

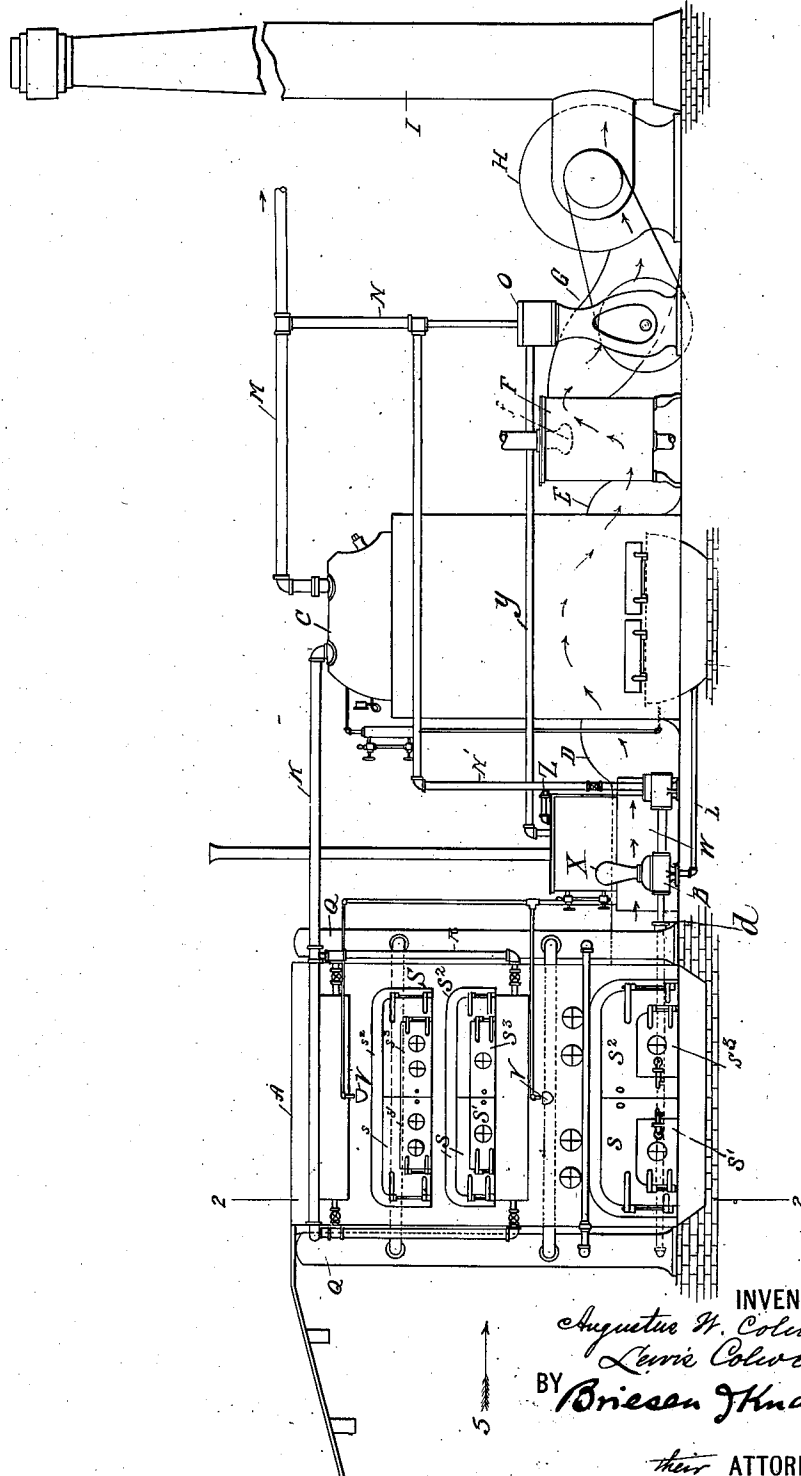
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A. W. & L. COLWELL.
REFUSE CREMATORY.

No. 583,566.

Patented June 1, 1897.



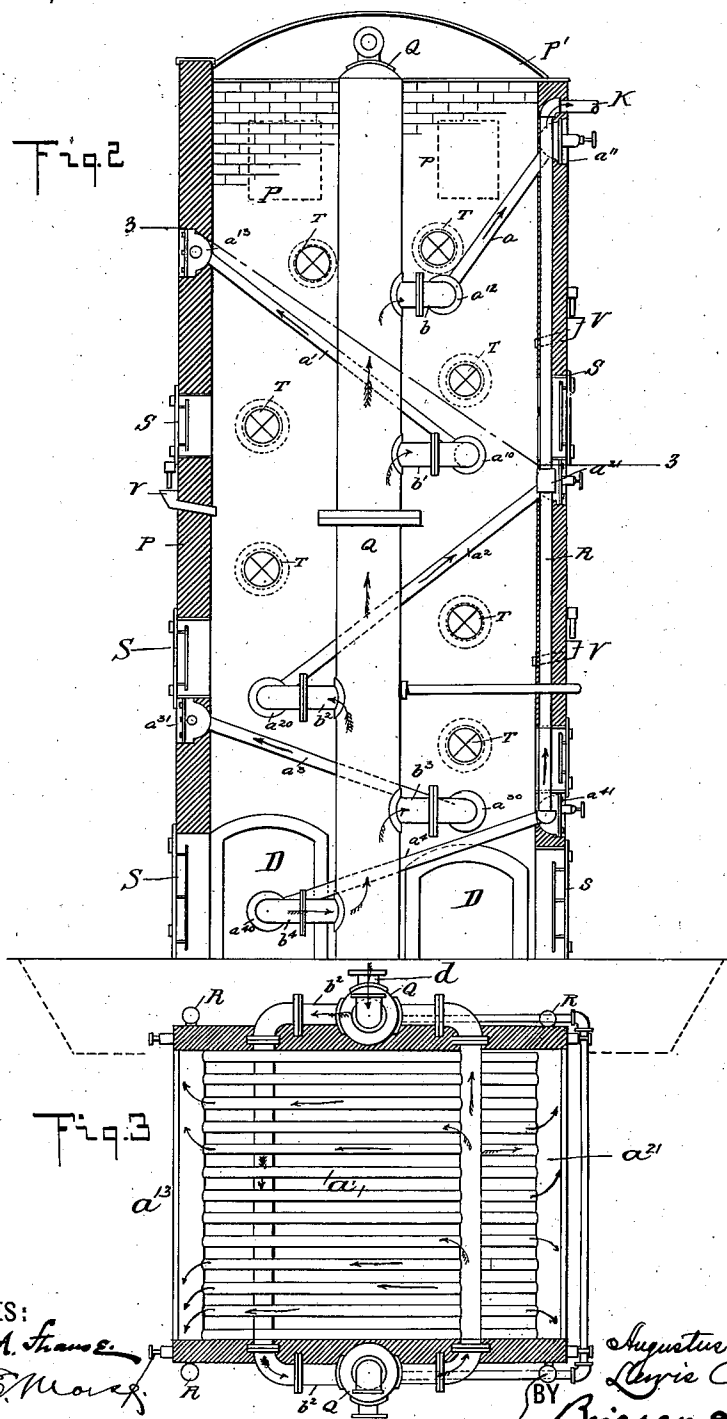
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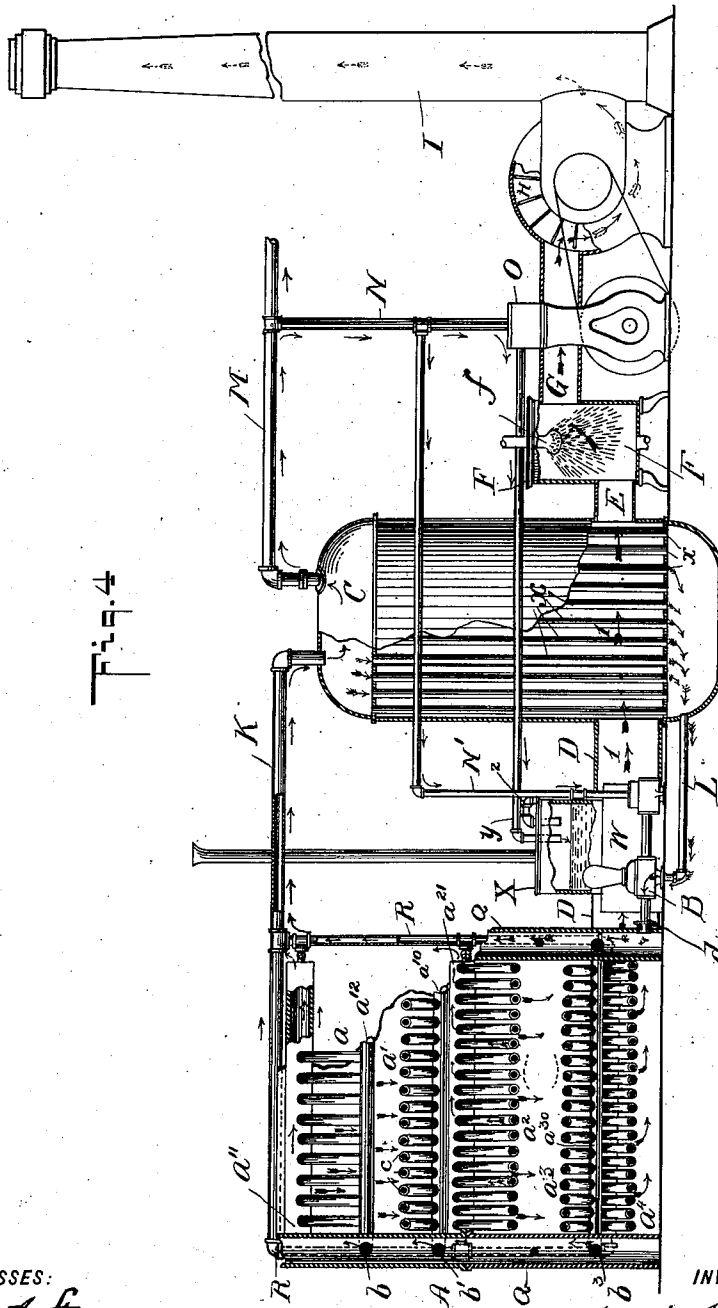
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UNITED STATES PATENT OFFICE.

AUGUSTUS W. COLWELL AND LEWIS COLWELL, OF NEW YORK, N. Y.

REFUSE-CREMATORY.

SPECIFICATION forming part of Letters Patent No. 583,566, dated June 1, 1897.

Application filed April 1, 1895. Serial No. 543,963. (No model.)

To all whom it may concern:

Be it known that we, AUGUSTUS W. COLWELL and LEWIS COLWELL, residents of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Destroying Refuse, of which the following is a specification.

Our invention relates to refuse-crematories; and the object thereof is to produce an efficient cremation or destruction of garbage or other waste matter without the aid of fuel except to give an initial ignition to the first charge and to cause a complete consumption of the noxious gases derived from the garbage, the burning of such gases aiding in the destruction of the garbage.

Our invention consists in the apparatus hereinafter set forth and claimed.

Our invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal elevation of the entire apparatus. Fig. 2 represents an elevation of the garbage-crematory proper, of somewhat different proportions from that represented in Fig. 1 to more clearly represent the parts, with the walls thereof shown removed on the line 2 2 of Fig. 1 and looking in the direction of the arrow 5. Fig. 3 is a horizontal sectional view of the same on the line 3 3 of Fig. 2, the stand-pipes being shown in full lines; and Fig. 4 is a central longitudinal sectional view of the entire apparatus with parts broken away.

We will first have reference to Figs. 1 and 4 of the drawings, wherein the entire apparatus is shown, and will describe the apparatus in general terms. In these figures A represents a suitable garbage-crematory proper. (Shown in detail in Figs. 2 and 3.) This crematory proper acts as a combined crematory and primary steam-generator, the steam-generator being supplied with water as by means of a pump B. A boiler is represented at C, which may be of any ordinary or preferred construction, between the tubes x of which the products of combustion from the crematory A proper pass, a flue D connecting the crematory proper, A, and the boiler C. A flue E connects the boiler C with a suitable separator or washer F, and a flue G connects the washer or separator F with an exhaust-fan

II, which communicates with a stack I by a suitable flue, and thus maintains an induced downdraft through the crematory proper. The primary generator in the crematory proper (which will be hereinafter more fully described) is connected to the boiler C by the pipe or pipes K. The boiler C is also connected to the primary generator through the medium of a pipe L in communication with the pump B. This pump B, in addition to supplying the primary generator with water for evaporating purposes, also serves to maintain a balance of water between the generating-grates of the crematory and the boiler C. A steam-pipe M leads from the boiler C and serves to convey steam from said boiler C to be used for any suitable industrial purpose. Part of this steam is conducted from the pipe M by pipes N N' to operate an engine O of any suitable type, which engine serves to drive the exhaust-fan II, which produces the induced draft, and also to operate the pump B. Pipes y z are exhaust-pipes from the engine O and pump B, respectively, which communicate with the condenser X. This condenser may be connected with the pump B in any suitable manner (not shown) to form a hot-water supply for the primary generator. We will now proceed to describe in detail the construction of the crematory proper and the primary steam-generator.

The walls P P, of fire-brick or other fire-resisting material, form a chamber which is designated as the crematory proper, A, and which may be capped by a blast-furnace top or hood P', if desired. Alongside of one or more of these walls is placed one or more stand-pipes Q, which stand pipe or pipes are supplied with water from the pump B by a suitable pipe through the connection d , and which in turn are connected to the lower manifold or water manifolds of the sets of grate-bars a , a' , a^2 , a^3 , and a^4 by connections b , b' , b^2 , b^3 , and b^4 . Each of these grates consists of a series of water-tubes, which communicate with water-supply manifolds a^{10} a^{12} a^{20} a^{30} a^{40} at their lower ends, and at their upper ends are in communication with water-box headers a^{11} a^{13} a^{21} a^{31} a^{41} in their respective sets or series. These water-box headers are connected at their ends to take-off pipes R, which convey portions of the heated water

and steam up to pipe K and to the upper end of the boiler C, where the steam and water separate, the water being received in the boiler for the further generation of steam therein and to be again conveyed to the water-grate bars, while the steam may be used in the manner described. It will be noted that the grate-bars of the different series project from opposite sides of the crematory and that the grate-bars of the series *a* are inclined at quite a steep angle. The grate-bars of the series *a'* are inclined at an angle a little less steep than those of the series *a*, and so on to the bottom, where the series or set of grate-bars *a⁴* will be found to be only slightly inclined, and here the coal and garbage or other material to be burned will rest longest or until it has been entirely consumed, the noxious gases being likewise consumed in this, which is the last and hottest fire. The grate-bars of the set or series *a* are set farther apart than those in the series *a'*, and those in the series *a'* are set farther apart than those in the series *a²*, and so on to the bottom of the crematory proper. This inclination of the grate-bars insures the thorough stirring up of the garbage and produces a separation of the larger and more incombustible portions of refuse therefrom. These large incombustible bodies, such as tin cans, &c., may be removed through the doors facing the lowest portion of the highest grates.

Placed at intervals along the walls P of the crematory proper are sectional doors S of any desired number, through which doors fuel or garbage may be fed or the condition of the interior of the crematory proper inspected. These doors are, as aforesaid, sectional, and consist of several small door-sections *s s' s² s³*, which may be opened individually or all together, as desired. Suitable ports T are provided in the walls of the crematory, which are ordinarily closed by suitable manhole-covers, which covers may be removed, so that a suitable portable funnel or tube may be inserted and the nozzle thereof placed near any dead place in the fire, and owing to the induced draft a jet of air will be drawn against such dead spot, which will instantly begin to burn, so that dead spots may be fired and broken up. We may also provide suitable oil-jets V V, (see Fig. 1,) which are supplied with oil from a suitable source, as the tank W, by suitable means. (Not shown.) These oil-jets or carbureting-burners may be used at any desired time to assist the operation.

The crematory proper is shown in Figs. 1 and 4 as open at the top and connected with the flue D at its bottom, so that the induced draft will be downward, but this arrangement may be reversed, if desired, or the flue D may be connected to the crematory proper at any other suitable place. With the crematory arranged, as in the present instance, with a downdraft, the operation is started by producing a fire of coal or wood or other com-

bustible upon the lower series or sets of grate-bars or the one above it, or both. As soon as the fire is burning fiercely garbage is dumped into the top of the crematory proper and passed down to the bottom over the superposed sets or series of grate-bars, and during such passage is dried and stirred up, so that it reaches the main fires beneath in a fit condition for burning, and the hydrocarbon gases created are likewise carried downward to the last fire, where they are ignited and give an intense heat, which is utilized to burn the refuse subsequently conveyed to the fires and to cause a second generation of steam in the boiler. The garbage catches fire and burns, the burning being assisted by the induced draft, and as it burns falls down to the lower sets or series of grate-bars and finally falls into the bottom of the crematory when it has been completely burned. After the initial firing it is not necessary to use any more coal or wood or any combustible to assist the burning, but the refuse itself by burning fiercely in the lower part of the crematory proper burns the refuse above it, that which drops, and henceforth forms the sole combustible material for carrying on the process. As this operation continues steam is generated in the generator or grate-bar tubes and passes over into the upper portion of the boiler C by the pipe K, and, mingling with the steam in this boiler, passes into the supply-pipe M, the water carried with the steam passing through the boiler-tubes and passing to the lower portion, from which it is forced to the stand-pipes, and a circulation of water between the primary generator and boiler is thereby maintained.

The products of combustion from the crematory proper, A, pass, by means of the duct D, between the tubes of the boiler C, as shown by the arrow 1 in Fig. 4, and generate steam in this boiler, so that there is no waste of caloric. These gases from the crematory proper, having passed through the boiler C, now having most of the caloric absorbed, are comparatively cool and preferably pass by the duct E into a scrubber or washer F, which is provided with a rose-spray nozzle *f*, the spray from which condenses and in some cases absorbs the gases. By this time the gases are sufficiently cool to be safely passed into the blower H through the duct G, whence they are projected up the stack I. The gases having been entirely deodorized by passing through high temperature are delivered from the stack I quite innocuous at a considerable height. The water from the scrubber or washer F may be used for industrial purposes, and the ash, which may be removed from suitable ash-doors, is very rich in phosphates and other fertilizing elements and will be found to be a valuable fertilizer, or it may be used for cement, rubble-filling, &c.

It will be quite obvious that the construction of the various parts of the apparatus may be varied.

It will be observed that by the preferred

form of our invention an induced downdraft is maintained through the refuse in the crematory proper and that the liquid-circulatory system arranged therein is adapted to conduct heat from the lower part of the crematory to the upper part thereof, so that this heat may be utilized for drying the refuse matter first introduced, at the same time allowing the products of combustion and the ignited gases from the garbage to be dissipated through the refuse without being choked by such refuse or having the draft interfered with, a portion of such products of combustion and ignited gases being utilized to heat the water in the boiler.

Having now fully and in detail described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A crematory having series of inclined water-tube grates, the several series being superposed and inclined at different degrees of inclination, the uppermost series being at the greatest inclination and the tubes of one series being differently spaced from those of the next series and projected only a portion of the distance across the crematory in opposite directions, the spacing between the tubes of the uppermost series being greater than that of the other series, substantially as described.

2. A crematory having a combustion-chamber containing a series of fuel-supports located one above another so that the refuse may fall successively from one support onto another and means for effecting a draft downward through the series of supports, substantially as described.

3. In a crematory, the combination of series of superposed grates, means for causing a downdraft to traverse each grate in succession, one or more oil-burners located in proximity to the grate or grates, the said oil burner or burners forming auxiliary burners for the said grates, and means for directing a blast upon any individual grate, substantially as described.

4. In a cremating apparatus, the combination of a crematory proper, a primary steam-generator and fuel-support located therein, a boiler forming a secondary steam-generator located in proximity to the crematory, steam and water connections between the primary steam-generator and the boiler, whereby a circulation of water can be maintained between the boiler and the primary steam-generator; and means for leading the products of combustion from the crematory through the boiler direct to generate steam therein, substantially as described.

5. In a cremating system, the combination of a crematory proper, a primary steam-generator and fuel-support contained therein, a boiler, steam and water connection between the steam-generator and boiler, an exhaustor, and a duct connecting the exhaustor and the boiler, as set forth.

6. The combination of a primary steam-generator consisting of water-grates, a stand pipe or pipes, connections between each grate-bar and the stand pipe or pipes, a boiler and connections between the boiler and stand-pipe, and between the boiler and primary generator, whereby efficient circulation is had, substantially as described.

7. In a crematory, the combination of a primary steam-generator and fuel-support comprising a plurality of water-tube grates located one above the other and means for maintaining a downdraft to convey the heat from the uppermost fire on the grates through the series, as specified.

8. A primary steam-generating crematory having several series of stationary inclined water-tube grate-bars located one above the other and on opposite sides of the crematory and discharging one onto the other.

9. In a primary generator, the combination of a plurality of water-supply stand-pipes, water-grate bars which constitute the fire-grates, connections between the water-grate bars and each stand-pipe, and a header connected to the upper end of the water-grate bars.

10. In a crematory apparatus, the combination of a crematory proper, a primary steam-generator consisting of a series of water-grates contained in said crematory proper, a boiler, steam and water connections between said boiler and the primary steam-generator, a pump in communication with said connections for maintaining a circulation between the boiler and primary steam-generator and for supplying the same with water, and means for conveying the products of combustion from the crematory proper to the boiler, substantially as described.

11. In a cremating apparatus, the combination of a crematory proper, a primary steam-generator consisting of a series of water-grates contained in said crematory proper, stand-pipes connected with said water-grates, a boiler, steam and water connections between said boiler and the stand-pipes, a pump in communication with said connections for maintaining a circulation between the boiler and primary steam-generator and for supplying the same with water, and means for conveying the products of combustion from the crematory proper to the boiler, substantially as described.

12. The combination of a furnace having inclined hollow grates and a smoke-outlet near its bottom, a fluid-circuit including said grates and a boiler, the boiler being situated within the path of the products of combustion, whereby the heat of the flame and the escaping products of combustion are utilized for drying the refuse on its way through the furnace.

13. The combination of a downdraft, cremation-furnace having a duct leading therefrom for the escape of products of combustion.

tion, hollow grates within the furnace, a heat-absorbing device within the duct, and a conduit for a heat-vehicle leading from said heat-absorbing device to the hollow grates,
5 whereby the refuse material within the furnace may receive heat from the escaping products of combustion.

The foregoing specification of our improve-

ments in refuse-crematories signed by us this 26th day of March, 1895.

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LEWIS COLWELL.

Witnesses:

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