Above the tilting hopper or muffle  $d$  is formed a hooded extension or pocket  $d^4$  of the upper compartment  $b^4$ . This hood  $d^4$  is connected by one or more pipes  $h$  with a pipe  $h'$ , leading to the fire-compartment  $a'$ . These pipes  $h$  are furnished with valves  $h^2$ , which when opened permit of the escape of gases, &c., into the hood or pocket  $d^4$  to the furnace for consumption therein. The upper compartment  $b^4$  also communicates by means of the pipes  $l$  with one or more saturators D. These saturators consist, preferably, of a tank  $m$ , lined with lead or other suitable material and partially filled with sulfuric acid. From each of the saturators D extends a pipe  $n$ , leading to the lower flue-compartment  $b^3$ .

The operation of the apparatus illustrated and described is as follows: The conveyer  $f$  receives the garbage or waste matter below the doors  $b'$  and conveys it slowly through the oven  $b$ , which is highly heated by the gases in the flue-compartment  $b^3$ . The material by the time it reaches the furnace end of the oven is completely dried and charred or coked. During its travel in the oven the gases and vapors driven off may be disposed of in one of two ways—namely, they may escape when the valves  $l^2$  on pipes  $l$  are closed and only the valves  $h^2$  are opened from the hood  $d^4$  directly to the pipe  $h'$ , from which they are fed into the furnace A, or when the valves  $l^2$  are opened the vapors and gases are first conducted through the saturator D, in which the available ammoniates are precipitated and from which the waste may be fed to the stack through the flue-compartment  $b^3$ . In this latter case if the valves  $h^2$  are opened some of the gases arising from the compartment  $b^4$  in the hood  $d^4$  may escape to the furnace. The disposition of the gases and vapors will depend largely upon the character of the waste matter to be treated. If the matter is rich in ammonia, then the gases and vapors should be passed through the saturators, so that the sulfuric acid may precipitate the ammonia in the form of sulfate of ammo-

nia. Again, if the matter is rich in hydrogen, then the gases should be fed to the furnace A to be consumed as fuel. When, however, the matter is neither rich in hydrogen nor in ammonia, it may be advisable to discharge the vapors and gases to the stack.

When the coked material reaches the end of the oven above the muffle  $d$ , it is discharged into the same and further heated until such gases as remain in the coked material are either wholly or partially driven off and led through the pocket or hood  $d^4$  and pipe  $h'$  to the furnace A to be consumed therein. The coked material is then dumped by operating the winch  $d^2$  upon the inclined floor  $a^4$  of the chamber  $a^2$ , from which it either may be removed or else fed into the fire-chamber  $a$ .

With the garbage or other matter deposited on the conveyer there may be mixed, if desired, a quantity of soft coal or other fuel, which with the material will be also coked prior to the deposition of the mixture into the muffle  $d$ .

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

1. In an apparatus for the treatment of garbage or other waste matter, a furnace or other source of heat having an oven heated thereby, an endless conveyer for the matter adapted to travel through said oven, and a muffle adapted to be heated by said source of heat, substantially as and for the purposes described.

2. In an apparatus for the treatment of garbage or other waste matter, a furnace or other source of heat having an oven, endless means upon which the matter is adapted to be introduced and moved in said oven, and a muffle adapted to be heated by the source of heat, said means adapted to discharge the treated matter into said muffle, substantially as and for the purposes described.

3. In an apparatus of the character described, a furnace having an oven heated thereby, a conveyer upon which the material is adapted to be treated and traveling within said oven, a muffle located at the discharge end of said conveyer and adapted to receive said material, and means for tilting said muffle to discharge its contents into the furnace, substantially as and for the purposes described.

4. In an apparatus of the character described, a furnace or other source of heat, a flue divided into two compartments and having no direct communication with each other, a conveyer adapted to receive the material to be treated and to travel through the upper flue-compartment, a connection between the furnace and lower flue-compartment, a connection from the upper flue-compartment to the furnace-chamber, a muffle adapted to be heated by said source of heat, and means for discharging the contents of said muffle into said furnace, substantially as and for the purposes described.

5. In an apparatus of the character described, a furnace or other source of heat divided into two chambers, of which one is directly above the grate and the other back of the first chamber and communicating therewith, a flue extending from the rear chamber to the stack, an endless conveyer traveling in said flue and adapted to receive the waste, a hopper into which said conveyer discharges, said hopper being suspended within the rear chamber of the furnace, and means for discharging the waste from said hopper into the rear chamber, substantially as and for the purposes described.

6. In an apparatus of the character described, a furnace or other source of heat provided with an oven heated thereby, movable receiving means for waste or other matter adapted to travel therethrough, a muffle adapted to be heated by said source of heat, said means adapted to discharge the treated matter into said muffle, a stack connected with said furnace having a sprayer or atomizer therein for protecting the stack against the furnace-gases and permitting of the con-

densing thereof, substantially as and for the purposes described.

7. In an apparatus of the character described, a furnace or other source of heat divided into two chambers, of which one is directly above the grate and the other back of the first chamber and communicating therewith, a flue extending from the rear chamber to the stack, an endless conveyer traveling in said flue and adapted to receive the waste, a hopper into which said conveyer discharges, said hopper being suspended within the rear chamber of the furnace, means for discharging the waste from said hopper into the rear chamber, and a pipe connecting said hopper with the front compartment of the furnace, 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:

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THOMAS M. SMITH.