

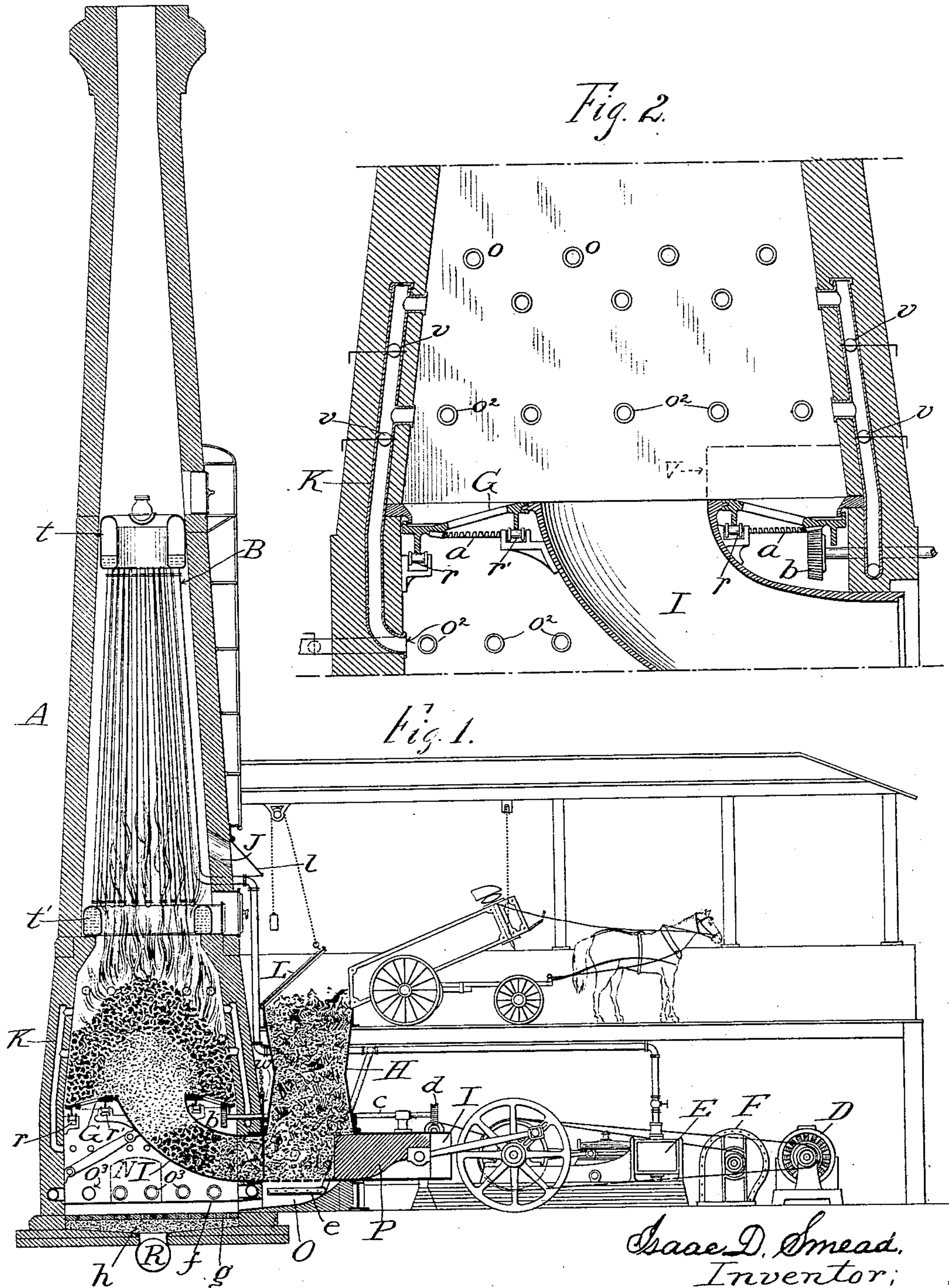
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Patented July 19, 1898.

I. D. SMEAD.  
GARBAGE FURNACE.

(Application filed Dec. 14, 1897.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## GARBAGE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 607,553, dated July 19, 1898.

Application filed December 14, 1897. Serial No. 661,837. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC D. SMEAD, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have  
5 invented certain new and useful Improvements in Garbage-Furnaces, of which the following is a specification.

My invention relates to crematories or furnaces for burning garbage; and the invention consists, primarily, in the method and  
10 means for feeding the garbage, together with the fuel, from below upward into the furnace, in means for filtering and purifying the fluid drained from the garbage, in providing the  
15 furnace with a forced blast and means for generating steam to operate the various parts, and in various details of construction, as hereinafter more fully set forth.

Figure 1 is a longitudinal vertical section  
20 of the entire apparatus, and Fig. 2 is a similar view of the furnace-chamber on a larger scale.

The object of this invention is to produce a furnace that will successfully burn garbage  
25 and at the same time generate steam-power to feed the garbage and fuel to the furnace, supply a blast, drive a dynamo for furnishing light or power, and treat the liquid drained from the garbage and filter the same, and  
30 that can be operated without being a nuisance to the neighborhood.

To construct a furnace on my plan, I build the same in the form of a large smoke-stack, as indicated by the letter A, Fig. 1, the furnace-chamber proper being located near the  
35 bottom of said stack, which is enlarged for that purpose. Within this chamber I mount a circular rotating grate G, as shown more clearly in Fig. 2. This grate has an opening  
40 at its center to receive the mouth of a curved chute I, through which the garbage and fuel are forced upward into the chamber, as indicated in Fig. 1, the grate being mounted on  
45 rollers *r*, as shown in Fig. 2, and provided on its under side with cogs or teeth *a* to engage with a pinion *b* to impart motion to the grate, as hereinafter described.

An opening with a door, as indicated at V, Fig. 2, will be made in the stack on a level  
50 with the top of the grate for the twofold pur-

pose of giving access for repairs to the grate and other parts when necessary, and also for the removal of any solid or non-combustible substances which may be in the garbage or be  
55 formed by the fire, such as pieces of metal, stones, slag, and the like.

Within the walls of the furnace I locate a series of blast-pipes K, these pipes being provided with annular rows of twyers arranged  
60 at various heights, as indicated at *o*, *o'*, and *o''*, the two former rows being at different heights above the grate and the row *o''* being below the grate. The object of this arrangement is to enable the blast to be applied at  
65 such point or points as is found to give the best results and to enable the application of the blast to be changed at will to suit the varying conditions which may arise from time to time.

When the twyers are connected to the vertical pipes K, as shown, valves or dampers *v*  
70 will be located in the supply-pipes K, as indicated in Fig. 2, whereby the blast through each row of twyers can be regulated or shut off entirely at will.

It is obvious that instead of arranging the supply-pipes vertically they may be arranged  
75 circularly, one pipe for each row of twyers, each of these pipes being connected to the main supply-pipe separately, in which case a single valve or damper in each connecting-pipe will suffice for each row of twyers. It is also obvious that the supply-pipes may be located upon the exterior of the wall; but it is  
80 preferred to locate them in the wall around the furnace, so that the air as it enters will be heated more or less. I have also shown a fourth row of twyers *o'''*, larger than the others, opening into the space below the grate near  
85 the bottom, this row to be connected to a separate supply-pipe provided with a valve, so that it may be used or not, as circumstances may require.

In constructing a furnace the air-blast pipes may be arranged in various ways, the object  
95 being to apply the blast at various heights and to control it at these different heights at will, and therefore any arrangement of the parts which will accomplish these objects is within the scope and spirit of this part of my  
100



invention Within the stack above the grate I locate a boiler B, as shown. This boiler may be composed of a series of tubes connected at top and bottom by annular shells *t* and *t'*, as shown in Fig. 1, or it may be composed of continuous annular shells, as may be preferred, it being so set as to permit the heat to impinge upon both its exterior and interior surfaces. Being thus located and of large capacity, this boiler will produce sufficient steam to operate the devices for feeding the material and fuel to the furnace, rotate the grate, operate a fan or air-compressor for the blast, and also electric apparatus for furnishing light or power or for other purposes. An engine E is located at one side, as shown in Fig. 1, and to this is connected a fan or blower F, which furnishes the air-blast, which is conveyed to the twyers by any suitable arrangement of pipes. (Not necessary to be shown.) In proximity to the fan is also located a dynamo D, also driven by the engine.

Close to one side of the furnace I locate a vertical hopper H, as shown, to receive the garbage and fuel. At its bottom this hopper opens into a horizontal chute or large pipe I, which extends through the wall into the ash-pit, from which point it is curved upward and connects with the central opening in the grate G, as shown in Figs. 1 and 2. A plunger or follower P is fitted within the outer portion of the chute I and is connected to the engine in such a manner as to impart to the plunger a reciprocating motion, whereby the garbage and fuel from the hopper are forced up into the furnace, as shown in Fig. 1.

It will be observed that the curved portion of the chute I is gradually enlarged in diameter as it approaches the grate to prevent the material from becoming jammed or clogged therein and enable the same to pass through it more readily. The plunger may be arranged to operate continuously or only at intervals, as may be desired.

Directly under the hopper the chute I is provided with a series of perforations to permit the liquid portions of the garbage to drain out into a tight pit O below, from whence it flows onto a filter-bed in the base of the stack, said filter consisting of a bed of sand, (indicated by the letter *h*,) and which is preferably covered with a loose layer of bricks *g* to enable the more ready removal of any accumulations that may occur, the same being removed through a door or opening at one side. (Not shown.)

To enable the fluid portion to be squeezed out of the garbage, I place a valve or gate *w* in the chute I close to or alongside of the hopper, as shown in Fig. 1. This valve is arranged to be closed or opened at will and will be provided with the necessary means for that purpose, a screw-stem and hand-wheel being a suitable and well-known means and which therefore need not be shown. By closing this valve or gate and moving the plunger the material between it and the end of the plun-

ger can be subjected to any degree of pressure required, the movement of the plunger of course being regulated by the engineer or attendant in charge. By this means all or nearly all the liquid portion of the garbage can be expelled, it passing off through the perforations above mentioned, and thus the material is presented to the furnace in a much better condition for combustion.

A metallic plate *f* separates the ash-pit from the filter underneath, and from this plate the ashes can be removed through a door N at one side, as indicated by dotted lines in Fig. 1.

The drain-pit O, and also the receptacle for the filter, will be made of cement or similar impervious material, and both will have their bottoms inclined, as shown, so that the fluid will flow from the pit to the filter, and thence to a drain-pipe R, by which it may be conveyed to any desired point.

Within the drain-pit and directly under the perforated portion of the chute I, I locate one or more perforated pipes *e*, through which jets of steam are injected to destroy any germs which may be contained in the fluid drained from the garbage; or, instead of steam, a disinfecting fluid may be injected through said pipe, and this, in connection with the filter, will render the drainage both harmless and inoffensive.

A suitable platform is provided upon which the vehicles containing the garbage and fuel may be drawn, so that the material may be dumped direct from the vehicles into the hopper, as shown in Fig. 1. If carts be used, as is the general custom, they will be backed up to the hopper and tilted in the usual manner. If wagons be used, as represented in Fig. 1, the front end of the box may be raised by any suitable hoisting device, as indicated, and the contents emptied into the hopper.

The hopper is provided with a counterbalance-lid L, which can be closed the moment the load is dumped to prevent the spread of noxious odors. Preferably the platform will be inclosed in a small building, and at the end next to the stack an opening J is formed in the stack, through which a strong draft will be produced by the draft of the stack, thereby drawing any odors or gases there may be into the stack, where they will be consumed or destroyed. This opening J is provided with a hinged lid or door *l*, by which it can be closed when desired. Doors or openings are also provided opposite the top and bottom of the boiler to afford access to the same.

It will of course be understood that the boiler will be provided with the customary appliances, such as safety-valve, gages, &c., and means provided for keeping it supplied with water.

As shown in Fig. 1, motion is imparted to the grate by means of a pinion *b*, secured to a shaft *c*, upon the opposite end of which is a worm-wheel *d*, driven by a screw operated



from the engine. By means of suitable well-known mechanical devices these may be made to rotate in either direction or remain stationary at will, thus moving the grate in either direction or letting it remain stationary; but as these are matters of ordinary mechanical knowledge I have not thought it necessary to show them.

In operation the fuel and garbage are both placed in the hopper, the fuel being put in at intervals, so that it will be intermingled with the garbage, and thus both will be fed into the furnace together.

In starting the furnace fuel alone will be used until enough steam is raised to operate the feeding-plunger, after which the garbage with fuel intermixed will be fed in and the operation be made continuous.

The fire is rendered intense by the strong blast, and as all the odors and gases arising from the burning garbage are compelled to pass directly upward through the flame and heat the entire height of the tall stack they are effectually burned or destroyed, thereby preventing the spread of noxious vapors, which is one of the serious objections to the location of garbage-furnaces in cities.

As the feeding of both the garbage and the fuel to the furnace is automatically accomplished by the power generated by the heat of the furnace, the labor of attending it is reduced to the minimum and the furnishing of surplus power for lighting or other purposes still further reduces the expense and renders the apparatus very desirable.

Having thus fully described my invention, what I claim is—

1. A garbage-crematory comprising a vertical stack, a furnace-chamber in the lower

portion of said stack, a horizontal rotary grate in said chamber, an annular vertical boiler located within the stack above the furnace-chamber, a hopper for the reception of the material, a curved chute leading from the hopper below to the furnace-chamber above, a reciprocating plunger or follower in the horizontal portion of said chute, and an engine for operating said plunger, all being combined and arranged to operate substantially as and for the purpose set forth.

2. In combination with the furnace-chamber and hopper, the curved and perforated chute provided with a valve or gate and a reciprocating plunger, all arranged to operate substantially as shown and described, whereby the fluids may be expressed from the material while in said chute, and then be forced upward through the same into the furnace as set forth.

3. An apparatus for treating garbage, comprising a perforated receptacle for separating the fluid from the solid portion, a pit or receptacle arranged to receive the fluid portion, one or more pipes located and adapted to inject steam or disinfectants into the fluid as it is separated from the solids, a filter arranged to receive and filter the fluid as it passes from the pit or receptacle, with a drain or outlet arranged to conduct away the filtered fluid, the said parts being arranged for joint operation, substantially as set forth.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ISAAC D. SMEAD.

Witnesses:

L. A. WILLOUGHBY,  
EDWIN P. BOYD.