Aug. 2, 1938. H. E. NICOL 2,125,517

INCINERATOR

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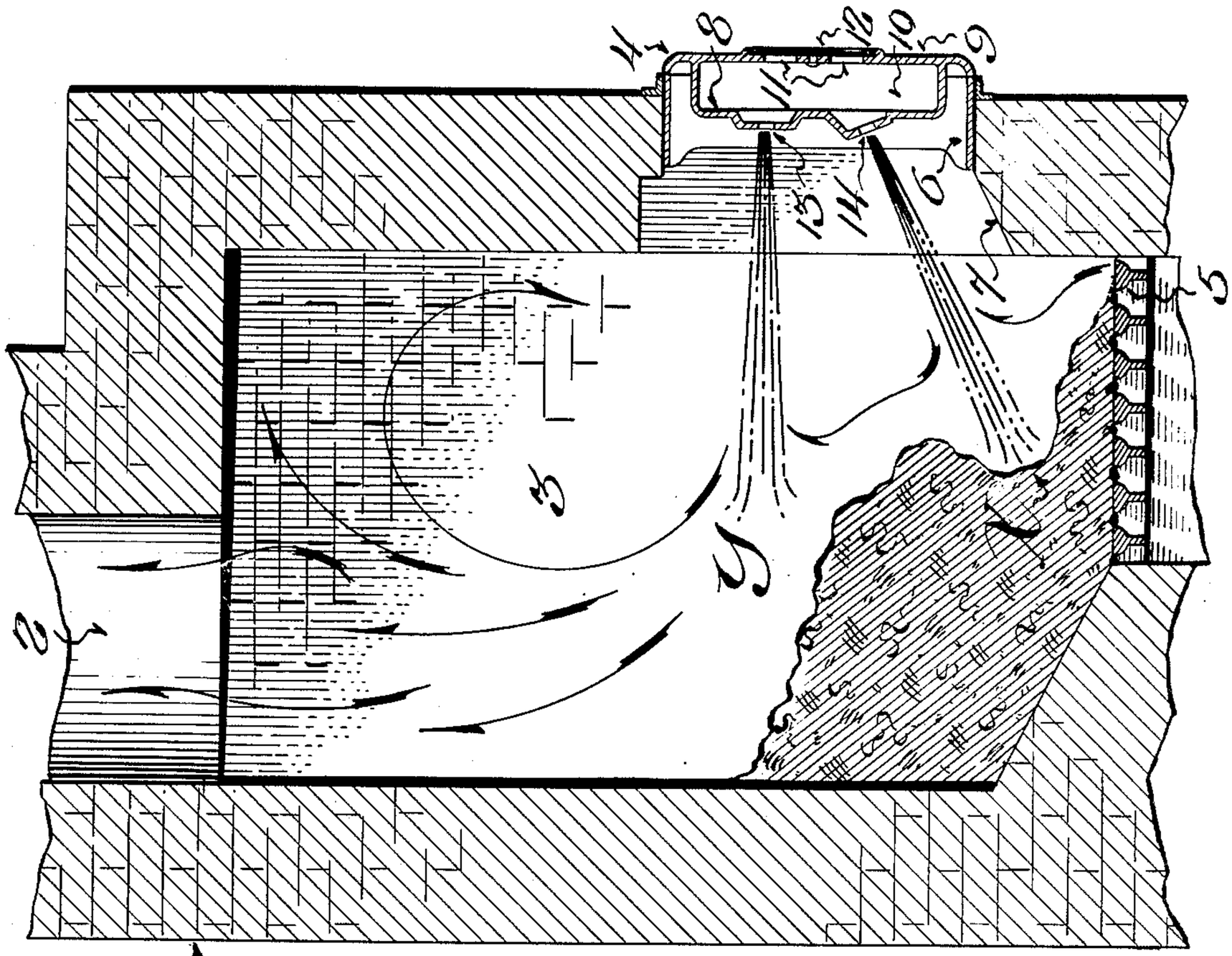

Fig. 1.

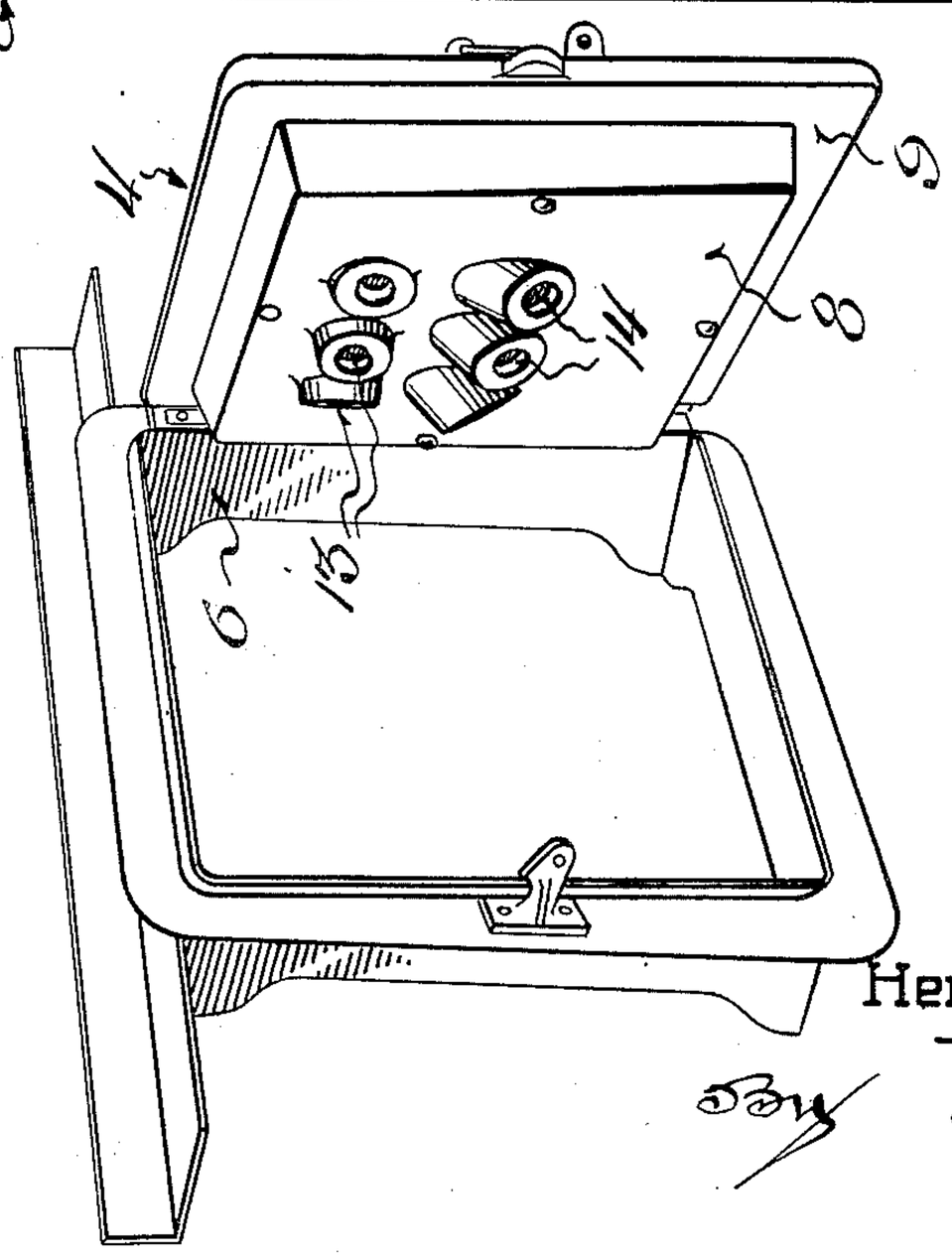

Fig. 2.

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INCINERATOR

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3 Claims. (Cl. 110—18)

This invention pertains broadly to incinerators, and more particularly to an improvement in firing doors for such apparatus.

At the present time considerable difficulty is encountered in obtaining the desired combustion of refuse contained within the combustion chamber of built-in types of incinerators, particularly those installations which attempt to burn the refuse without the aid of auxiliary fuel, and even those that resort to auxiliary fuel are highly inefficient.

The present invention has primarily for its object to solve the foregoing difficulty by provision of an exceedingly simple and inexpensive incinerator firing door, so designed as to provide controlled and directed jets of air, for both primary and secondary combustion of refuse.

Incidental to the foregoing, a more specific object resides in the provision of an incinerator firing door having a plurality of orifices directed at different elevations within the combustion chamber, the air from the lower orifice, or set of orifices, serving to aid primary combustion, while those of the upper set provide for secondary combustion.

A further object in connection with the foregoing resides in creating the directed jets of air by the differential pressures within and without the incinerator, resulting from normal flue draft.

A still further object is to provide a door, including spaced walls forming a compartment, the outer wall having a regulated air inlet, and the inner wall being provided with a plurality of orifices directed at different elevations, whereby the velocity of air discharged through said orifices is controlled in proportion to the existing flue draft by regulation of the air inlet.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination, and arrangement of parts, substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawing is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof.

In the drawing:

Figure 1 is a perspective view of an incinerator charging door constructed in accordance with the preferred form of the present invention; and

Figure 2 is a fragmentary vertical section through a conventional built-in incinerator installation with the present invention applied thereto.

Referring now more particularly to the accompanying drawing, the numeral 1 designates a typical built-in incinerator comprising a flue 2, and a combustion chamber 3, the latter being provided with a firing door 4, and a grate 5. The salient feature of the invention resides primarily in the construction of the door 4, which is suitably hinged to a frame 6 mounted within the opening 7, providing access to the combustion chamber 3.

The apparatus so far described is more or less conventional, and in its operation refuse is delivered to the combustion chamber 3, through the flue 2, which is provided with the usual delivery hoppers (not shown). Due to the fact that the flue 2 is offset with relation to the combustion chamber 3, refuse is delivered to the latter in the manner indicated in the drawing. In the normal operation of incinerators of the type disclosed, sufficient drainage, and resultant drying of the refuse, together with combustible material contained therein, such as paper and the like, are presumed to allow combustion of the refuse upon ignition of the same. However, in actual practise, it has been found that the natural circulation of air, when admitted in various conventional manners, is not always enough to dry out the material, or to maintain combustion of the refuse after initial ignition, and fuel nozzles are required to effect complete combustion.

Further, even in those installations using auxiliary fuel, it has been found that combustion of the refuse is exceedingly slow and inefficient, thus requiring an excessive amount of fuel. By employing the present invention, even when auxiliary fuel is used, combustion is facilitated, thereby effecting a material economy in fuel.

The foregoing is accomplished by the provision of a charging door having a plurality of orifices directed at different elevations, in combination with means for controlling the volume of air passing through the charging door, in proportion to the flue draft, to insure sufficient velocity of the directed jets of air for both primary and secondary combustion, as will be hereinafter explained more in detail.

That form of the invention illustrated includes a door 5 having an inner spaced wall 8 carried

by the outer wall 9, to provide an intermediate air chamber 10. The outer wall 9 is provided with a plurality of radial openings 11, regulated by a damper 12, of conventional structure, the damper 12 being rotatably connected to the front wall 9 of the door. The inner wall 8 of the door 4 is provided with upper and lower series of orifices 13 and 14, respectively. The orifices of each series are divergently directed laterally with respect to each other, and, as best shown in Figure 2, the orifices in the upper series are directed into the combustion chamber 3 on a substantially horizontal plane, while those in the lower series direct the air downwardly into the area where primary combustion of the refuse takes place.

Here it is to be understood that while I have illustrated and described the door 4 as being provided with a series of upper and lower orifices, it is not essential to the invention that more than one upper and one lower orifice be employed, particularly in a small installation.

Considering now the operation of the present invention, it is customary to light refuse in the incinerator through the opening normally closed by the firing door 4. This is accomplished in any suitable manner, as for instance with a match, or other lighted material, the result of which creates a draft through the flue 2 that reduces pressure within the combustion chamber 3, in relation to outside atmospheric pressure, thus causing air to enter the compartment 10 through the openings 11, from where it is discharged through the orifices 13 and 14. Naturally, control of the volume of air discharged through the orifices 13 and 14 determines the velocity of the same. Thus, regardless of varying differential pressures inside and outside of the combustion chamber 3, as the result of changes in the flue draft, the velocity of air discharged through the orifices may be controlled to a high degree of accuracy by means of the damper 12, thereby insuring sufficient force of the air jets to project them into the desired spaced areas, and supply air for both primary and secondary combustion, the former occurring at the point of contact indicated by the letter X, and the latter in the area designated as Y.

In operation, it has been found that primary combustion occurring in the area X creates partially consumed gases, which, as they rise, come in contact with the upper jets of air, at which point sufficient oxygen is supplied for secondary and complete combustion. Obviously, as the lower portion of the refuse is consumed, the mass gradually settles, and complete consumption takes place.

From the foregoing explanation, considered in connection with the accompanying drawing, it will be readily seen that an exceedingly simple, inexpensive, and efficient firing door for incinerators has been provided, which insures directed jets of air for the most efficient combustion of refuse by the creation of both primary and secondary combustion, to the end that necessity of auxiliary fuel is eliminated entirely, and in instances where it is desired to use auxiliary fuel, combustion is materially facilitated, thereby effecting a great economy in fuel.

While the invention has been illustrated and described as applied to an incinerator firing door, it is to be understood that any application of the principle involved, independent of the firing door, is contemplated as within the scope of the appended claims, which are directed broadly to spaced jets of air for both primary and secondary combustion, and specifically to a design including spaced inner and outer walls provided with directed orifices and controlled air inlets, respectively.

I claim:

1. In a refuse incinerator including a combustion chamber and a combined flue and delivery chute communicating with the top of said combustion chamber adjacent its rear wall for delivering refuse to the rear of said chamber; a firing door positioned in the front wall of said combustion chamber above its bottom, said door being provided with upper and lower orifices to provide spaced separated jets of air directed into the combustion chamber, the jet from the lower orifice being directed against a confined area of refuse at the forward and bottom portion of the pile to create initial combustion at high temperature within said area only, and the jet from the upper orifice being completely separated and directed above the lower jet to continue combustion of the unburnt gases resulting from the primary combustion.

2. In a refuse incinerator including a combustion chamber, and a combined flue and delivery chute communicating with the top of said combustion chamber adjacent its rear wall for delivering refuse to the rear of said chamber, a fire door positioned in the front wall of said combustion chamber above its bottom, said door being provided with spaced inner and outer walls forming an air chamber, the outer wall having an air inlet opening and the inner wall being provided with upper and lower orifices to provide spaced separated jets of air directed into the combustion chamber, the jet from the lower orifice being directed against a confined area of refuse at the forward and bottom portion of the pile to create initial combustion at high temperature within said area only, and the jet from the upper orifice being completely separated and directed above the lower jet to continue combustion of the unburned gases resulting from primary combustion.

3. In a refuse incinerator including a combustion chamber, and a combined flue and delivery chute communicating with the top of said combustion chamber adjacent its rear wall for delivering refuse to the rear of said chamber; a fire door positioned in the front wall of said combustion chamber above its bottom, said door being provided with spaced inner and outer walls forming an air chamber, the outer walls having an air inlet opening and the inner wall being provided with upper and lower orifices to provide spaced separated jets of air directed into the combustion chamber, the jet from the lower orifice being directed against a confined area of refuse at the forward and bottom portion of the pile to create initial combustion at high temperature within said area only, the jet from the upper orifice being completely separated and directed above the lower jet to continue combustion of the unburned gases resulting from primary combustion, and means for controlling said inlet opening.

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