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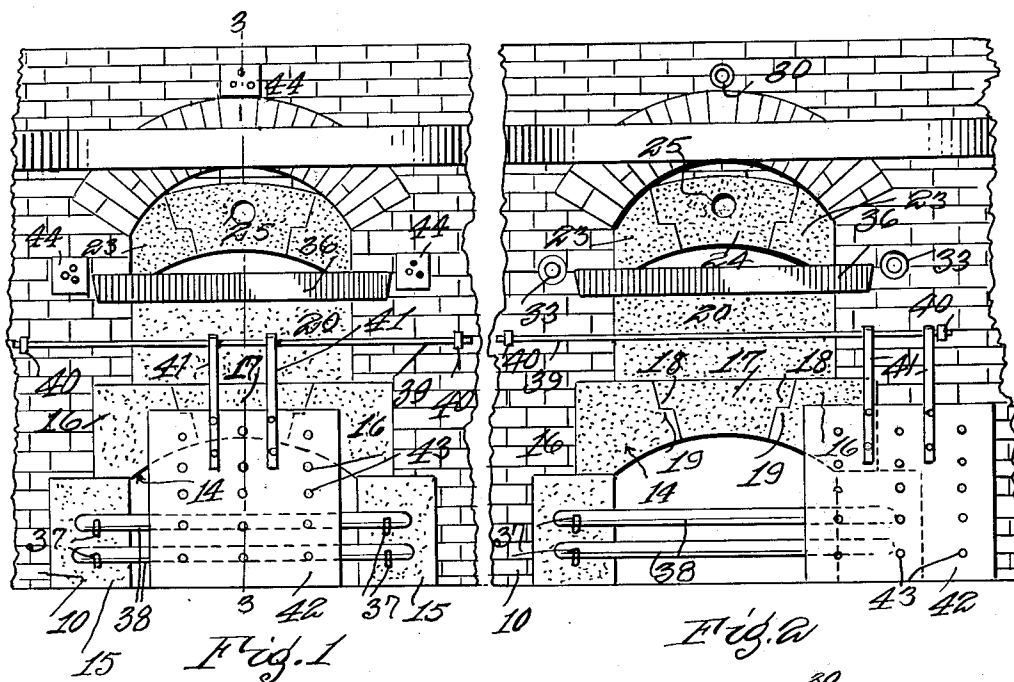
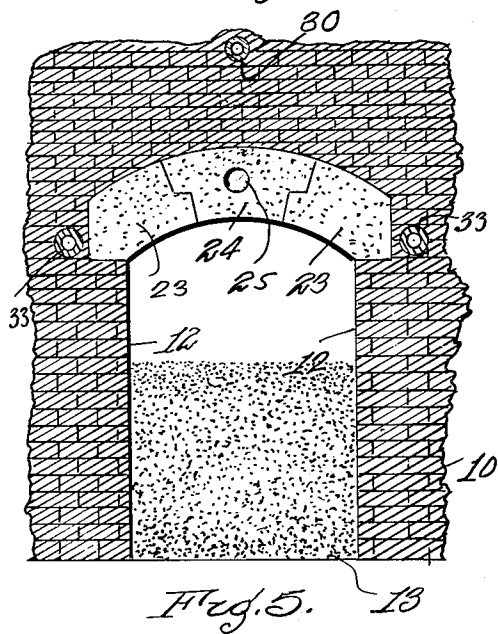
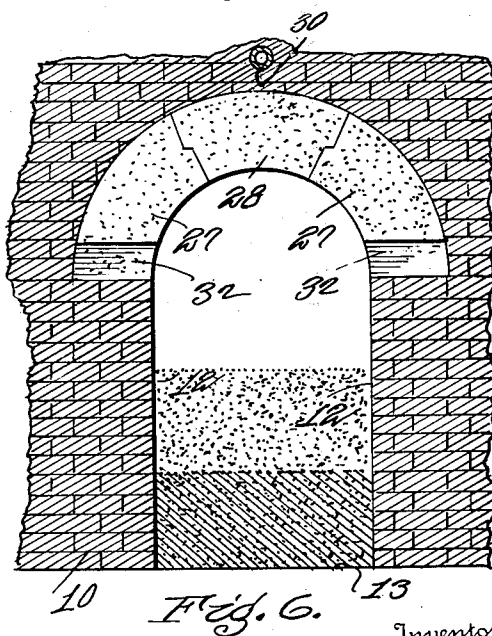
J. F. SLATER

1,981,127

FIRE BOX

Filed Dec. 28, 1932

2 Sheets-Sheet 1



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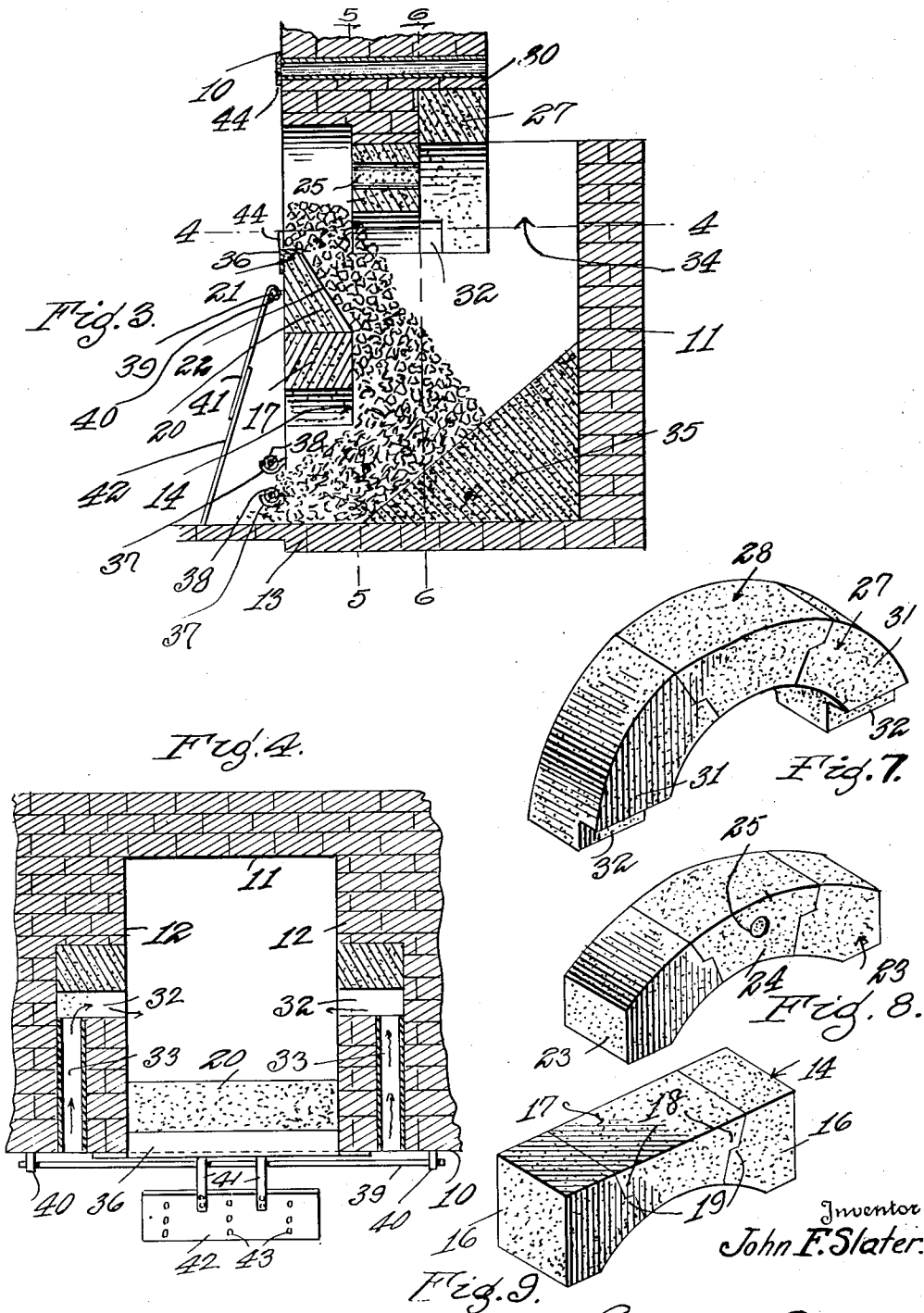
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UNITED STATES PATENT OFFICE

1,981,127

FIRE BOX

John F. Slater, Johnstown, Pa.

Application December 28, 1932, Serial No. 649,206

3 Claims. (Cl. 110—85)

This invention relates to improvements in fireboxes for brick and pottery kilns, auxiliaries, Dutch ovens, asphalt stills, heating plants and the like, and more specifically to a grateless gravity feed firebox of the general type described in United States Patent to Paul Beer, No. 1,195,174, dated August 22, 1916 and embodying the excellences of that firebox together with certain important improvements which experience in the manufacture and sale of the firebox of that patent has shown to be necessary, that patent having been assigned to me and fireboxes thereunder having been placed upon the market by me.

15 It is an object of my invention to provide a firebox in which the ashes resulting from combustion of the fuel will be more readily accessible to the operator thereof and thus the box may be more easily cleaned.

20 Another object of the invention is to provide a device of this kind in which there will be less tendency of the fuel to clinker.

Another object of the invention is the provision of an inclined fuel table superposed on a fuel table arch, instead of the overlapping table heretofore employed, so that the fire is brought nearer the front wall of the firebox and the ashes thereby more easily cleaned or removed.

Another and important feature of my invention resides in the construction of the arches employed in the firebox, wherein the blocks are so interlocked or set that the expansion and contraction of the box due to heating and cooling will not crack the arches and further, the use of mortar in their construction is rendered unnecessary.

A further object is to prevent the eddying of air in the ash pit opening and thus assuring a supply of clean air to the combustion chamber with obviously better results.

It is now well known that comparatively cold air admitted directly into or very near the combustion zone of a coal fire will cause a coking and clinkering of the fuel affected by the cold air and a further object, therefore, is to provide, in a device of this kind, a preheated additional air supply above the region where combustion is designed to take place, thus eliminating to a large extent such coking and clinkering.

A further object of the invention is to provide a forwardly sloping sand bed for the coal or other fuel whereby any clinkers are prevented from adhering to the walls of the box and may be readily removed therefrom.

A further object of the invention is the pro-

vision of hollow guards or retaining bars for holding the fuel in position while the fire is burning and which are removably mounted in order for easier access to the ash pit.

A further object of the invention is the provision of a horizontally slidable perforated apron which is designed to act as a wind breaker against unnecessary drafts but which may readily be moved out of the way when cleaning the fire box.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which

Figure 1 is a front elevational view of a fire box constructed according to my invention, in normal operating condition,

Figure 2 is a similar view showing an apron, hereinafter to be more fully described, in a position at one side of the fire pit,

Figure 3 is a vertical sectional view taken on line 3—3 of Figure 1,

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 3,

Figure 5 is a transverse sectional view taken on line 5—5 of Figure 3,

Figure 6 is a transverse sectional view taken on line 6—6 of Figure 3 and

Figures 7, 8 and 9 are enlarged perspective views of various arch-members utilized in the construction of my device.

Referring more particularly to the drawings, I have shown therein a fire box having a front wall 10, a rear wall 11, side walls 12 and a floor 13. Built into the front wall of the box is a table arch 14 supported upon a pair of base blocks 15. The table arch is preferably constructed of a pair of substantially arcuate shaped blocks 16 at either side and a keystone 17 having its upper portion flared to form shoulders 18 which rest upon corresponding seats 19 in the blocks 16.

Supported upon the table arch 14 is a block 20 formed to provide a short horizontal feeding table 21 on its top side and an inclined fuel table 22 at its rear side.

Mounted in the side walls 12 in such manner that its front side is parallel to the rear wall of the table arch 14 is a baffle arch 23 constructed similarly to the table arch 14 and having a keystone 24 in which a centrally disposed cylindrical opening or pipe 25 is formed.

Immediately to the rear of the baffle arch 23 and similarly mounted and of similar construction to the baffle arch is a combustion arch 27 which is of greater size than the baffle arch and 5 extends upwardly beyond the top of the baffle arch. The combustion arch is provided with the usual keystone 28 and an air supply pipe is mounted in the wall 10 directly above the keystone 27.

10 The lower corners of the bases 31 of the combustion arch 27 nearest the baffle arch 23 are cut away to form horizontal passages 32. A pair of pipes 33 are located in the front wall 10 at either side of the baffle arch 23 and form 15 interconnecting passages between the atmosphere and the passages 32. It will be observed that the space between the combustion arch 27 and the rear wall 11 forms a flue 34. Sand is arranged in a forwardly sloping pile against the rear wall 11 to form a sand base 35 for the fire.

20 A rearwardly and downwardly extending piece of angle iron is arranged horizontally across the block 20 to form a lip 36 therefor.

In each of the base blocks 15 are set a pair of 25 hooks 37 for removably supporting a pair of hollow retaining bars 38.

A horizontal rod 39 is removably mounted in a pair of eyes 40 fastened in the front wall 10 at either side of the block 20.

30 Slidably mounted upon the rod 39 by means of a pair of vertical arms 41 looped therearound is a flat apron 42 having a plurality of openings 43.

The pipes 30 and 33 are provided with perforated coverings 44.

35 In operation, a fire is started in the ash pit of the fire box and additional fuel is fed to the fire until the fire has reached the table arch 20. Fresh coal is thereafter fed over the feeding table 21 and downwardly upon the fuel table 22.

40 It will be seen that the fuel feed to the fire will be continuous and that the fuel itself will be preheated before reaching the combustion zone by reason of being fed slowly and naturally down to this zone.

45 The passages formed by the pipes 33 and the passages 32 in the baffle arch 27 are for the purpose of feeding an overdraft of air which will be preheated by reason of its contact with the walls of the passages, which in turn derive 50 heat from the heated walls of the fire box.

These passages form an important part of the present invention inasmuch as they have been so designed that this overdraft of heated air furnishes a supply of oxygen to the hot volatile gases leaving the combustion zone of the 55 fire and permits the oxidation of such gases instead of allowing them to escape unused. Moreover, if such additional air were fed directly into the zone of combustion, it would 60 have a tendency to form clinkers, as such air would be relatively cold in comparison to the burning fuel, even though it had derived heat on its passage through the walls of the box.

65 The inner walls of the baffle arch 23 and of the ignition arch 27 will become heated to incandescence when the fire is in operation and thus the volatile gases given off by the coal will be ignited upon coming into contact therewith. This latter combustion is aided by the supply 70 of heated air coming into the fire box through the passages 32.

The pipe 30 is provided in order that a preheated supply of air may be furnished the gases passing up the flue 34 so that if any gases are 75 contained therein which have not been oxidized

they will be burned upon coming into contact with this additional air.

The sand base 35 is provided so that the ashes resulting from the combustion of the coal 80 will be fed forwardly and downwardly by gravity toward a point directly beneath the table arch 14. This sand base serves a double purpose in that it not only feeds the ashes to a readily accessible point for their removal by the fireman, but also prevents clinkers from 85 forming upon the inner walls of the fire box. The sand may, of course, be rearranged or replaced from time to time with little difficulty or expense.

The bars 38 are provided for retaining the mass of coal in position and are constructed of hollow material in order that air may circulate through them and prevent their melting 90 because of the heat of the fire. Either or both of them may easily be removed whenever it is desired to gain freer access to the ash pit, as they merely rest in place upon the hooks 37. 95

The covers 44 are provided for regulation of the amount of air it is desired to feed into the fire box. 100

The perforated apron 42 affords a control for the main draft for the fire, which draft, of course, is through the ash pit opening. This apron prevents wind from causing an unnecessarily forced draft but does not in any way hinder the free passage of air to the combustion 105 chamber, as air may readily pass not only through the perforations 43 in the apron, but due to the spacing between the apron and the front wall 10 of the fire box, air may pass 110 around the sides of the apron. The apron is constructed to slide along the bar 39 and so may be moved to either side of the ash pit opening whenever desired.

The pipe 25 is provided for the purpose of 115 observing the state of the fire.

The particular construction of the arches employed in my device, I deem of importance in that upon expansion, which is very great in devices of this kind due to the high degrees of 120 heat attained, the ordinary arches have a tendency to crack due to the slipping down of the keystone and other parts of the arch which later are compressed upon cooling. In my device this slipping is prevented as the keystone 125 rides upon the seats 19 in the blocks 16 and the corresponding seats in the other arches employed in the construction of the box.

While I have shown the preferred form of my invention herein, I do not wish to be limited to 130 the exact structure described, but any change or changes may be made in the material or structure within the scope of the appended claims.

I claim:

1. A fire box comprising enclosing walls forming a combustion chamber, a flue communicating therewith, the chamber having at its front an upper and a lower opening and having between said openings an arch composed of side 140 blocks and a keystone having shoulders adapted to rest upon seats cut in the side blocks and a solid rearwardly and downwardly extending platform resting upon said arch and having its base flush with the front and rear walls of the 145 arch.

2. In a fire box, the combination of enclosing walls forming a combustion chamber, having a fuel opening at its front and an ash pit opening below the fuel opening, a supporting arch 150

- above the ash pit opening, a rearwardly and downwardly extending platform resting upon said arch and having its base flush with the front and rear walls of said arch, a baffle arch above the fuel opening and having its front side substantially in the same plane as the rear side of the supporting arch, a third arch mounted above and behind the baffle arch and having cut away portions in its ends, a flue communicating with the combustion chamber, and a pair of air passages formed in the front wall at either side of the fuel opening and communicating with the cut away portions of the third arch.
3. In a fire box, the combination of enclosing walls forming a combustion chamber, having a fuel opening at its front and an ash pit opening below the fuel opening, a supporting arch above the ash pit opening, a rearwardly and downwardly extending platform resting upon said arch and having its base flush with the front and rear walls of said arch, a baffle arch above the fuel opening and having its front side substantially in the same plane as the rear side of the supporting arch, a third arch mounted above and behind the baffle arch and having cut away portions in its ends, a flue communicating with the combustion chamber, a pair of air passages formed in the front wall at either side of the fuel opening and communicating with the cut away portions of the third arch and a base of loose sand in the combustion chamber inclined downwardly toward the ash pit opening.
- JOHN F. SLATER.

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