March 28, 1944. M. B. OWEN 2,345,497

FURNACE CONSTRUCTION

Filed Feb. 10, 1943

Fig. 1.

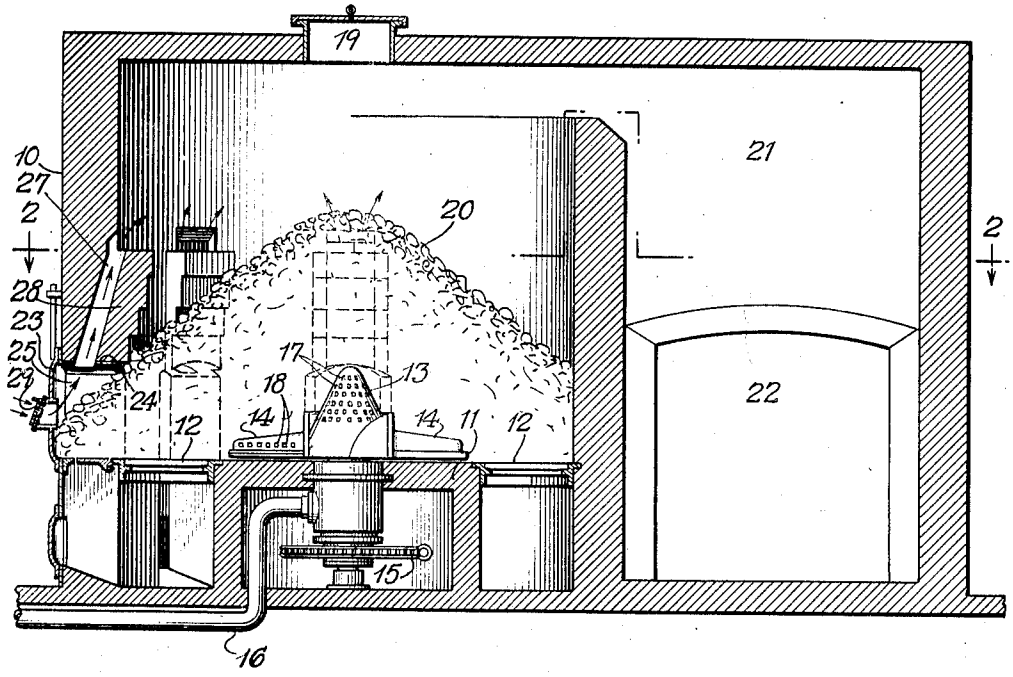
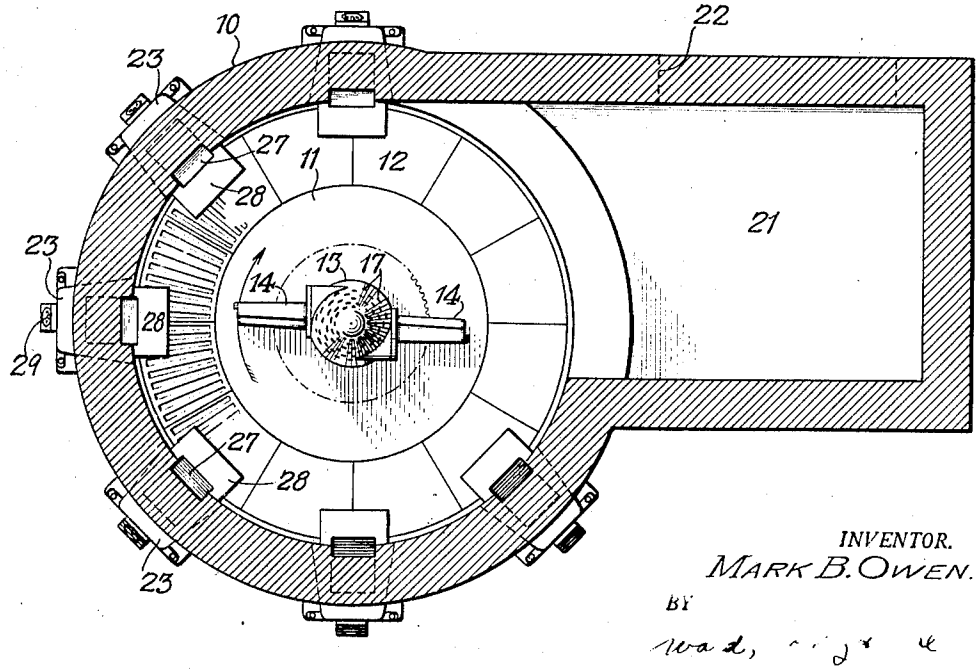


Fig. 2.



INVENTOR.
MARK B. OWEN.
BY
Ward, [illegible]
ATTORNEYS

Patented Mar. 28, 1944

2,345,497

UNITED STATES PATENT OFFICE

2,345,497

FURNACE CONSTRUCTION

Mark B. Owen, Hastings on Hudson, N. Y., assignor to Nichols Engineering & Research Corporation, New York, N. Y., a corporation of Delaware

Application February 10, 1943, Serial No. 475,344

1 Claim. (Cl. 110—18)

This invention relates to an improved furnace construction and involves features particularly adaptable among other possible uses, to incinerating furnaces of the general type disclosed in U. S. patent to Charles W. Nichols, No. 2,232,556, granted February 18, 1941.

Furnaces of the above indicated class have a grate area upon which material such for example as trash or garbage is adapted to be piled for combustion. Generally concentric with the grate area a rotatable structure is provided for agitating the material in the pile and for advancing same outwardly of the grate while also discharging air therein in directions outwardly of the pile. For furnaces of this type the outer walls must be relatively thick, being comprised for example of an inner lining of fire brick or the like, and an outer layer of insulating material, supporting brick or other material. In order to provide access to the grate areas, a plurality of doors are provided having metal door frames extending inwardly through these thick walls at locations just above the grate. Consequently when a large pile of material is placed on the grate in order to use the furnace at full capacity, some of this material may fall, or be advanced into and tend to block the inner portions of the door frames, thereby leaving more or less closed pockets at the upper and outer portions of the door frames. Since the normal draft of the furnace is blocked off from access to these pockets, considerable quantities of smoke and fumes from the burning material may tend to flow into the pockets and thence out through the cracks around the door into the room or building and thereby create very objectionable or even intolerable working conditions in the room.

In accordance with an important feature of the present invention, this problem is satisfactorily solved by the use of flues formed in the furnace wall structure, and extending upwardly from such pocket areas for discharging the smoke and fumes therefrom, under the influence of the normal furnace draft, into the furnace space above the pile of waste material.

Various further and more specific objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms a part of this specification and illustrates merely by way of example, a preferred form of the invention. The invention consists in such novel features, arrangements and combinations of parts as may be shown and described in connection with the apparatus herein disclosed.

In the drawing:

Fig. 1 is a vertical sectional view of one form of furnace structure embodying the invention; and

Fig. 2 is a horizontal sectional view taken substantially along line 2—2 of Fig. 1.

Referring now to the drawing in further detail, the main part of the furnace as shown is surrounded by a relatively thick wall 10 of the above mentioned type of construction. As in the case of the furnace of the above mentioned Nichols patent, a central circular flat hearth area 11 may be provided, surrounded by a grate area 12. At the center of the hearth area an upstanding hollow cone-like structure 13 is provided having generally tangentially extending hollow arms as at 14. This construction as will be understood from said Nichols patent, is adapted to be rotated as by gearing 15, while at the same time air supplied under substantial pressure through a conduit 16 is conveyed by suitable means, up into the cone and arm structure for discharge through apertures as at 17, 18.

The material to be burned or incinerated may be charged through an inlet 19 in the top of the furnace, so as to fall into a pile as at 20 covering and surrounding the rotatable structure. The gaseous products of combustion may be conducted into a gas combustion space 21 and thence out through opening 22 to a stack or other suitable means (not shown) for creating a normal amount of draft through and from the furnace.

Furnace doors are shown as at 23 at spaced points around the grate, with cooperating metal door frames 24 extending through the furnace wall at regions just above the grate.

When as shown in Fig. 1, a pile of waste material 20 is of sufficient size to charge the furnace to full capacity, it will be apparent that considerable quantities of the material will fall into the inner portions of the door frames and thus effectively block off these portions of the frames and leave pockets as at 25 in the upper and outer portions of the door frames. Then if the material within the door frames burns or smolders, it will be apparent that smoke and fumes will be discharged into the pockets 25 and tend to pass out through the cracks around the door, or through the door dampers if same are provided, unless some precaution is taken to prevent this result.

In view of the fact that the rotatable structure constantly tends to advance the burning

material outwardly toward the doors, the blocking off of the inner portion of the door frames will tend to occur even though the furnace may not be charged to full capacity and this blocking effect will also tend to be maintained for this same reason, even after the pile of material has burned down to a smaller volume. The normal draft of the furnace will ordinarily be insufficient to cause the smoke from pockets **25** to be drawn through the material and up into the furnace space above the pile. Also any tendency of the normal draft of the furnace to accomplish this result is opposed by the normally outwardly discharged air coming from the rotatable structure, which air also tends to forcefully expel the smoke out around the door cracks.

Heretofore the amounts of smoke and fumes which under these circumstances have been forced into the pockets as at **25** and thence out around the doors, have sometimes been sufficient to make prohibitive atmospheric conditions around the furnace room. This condition when heretofore met with has presented a perplexing problem and has generally either required laborious manual stoking of the material to keep it away from the door frames or else operation of the furnace at less than its full capacity or with an abnormally low pressure in the air as discharged from the rotating structure. If steps should be taken to so shape the upper inner portions of the door frames that same will be spaced from the pile of material, then it will not only be necessary to provide specially shaped door frames, but the inner portions of the door frames would be subject to rapid destruction because of the high temperatures present and also the inner portions of the wall would necessarily be too thin at this region to provide adequate strength in the arches over the door frames, or adequate heat protection for the outer portions of the wall.

I have found that a simple dependable and inexpensive way to eliminate this problem is to form the furnace wall structure in the region above each of the door frames, with a flue as at **27** extending from within the upper side of the door frames at the pockets **25**, upwardly and inwardly to points of discharge in the furnace space above the pile of burning material. With the flues thus arranged and located, the natural draft of the furnace serves to draw the smoke and fumes from the pocket regions **25** up to the top of the furnace along with the smoke from the main body of burning material. The brick work on the inner side of these flues may be extended gradually inwardly of the furnace with an inverted step formation as at **28** to insure maintenance of proper strength of the furnace wall at the regions above the door frames. If desired, the doors may be provided with small dampers as at **29** through which air may be drawn from the room into and through the pockets **25** and thence up through the flues **27** to further insure that smoke will not accumulate in the pockets.

With the above type of construction the smoke difficulty at the doors is wholly eliminated, whether the doors are closed or open. The flues **27** being relatively small, same do not noticeably interfere with the proper functioning of the furnace draft above the main body of material being burned in the furnace.

While the invention has been described in detail with respect to a particular preferred example, it will be understood by those skilled in the art after understanding the invention, that various changes and further modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claim to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

A furnace construction having in combination, a grate, a furnace wall of substantial thickness surrounding the grate construction upon which material is adapted to be piled for combustion, means for agitating the material in the pile and for advancing same outwardly while also discharging air therein in directions outwardly of the pile, a door and a door frame therefor extending through the wall, the lower side of such frame being at approximately the level of the grate and the frame being at a region such that the material of the pile as outwardly advanced, tends to block the inner portion of said frame and thereby form a pocket in its upper outer portion, into which pocket smoke and fumes tend to be driven by said discharged air, and a flue formed in the wall structure and extending upwardly from within the outer upper portion of said door frame to a substantially higher point within the furnace, for discharging such smoke and fumes into the furnace space above the pile.

MARK B. OWEN.