Feb. 23, 1937. L. HERMANNS 2,071,835

PROCESS AND APPARATUS FOR TREATING RESIDUE, WASTE, AND THE LIKE

Filed April 27, 1935

Fig.1.

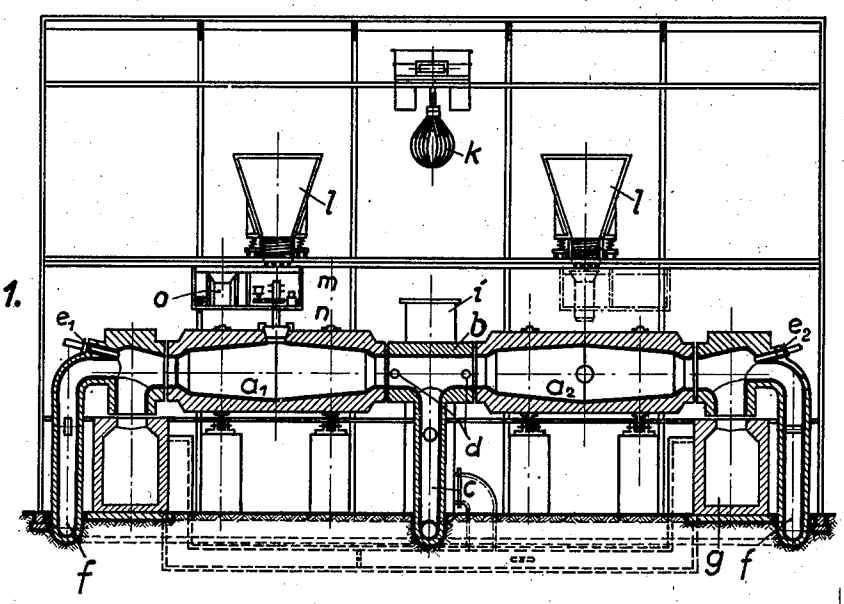


Fig.2.

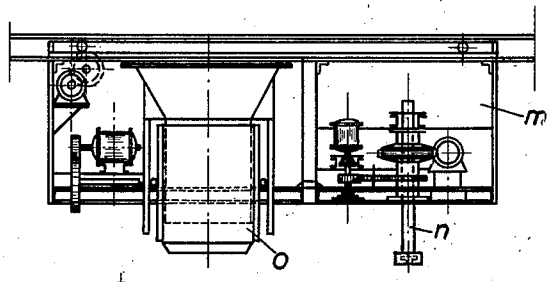
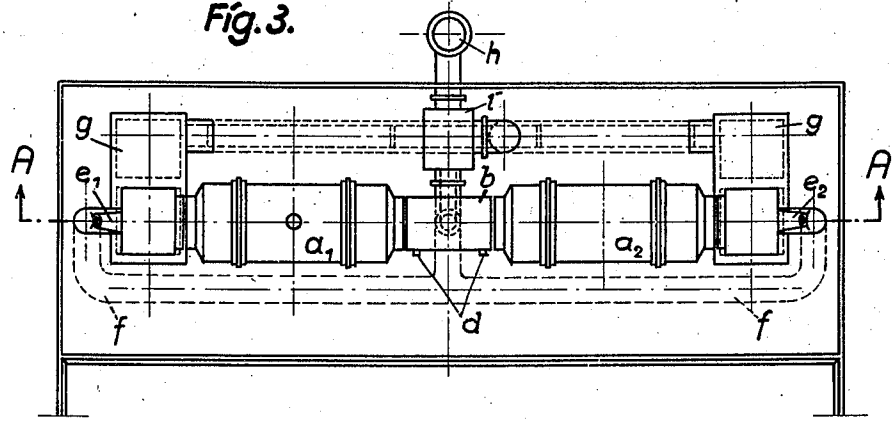


Fig.3.



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PROCESS AND APPARATUS FOR TREATING RESIDUE, WASTE, AND THE LIKE

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2 Claims. (Cl. 110—8)

It is known to incinerate or scorify dust or rubbish in rotary furnaces and thereby destroy and utilize the dust or rubbish completely. It has, however, been found that the drying, and in some circumstances also the incineration, involves difficulties, which arise because of the rapid cooling of the furnace wall when a fresh charge of crude rubbish is introduced, and because of the lack of a sufficient supply of air to the rotary furnace.

With the present invention these difficulties and disadvantages are obviated, and a process is provided whereby the crude rubbish, including all kinds of industrial, domestic or other waste, is dried in a rotary furnace or hearth furnace, is incinerated, scorified and melted. The smelting gases that accrue during the operation are directly utilized for drying purposes, and, with the addition of air, which is preferably preheated in the regenerator or recuperator, for incinerating or scorifying. Thus the associated smelting is carried out with the minimum essential requirement of additional fuel, to produce a marketable product, such as dipyres, fertilizers, and the like. With this treatment of the crude rubbish it is advantageous to work it up either while stationary or in motion. Stationary incineration means an absolutely stationary condition of the incineration supports for the material, while moving incineration is understood to involve a movement of the support in relation to the material. Now it has been found that for an optimum capacity, the movement, for example the rotation of the furnace, and the position of rest or a rocking movement, must be kept different according to the operations.

For this purpose the furnace, according to this invention, is divided for the working or smelting of the rubbish into two independently movable separate compartments, which communicate with one another through the medium of a stationary but preferably exchangeable central member, to effect the incineration, and also, it may be, the slagging of the crude rubbish, in one compartment, by means of the gases of the material that is being smelted in the other compartment. Thus an advantageous utilization of the waste heat, particularly of the smelting gases is obtained.

Through the said central member the air necessary for the combustion is also supplied to that compartment in which the rubbish is to be incinerated only, and a means is preferably provided on said central member which renders it possible to determine the composition and temperature of the escaping gases. In this way the operations in the compartment out of which the gases flow can be observed, and the supply of air in the admission compartment of the gases can be regulated.

The operation of such a furnace permits of the smelting or treatment of the crude rubbish in the state in which it accrues, and of a complete utilization of the total heat inside the furnace, eliminating the waste heat utilization appliances that are otherwise usual in such incinerators, and which have no connection with the destruction of rubbish, and require more or less complicated handling.

By the process according to this invention there are manufactured from the crude rubbish useful artificial stones or fertilizers, which make it unnecessary to discharge incineration residues, arising from the removal of dust, on to dumps, notwithstanding the incineration.

A furnace plant for carrying out the present process is illustrated by way of example in the accompanying drawing, in which

Figure 1 shows the plant in longitudinal section on the line A—A in Figure 3,

Figure 2 illustrates a detail, and

Figure 3 shows the plant in plan.

The revolving or hearth furnace consists of two independently movable separate compartments a_1 and a_2, so that in one compartment for instance, incineration can be effected in a stationary condition, while in the other compartment smelting can be effected with a rotating or a rocking movement. A central member b uniting the two compartments consists of a tube which is stationary in relation to the two compartments and through which the heating gases can pass from one compartment to the other. Fresh air is also introduced through this central member at c. At the two points marked d there are apertures permitting samples to be obtained for analysis, whereby the existing composition of the flowing gases can be ascertained. Thus, one may control the operation in the compartment out of which the heating gases flow. At e_1 and e_2, coal dust burners are indicated, which receive their air of combustion through a pipe f. Ash chambers g are provided for the withdrawal of the heating gases at the appropriate end of the furnace for the purpose of purifying the said heating gases. Before the heating gases pass out of the furnace into the chimney h, their residual heat is utilized for heating the air of combustion, for which purpose, in the example illustrated, a recuperator i is provided. It is of

course also possible to utilize the waste heat in a regenerator, not shown.

For the direct charging of the furnace with rubbish a grab crane *k* is provided, which takes up the proper quantity of rubbish sufficient for a charge to be delivered to the furnace through a collecting hopper *l*, provided with a suitable shaking device. For the charging of and withdrawal from the furnace a travelling crab *m* is provided, in which there is provided for the charging operation, not only a cover lifter *n*, but also a filling hopper *o*, which, after the raising of the cover, travels into a position above the furnace compartment to be charged, and enables the crude rubbish from the collecting hopper *l* to be charged directly into the appropriate compartment. For the opening of the furnace the crab *m* is moved into a position above the raised charging aperture of the appropriate compartment. The cover is then seized with a claw-like recess or a recess like a bayonet joint on the gripping rod of the cover lifter *n*, rotated through a definite angle in the disengaging direction, and raised. In the reverse sequence the cover is put on again and the compartment is closed.

The operation is as follows:

Let is be assumed that in the compartment a_1 the rubbish is already in a molten condition, and heat is being supplied by the coal-dust burner e_1 for the purpose of promoting and maintaining the fluidity of the melt.

Then in the compartment a_2, into which a charge of rubbish has previously been placed, the latter is dried by the smelting flue gases, and is incinerated by the supply of fresh air through the pipe *c*, and, it may be, slagged. The heating gases for the drying and the incineration of the rubbish in a_2 come directly out of the smelting bath in the compartment a_1 and pass for example, through the compartment a_2 and the ash chamber *g*, into the uptake, and from there into the regenerator or recuperator *i*, where the residual heat is utilized for heating fresh air, after which the said gases pass through the chimney *h* out into the atmosphere. During this travel a complete utilization of the waste heat is attained, and by its aid a product of marketable consistency is obtained.

When the rubbish in the compartment a_2 is incinerated, and, it may be, already slagged, the melt in the compartment a_1 is in the meantime ready and is tapped, whereby this compartment is now adapted to receive a fresh charge of crude rubbish, and by a reversal of the supplementary heating means the operations in the two compartments are now interchanged.

I claim:

1. The process of disposing of residue, waste, and the like, which comprises subjecting the material to be treated simultaneously in two separate compartments to the action of heat, increasing the temperature in one of said compartments to effect smelting of the material therein, conducting the heat gases of the smelt to the other compartment while, at the same time, passing to said other compartment a supply of fresh air for at least partial incineration therein, tapping the first compartment to discharge therefrom the molten material, introducing a fresh charge into said first compartment, and then repeating the process in the reverse order.

2. In an apparatus for disposing of residue, waste and the like, the combination of two separate compartments, a hollow central member disposed intermediate said compartments constituting a communication therebetween so as to enable the heat gases of the smelt to pass from one compartment to the other, means for supplying air to said compartments through said central member, means at the outer ends of said compartments for supplying heating gases thereto, and means for conducting away said heating gases from the outer ends of said compartments and directing said gases in heat-exchange relation to the air supplied to said compartments, whereby the apparatus is adapted to be operated continuously by heating one of the compartments to effect smelting of material therein, by utilizing hot gases from said compartment, mixed with air, to effect at least partial incineration of material in the other compartment, by drawing off smelted material from the first compartment and introducing a fresh charge of material therein, and by repeating the operation in reverse order.

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