Dec. 11, 1934. M. A. HOFFT ET AL 1,984,344

REFUSE BURNING FURNACE

Filed Dec. 19, 1931

Fig. 1.

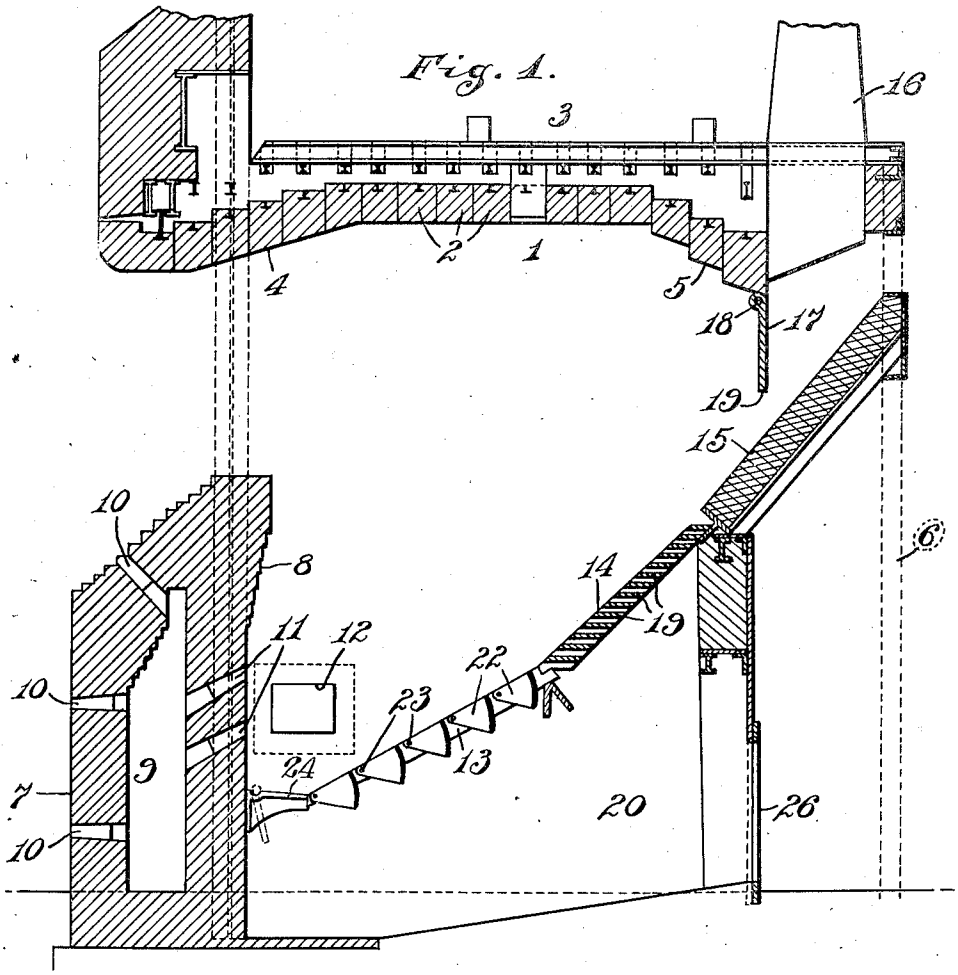
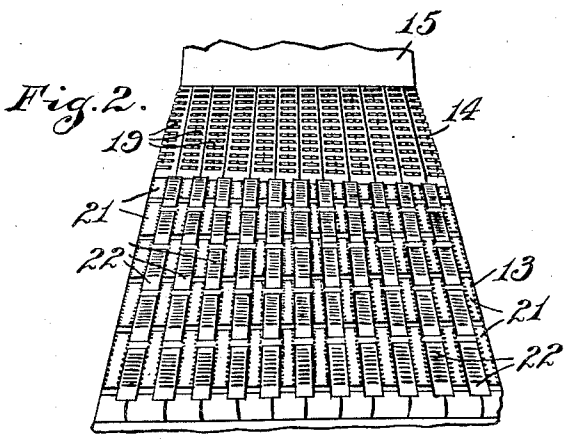


Fig. 2.



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Patented Dec. 11, 1934 1,984,344

UNITED STATES PATENT OFFICE

1,984,344

REFUSE BURNING FURNACE

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Application December 19, 1931, Serial No. 582,026

4 Claims. (Cl. 110—7)

Our invention relates to improvements in furnaces and particularly that type of furnace designed for burning refuse fuels, such as wood refuse from wood-working plants of various types, sawmill refuse and other types of refuse, such as bagasse, papermill refuse and similar material.

It is one of the objects of our invention to provide a furnace which is particularly adapted for burning fuel having a relatively large moisture content. Our furnace is designed for burning all sorts of refuse but particularly refuse having a large moisture content.

For the purpose of disclosing our invention we have illustrated one embodiment of the same in the accompanying drawing, in which:

Fig. 1 is a sectional view of a boiler furnace embodying our invention, and

Fig. 2 is a perspective view of a portion of the grate thereof.

In the embodiment of the invention illustrated the furnace which may be used for various types of boilers has an arch 1 preferably formed of fire resisting material, such as blocks 2 of fire brick, supported from suitable supporting bars 3. This arch, as will be noted, takes a downward dip as at 4 towards the rear and also has a downward dip as at 5 at the front.

The front of the furnace may be formed in any suitable manner and for the purpose of illustration is merely diagrammatically shown as a front plate 6. The bridge wall 7 of the furnace is formed of fire resisting material, such as fire brick and has its front face inclined forwardly as at 8. This bridge wall has a transversely extending opening 9 in the center thereof provided with a series of air outlet openings 10, at the rear and suitable air outlet openings 11 at the front, these openings being provided with air from the central chamber 9 which receives air from any suitable source.

The grate in this furnace comprises two sections 13, and 14. The hearth 15, is preferably formed of suitable refractory material, which may be fire brick or the like and the angle inclination of this hearth is on a 50 degree incline. The fuel is deposited on the refractory hearth through the fuel chute 16, entering at the top of the furnace in front of the arch. The thickness of the fuel bed on the grate and on the hearth 15 may be regulated by a gate 17 hingedly mounted on a suitable cross-rod 16 and adapted by any suitable means to be swung backward to raise the lower edge 19 above the plane of the hearth 15 to any desired degree, thereby regulating, by this means the thickness of the fuel bed as it slides down the hearth. Furthermore, due to the fact that the gate 17 is swung rearwardly it offers a minimum obstruction to the downward movement of the fuel. While this hearth 15 is preferably formed of fire brick and therefore of refractory material it may be formed of other material if desired.

Section 14 of the grate is a stationary grate member having ladder grate bars 19 extending at an angle to the surface of the grate section. This section has a 45 degree angle of inclination, which it will be noted is less than that of the hearth 15. It will be noted that due to the construction of the grate bars 19, ample provision is made for the passage of air through the grate, while at the same time the finer portions of fuel, because of the horizontal arrangement of the grate bars, is prevented from dropping through the grate.

The lower section 13 of the grate includes certain pusher bars and this section is set at approximately a 30 degree incline. This section of the grate comprises a plurality of longitudinally extending grate bar sections 21, extending from top to bottom of the section, and disposed between these grate bar sections 21 are pusher sections 22, suitably pivoted at their lower ends as at 23 and adapted to be rocked upwardly and forwardly by any suitable mechanism for the purpose of cleaning the grate. The delivery end of the grate is spaced from the bridge wall and in this space we arrange dumping grates 24. Any provision, such as doors 26, or the like, may be made for the admission of air into the ash pit 20 and thence through the grate and the fuel bed to the fire chamber.

While we have for the purpose of disclosing our invention described specific angles of inclination of the sections of the grate, it will be understood that these angles may be varied to meet varying conditions.

In operation the fuel, being fed on the refractory hearth 15, is first subjected to the heat of the furnace to such an extent that during its first movement on the hearth it will be dried out to such an extent that by the time it reaches the grate 14 it will have been ignited and commence to burn. Furthermore, during this initial stage the heavier volatiles of the fuel are driven off by the heat and passing and rearwardly, due to the shape of the furnace arch will mingle with the hot and burning gases of the furnace and be consumed. Due to the fact that the mass of material deposited on the

hearth, when first deposited has a high moisture content, its movement down the hearth would tend to be sluggish, unless its angle of inclination is rather sharp. As the fuel moves from the hearth 15 on to the grate 14, practically all of its moisture content has been evaporated and it commences to burn. Therefore, with the passage therethrough of the air and due to its lightness its tendency to slip down the grate will be considerably greater and in order to have its movement coincide with the movement of the fuel on the hearth 15 and to prevent avalanching of the fuel, the angle of the grate 14 is slightly less. By the time it has reached the grate 13, it is practically a burning mass of coals and it is desirable that the movement across this grate shall be relatively slow whereby the fuel will be given ample opportunity for complete combustion before it reaches the ash pit. The angle of this grate therefore is relatively small. By inclining the bridge wall forward as at 8, the lighter, hotter gases from the lower end of the furnace are forced forwardly to mix better with the heavier volatile gases from the drying pile of fuel on the hearth and due to the downward inclination of the front of the furnace arch and the downward inclination of the rear of the furnace arch, the burning gases are swept backwardly over the top of the bridge wall and then downwardly through the throat to pass beneath the boiler which is arranged at the rear of the furnace. The air ports 10 on the back face of the bridge wall will provide air to assist in the consumption of any of the unburned particles of fuel which may be carried over the bridge wall, while the end ports 11 supply additional air to the fire pot to supplement the air supplied through the grate bars. Furthermore, with the air passing in through these ports 11 additional turbulence is imparted to the air which materially speeds up combustion.

We claim the following:

1. A furnace for burning refuse fuel comprising a grate formed of two sections inclined downwardly from front to rear and slidingly supporting the fuel body from beneath, the first section having a greater inclination than the second section and the angle of inclination not exceeding fifty degrees, and a hearth upon which the fuel is received and slidingly supported from beneath, extending upwardly from the first grate section and at a greater inclination than the first section with the angle of inclination not exceeding sixty degrees, the angle of inclination of said grate sections and hearth being such as to cause an unobstructed continuous forward slipping of the entire fuel mass and the space above said grate section being free and unobstructed to permit a continuous unobstructed movement of the fuel mass.

2. A furnace for burning refuse fuel comprising a grate formed of two sections inclined downwardly from front to rear and slidingly supporting the fuel body from beneath, the first section having a greater inclination than the second section and the angle of inclination not exceeding fifty degrees, a hearth upon which said fuel is received and slidingly supported from beneath extending upwardly from the first grate section and at a greater inclination than the first section with the angle of inclination not exceeding sixty degrees, the angle of inclination of said grate sections and hearth being such as to cause an unobstructed continuous forward slipping of the entire fuel mass, and the space above the grate section being free and unobstructed to permit a continuous unobstructed movement of the fuel mass, and means at the rear of the second grate section for removing the unconsumed products.

3. A furnace for burning refuse fuel comprising a grate formed of two sections inclined downwardly from front to rear and slidingly supporting the fuel body from beneath, the first section being composed of relatively stationary grate bars and having a greater inclination than the second section, the second section comprising grate bars and interposed pushers, and a hearth upon which the fuel is received and slidingly supported from beneath, extending upwardly from the first grate section and at a greater inclination than the first section, the angle of inclination of said grate sections and hearth being such as to permit an unobstructed continuous forward slipping of the entire fuel mass.

4. A furnace for burning refuse fuel comprising a grate formed of two sections inclined downwardly from front to rear and slidingly supporting the fuel body from beneath, the first section being composed of relatively stationary grate bars and having a greater inclination than the second section, said second section comprising great bars and interposed pusher, a hearth upon which the fuel is received and slidingly supported from beneath, extending upwardly from the first grate section and at a greater inclination than the first section, the angle of inclination of said grate sections and hearth being such as to cause an unobstructed continuous forward slipping of the entire fuel mass, and means at the rear of the second section for removing the unconsumed products.

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