

(No Model.)

3 Sheets—Sheet 1.

N. DOWLING.
APPARATUS FOR BURNING GARBAGE.

No. 533,448.

Patented Feb. 5, 1895.

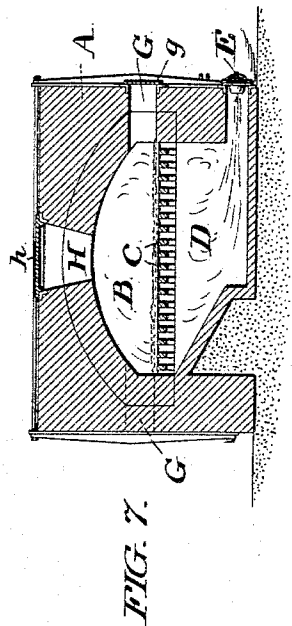


FIG. 7.

WITNESSES:

F. Norman Dixon
Thos. K. Lancaster.

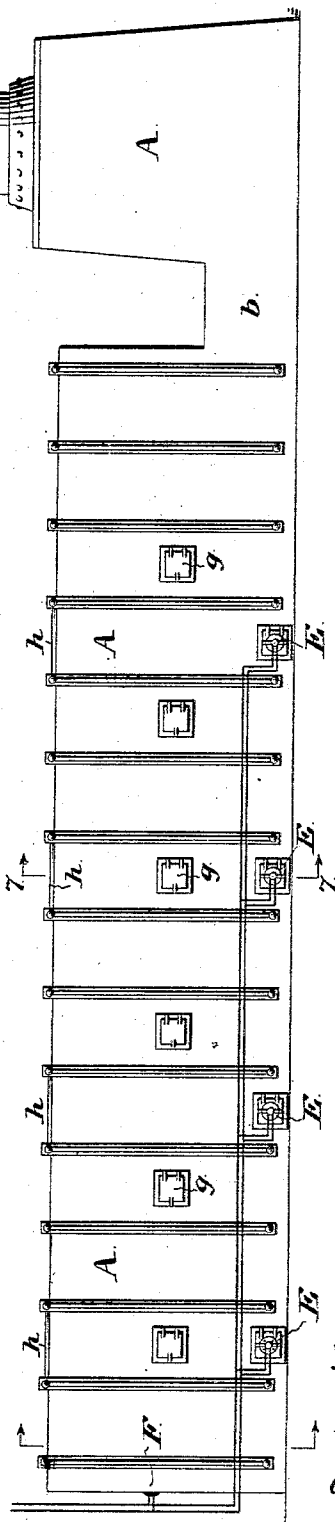


FIG. 1.

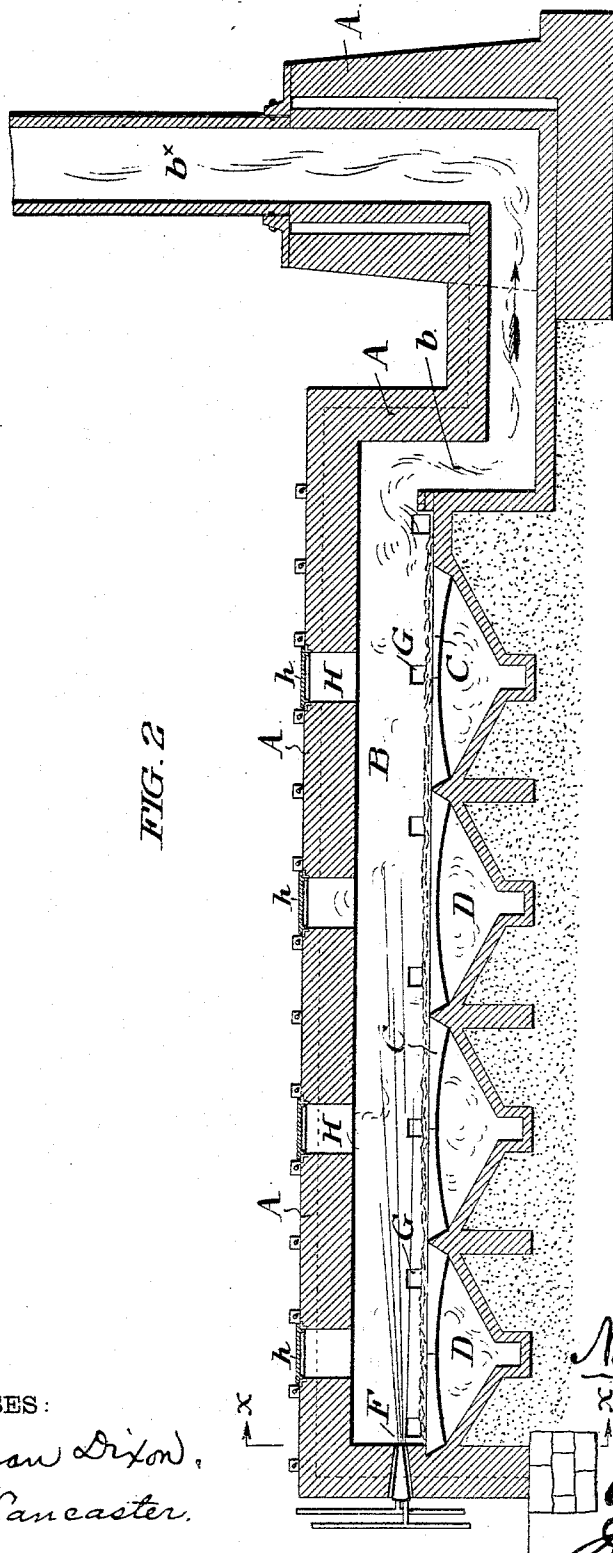
North Dowling
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FIG. 2



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FIG. 6.

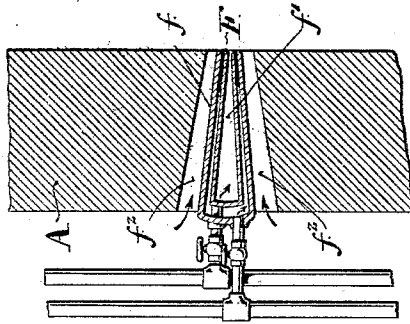


FIG. 3.

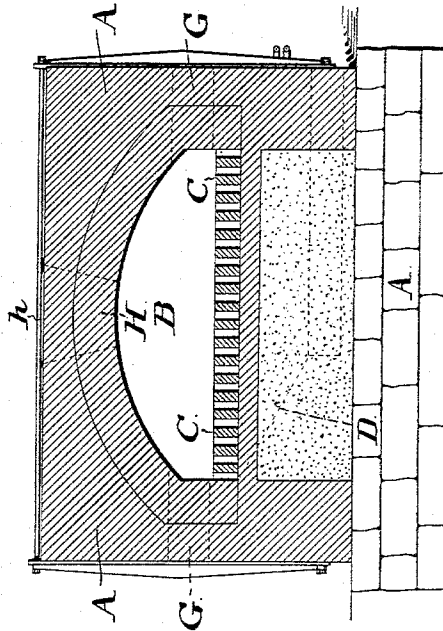
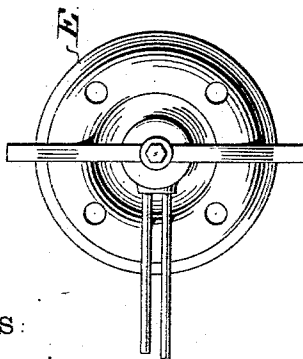


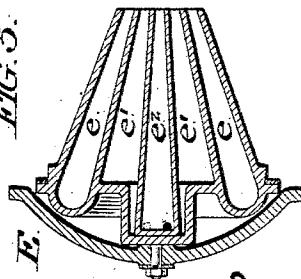
FIG. 4.



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FIG. 5.



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UNITED STATES PATENT OFFICE.

NORTH DOWLING, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR BURNING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 533,448, dated February 5, 1895.

Application filed April 2, 1894. Serial No. 506,022. (No model.)

To all whom it may concern:

Be it known that I, NORTH DOWLING, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Burning Garbage, of which the following is a specification.

My invention relates in general to operations of, and furnaces for, the incineration or cremation of garbage and kindred refuse matters, its object being to effectually decompose and completely consume the substance or body of the garbage, and at the same time to decompose and dissipate all gases and vapors generated in the initial heating and final incineration, and cause them to pass off as carbonic acid and hydrogen gases, free from such odors and noxious vapors as result from imperfect cremation. These results, to state it generally, are accomplished by subjecting the garbage upon the hearth of a highly heated furnace to the direct action of flame caused to traverse the bed of garbage and to more or less directly impinge upon it from above,—and at the same time to the agitating action of fluid under pressure, preferably ignited burning fluid, acting from beneath the garbage upwardly through the hearth and in practical contact with all portions of the garbage.

Apparatus conveniently adapted to effectuate the foregoing operation, and embodying my improvements, is represented in the accompanying drawings and hereinafter described, the particular subject-matter claimed as novel being hereinafter definitely specified.

In the drawings, Figure 1 is a side elevational view of a good form of furnace embodying my improvements. Fig. 2 is a central, vertical, longitudinal, sectional elevation through the same. Fig. 3 is a transverse, vertical, sectional, elevation, upon a slightly enlarged scale, through the furnace represented in Figs. 1 and 2, in the plane of the dotted lines $x-x$ upon said figures. Fig. 4 is an outside elevational view of a form of hydrocarbon burner which I find it convenient to employ with the pressure generating chambers of the furnace. Fig. 5 is a central, vertical, longitudinal, elevation through

the same. Fig. 6 is a side elevational view, partly sectional, of a form of hydrocarbon burner which I find it convenient to employ with the combustion chamber of the furnace. Fig. 7 is a transverse vertical sectional elevation, taken on the dotted line $x-x$ of Fig. 1.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the body of the furnace,—the same being typified by the brick-work or masonry of which the walls, crown, down-take, stack, and other essential elements of the structure as such, may conveniently be composed. The body of the furnace is preferably longer than wide, and throughout its length extends the combustion chamber B, the roof of which is preferably arched, as shown in Fig. 3.

The hearth or floor of the combustion chamber is perforated preferably by being constituted by grate bars C elevated a considerable distance from the ground or base level of the furnace as an entirety, and composing the roofs, crowns or covers, so to speak, of a series of chambers or compartments within the body of the furnace beneath the combustion chamber, which I term the pressure-generating chambers D, and which communicate with the combustion chamber through its perforated hearth. These chambers may possess any desired form, that represented being appropriate for the purpose, and they are conveniently formed in the substance of the brick-work body of the furnace as an entirety. Each of these chambers is preferably of the breadth of the combustion chamber, and any desired number of them are arranged in succession beneath said chamber, so that in the aggregate the series is about equal in length to the combustion chamber. To each of these pressure generating chambers, preferably through a suitable opening in the side wall of the furnace body, there is entered an injector, being preferably a burner E of any selected fluid-burning type, and conveniently of that represented in Figs. 4 and 5 in which three concentric nozzles, $e e' e''$, serve to compose the burner as a whole and to admit through it, at any desired pressure, into the interior of the pressure generating chamber to which it is applied, air, steam, and oil. These burners are conveniently applied to

doors opening into the pressure chambers, through which the chambers may be cleaned out.

F is a fluid burner of any preferred character, applied to the combustion chamber B, and conveniently opening thereinto near the end of the furnace opposite to that which preferably terminates in a down-take *b*, or other outlet leading to the stack *b'*. This burner
 10 F,—and, if desired, more than one such burner may be employed,—preferably, but not necessarily, opens through the end wall of the furnace into the combustion chamber in the direction of the length of said chamber, so that a jet from it will be directed over
 15 the hearth of said chamber in the direction of its length toward the down-take, and, of course, over any charge of material placed upon said hearth. If desired, burners may
 20 open laterally into the combustion chamber.

In Fig. 6 I have represented a convenient form of burner for the combustion chamber, in which two concentric nozzles, an outer one, *f*, for steam, and an inner one, *f'*, for oil, are
 25 combined with each other and with a concentrically-disposed encompassing conical air opening *f''*, shown as opening through the end wall of the furnace, to form an injector burner of a well-known character.

G is a series of openings, which I term the raking openings, formed through the side walls of the furnace preferably slightly above the level of the hearth of the combustion chamber, and provided with doors *g*.
 35 Through these openings access may be had to the hearth of the combustion chamber, for the leveling or other manipulation of the charge fed thereupon, and for cleaning out the furnace.

H are a series of charging apertures, provided with suitable covers *h*, through which the material to be incinerated may be charged to the hearth of the combustion chamber.

The details of the construction and application of the elements thus far described are not of the essence of the invention and may be varied at the will of the constructor.

Such being a description of a good form of furnace, the mode of its operation will be
 50 easily understood.

The garbage to be incinerated having been fed to the hearth of the combustion chambers, is preferably leveled to an approximately uniform depth upon the grate bar
 55 surface of said chamber by a manually-performed operation conducted through the raking openings. The burners having been lighted, the hydrocarbon flame preferably employed, is discharged into the combustion
 60 chamber, superheats and maintains in a superheated condition the walls and roof of said chamber, and maintains the bed of garbage upon its hearth at a sufficient heat to

decompose and destroy all vapors and organic matter,—the action being rendered
 65 rapid and complete by the operation of injection from the burners in the generating chambers,—the pressure of the burning gas, heated air, or other fluid, existing within said chambers by reason of the injection, acting
 70 upwardly through the hearth grate bars, or other openings through the hearth, and the mass of garbage thereupon, to effect agitation of the mass and complete its decomposition. In fact a great advantage inhering in the
 75 operation, results from this agitation of the mass of garbage by the pressure from beneath it, occasioning as it does the thorough and practically uniform exposure of the garbage to the action of the flame. 80

It will now be understood that by reason of the presence of a series of pressure chambers D, each containing an injector or burner, and each entirely independent of the others, the pressure generated in the several chambers
 85 will be equally distributed along the whole length of the furnace, and will operate uniformly upon all parts of the charge disposed upon the aggregate grate bar surface. This construction is, therefore, to be distinguished
 90 from a construction in which but a single pressure chamber exists beneath the grate bar surface, and in the operation of which the pressure does not bear uniformly upon the charge of material but escapes to the up-
 95 per chamber through any one point of the charge of less thickness than the remainder.

Having thus described my invention, I claim—

1. In a furnace for burning garbage, in
 100 combination:—a combustion chamber the bed or hearth of which is perforated,—a series of chambers or compartments beneath the hearth of the combustion chamber—and fluid
 105 burners or injectors opening into said chambers,—substantially as set forth.

2. In a furnace for burning garbage, in combination:—a combustion chamber the bed or hearth of which is perforated, and into which opens a fluid burner,—a series of cham-
 110 bers or compartments beneath the hearth of the combustion chamber and communicating therewith through said hearth, into which fluid injectors open and discharge,—means
 115 for introducing garbage to the hearth of the furnace,—and an outlet for the escape of the products of combustion,—substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name
 120 this 24th day of March, A. D. 1894.

NORTH DOWLING.

In presence of—

J. BONNALL TAYLOR,
 WM. C. STRAWBRIDGE.