

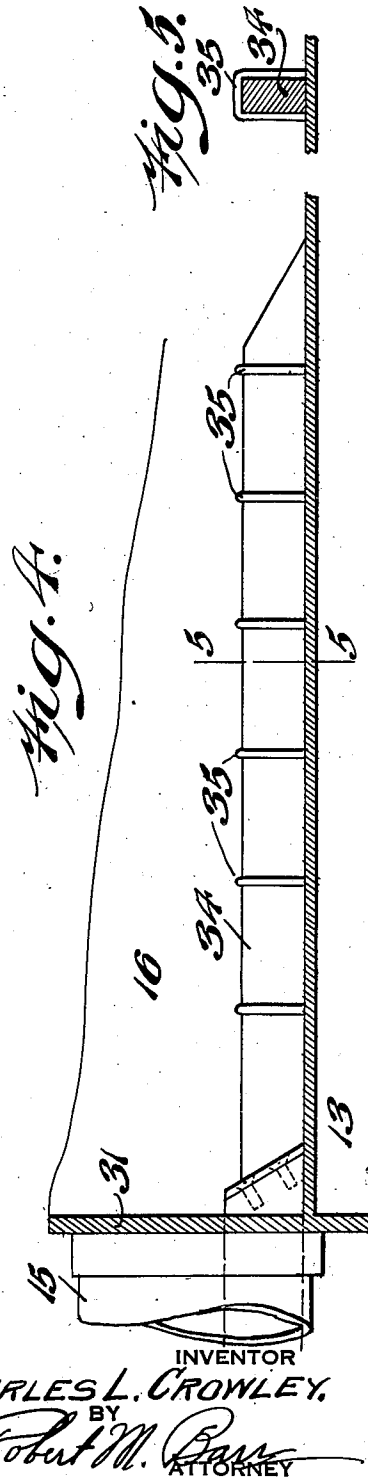
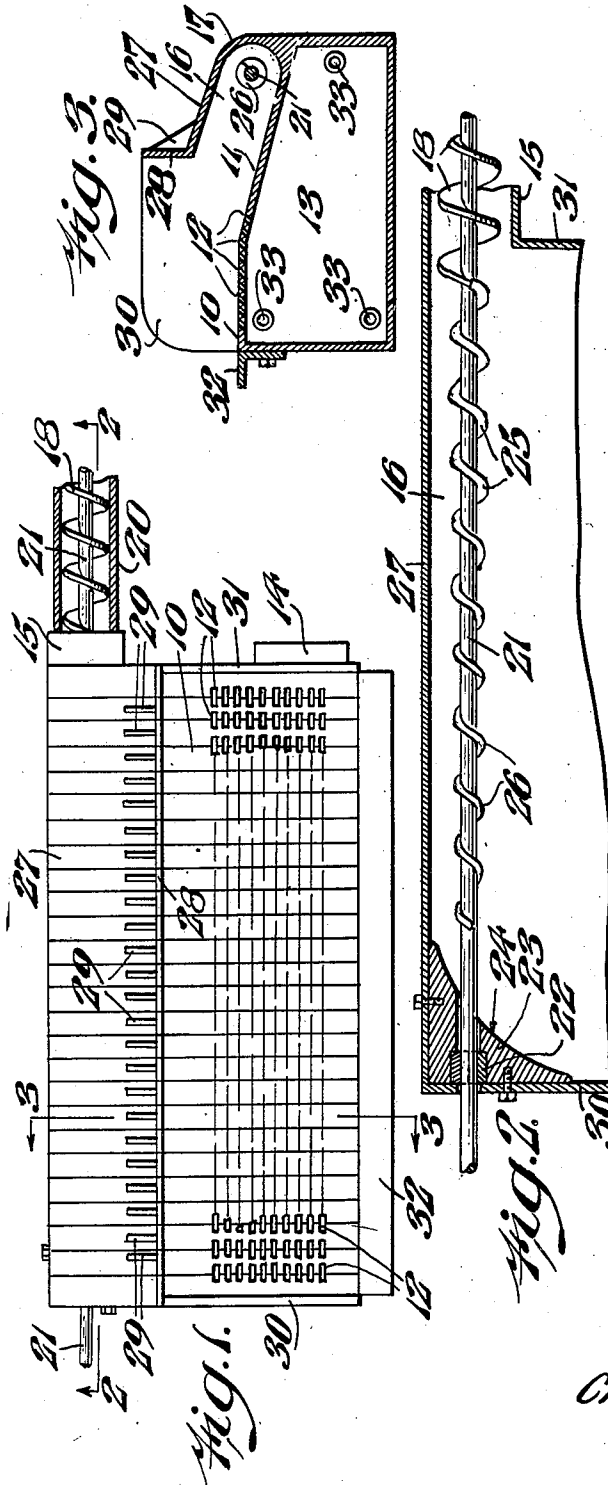
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RETORT FOR COAL STOKERS

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RETORT FOR COAL STOKERS

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The present invention relates to coal stokers and more particularly to a novel retort for use therewith.

In coal stoking equipment for household heaters and boilers it has been the general practice to employ a retort of circular shape because it lends itself to fairly uniform distribution of the coal, a more or less even fuel bed, and the ready trimming off of the ash by gravity, the motion of the retort, or the use of a mechanical scraper. While such retorts function efficiently in combustion chambers which are circular in cross-section, a very different result obtains where the combustion chamber is of oblong contour. In such case it is usually impossible to install a round retort of sufficient grate size to burn the required amount of coal per hour necessary to produce the steam output for which the boiler was designed. The limiting dimension of course is the width of the oblong combustion space. To install two circular retorts requires two stokers and makes the expense for home use prohibitive. On the other hand if a retort is installed which corresponds to the oblong or rectangular shape of the combustion chamber there at once arises problems of operation not heretofore solved, for example an effective feeding means which will uniformly distribute the fuel; an economical and efficient means for removing the ash from four sides; how to prevent banking of fines, and many other details heretofore presenting unsolved obstacles to the use of a rectangular retort.

Some of the objects of the present invention are to provide a new and novel retort for use with coal stokers; to provide a retort which will operate a rectangular heater or boiler efficiently; to provide a rectangular retort wherein provision is made for equal distribution of fuel and a uniform fuel bed obtained under burning conditions; to provide for the economical and efficient removal of ash from a rectangular retort; and to provide other improvements as will hereinafter appear.

In the accompanying drawing Fig. 1 represents a plan of a rectangular retort embodying one form of the present invention; Fig. 2 represents a section on line 2—2 of Fig. 1; Fig. 3 represents a section on line 3—3 of Fig. 1; Fig. 4 represents a longitudinal section of a retort embodying the invention equipped with a pusher type of fuel feed; and Fig. 5 represents a section on line 5—5 of Fig. 4.

Referring to the drawing, one form of the present invention consists of a retort of generally rectangular shape and made of suitable heat re-

sisting material to provide a fuel supporting and burning surface or grate 10 which forms a continuation of a way or track 11 leading from the longitudinal coal receiving side of the retort, this track 11 as shown by way of example is in the form of a ramp or upwardly inclined plane surface over which the fuel travels. The grate 10 is provided with a plurality of tuyères 12 suitably distributed throughout the surface for the passage of air as delivered under forced draft from a wind-box 13 which extends beneath the grate 10 as will be seen. An air inlet 14 serves to admit air to the wind-box 13 and is in communication with a suitable blower (not shown) or other source of forced draft. A fuel inlet 15 communicates with one end of the retort in substantial register with the coal receiving space 16 formed by the semi-circular side wall 17.

For feeding fuel to the aforesaid space 16, the form of the invention shown in Figs. 1 to 3 utilizes a worm 18 coaxially mounted in a pipe 20 which extends into the fuel bin, this latter being usually adjacent to the furnace. In the present construction the worm shaft 21 extends lengthwise of the retort to project from the end where it is arranged to be driven from the stoker motor. As shown this end of the shaft 21 is journaled in a bearing 22 formed by a filler block 23 having an inner curved face 24 disposed in the path of the moving fuel. After the fuel has been delivered within the fuel inlet 15 provision is made for distributing it throughout the length of the receiving space 16 in such a manner that the resulting fuel bed on the grate 10 is of substantially uniform depth. In the present instance this even distribution of the entering fuel is accomplished by a variation of the diameter of the worm flights, and in the preferred construction changing the character of the worm itself. Thus where the main fuel feeding worm 18 has flights of two inch diameter and of the usual plane surface spiral, the grate feeding worm has flights formed of round rod 25 of, for example, three eighths diameter and a second round rod 26 of, for example, one quarter inch diameter. The two rods 25 and 26 are wound as a continuous spiral about the shaft 21 and, preferably, have the same pitch as that of the worm 18, though this is not to be taken as a necessary arrangement. As shown the flight rods 25 and 26 are welded to the shaft 21 with the larger diameter rod 25 joining the worm 18 and the smaller diameter rod 26 terminating in close proximity to the curved face 24 of the block 23.

In order to control the thickness of the fuel bed,

an upwardly inclined plate 27 is located above the grate worm and, as shown, is substantially parallel to the track 11 forming a canopy which terminates at the entrance to the grate proper. The free edge of this plate or canopy 27 is turned upwardly as a vertical flange 28, the respective ends of which abut the end walls 30 and 31 of the retort. Preferably this flange 28 is reinforced by ribs 29 arranged at suitable intervals. Thus as the fuel is delivered to the space 16 the thrust of the worm reacts against the canopy 27 to maintain an even upward travel of the fuel along the track 11 with that portion between the track 11 and canopy 27 having a mass travel towards the grate at a rate predetermined by the fuel consumption so that as fuel enters one side of the grate ash will leave the opposite side. At this discharge side a lip 32, formed of an angle iron, is preferably provided as a spill-over ledge for the ashes, and is bolted or otherwise fixed in position.

While in the foregoing the retort of the invention has been described as a unitary structure, and it can be so constructed, the preferred construction is to make it in transverse sections which are bolted together by tie rods 33 extending longitudinally of the retort and preferably in the wind-box 13. As shown the sections are relatively thin but each includes a grate surface with tuyères, a wind-box, a fuel receiving space, canopy, and all elements required to form the complete retort when assembled and bolted together. This construction makes it possible to vary the size of the retort to meet conditions by adding or removing sections as necessary.

In the form of the invention of Figures 4 and 5, the retort is shown equipped with a pusher type of fuel feed, wherein a reciprocable bar 34 is mounted for operation within the fuel receiving space 16. As shown the bar 34 is rectangular in transverse section and carries a plurality of feeder or pusher elements 35 in the form of U-shaped rods or strips which are welded or otherwise made fast at intervals suitable for efficient feeding of the fuel in the required manner for even distribution.

It will now be apparent that a novel retort has been devised for use in domestic furnaces and boilers having a rectangular fire-box and which can be definitely proportioned to efficiently distribute the heat to all exposed parts of the fire-box. This variation in size takes place by the assembly of the proper number of grate sections to meet the required condition. It should be noted by the provision of the offset fuel receiving space that the retort readily takes its centrally disposed position even in boilers having a side water leg since the offset can fit thereunder while leaving the grate properly located for effective heating.

In operation the fuel is fed to the receiving space by the worm 18 from the fuel bin and is then handled by the two worms of smaller diameter which are arranged in diminishing order. This construction causes the fuel to be distributed evenly along the entire long side of the fuel passage, while during such regulated distribution the overhanging canopy reacts to the thrust of the fuel to automatically form a fuel bed of uniform thickness and width. This results from the uniform lateral velocity imported to the fuel. That portion of the fuel which travels clear to the end of the receiving chamber is directed towards the grate by the block face 24 and thereby

prevents any pockets of fines or the like forming at that place. While the preferred form shows the worm having flights which vary in diameter, the invention is not limited in this particular as flights of different pitch or tapering flights might be employed satisfactorily.

While only a single form is shown in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be applied to various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, I claim:

1. A retort for burning non-coking, non-caking coals, comprising a horizontal grate arranged to receive fuel at one side and to discharge ash at another side, said grate having a plurality of tuyères therethrough, a wind-box for supplying air to said tuyères, means including an inclined plane surface to feed fuel upwardly to the receiving side of said grate, means associated with said feeding means for delivering the fuel evenly throughout the length of said receiving side, and guiding means spaced from and substantially parallel to said inclined surface coacting with said feeding means to maintain a substantially uniform depth and width of the fuel bed.

2. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a grate with tuyères and an inclined track leading upwardly to said grate, a canopy plate above and parallel to said track forming a fuel receiving chamber and a fuel passage opening onto said grate, and a fuel feeding means arranged to discharge into said receiving chamber.

3. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a substantially horizontal grate with tuyères and an inclined covered track leading upwardly to one side of said grate, and means to deliver fuel evenly throughout the width of said track.

4. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a substantially horizontal grate with tuyères and an inclined track leading upwardly to one side of said grate, means to deliver fuel evenly throughout the width of said track, and means reacting to the thrust of said delivering means to regulate the depth of the fuel bed.

5. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a substantially horizontal grate with tuyères and an inclined track leading upwardly to one side of said grate, means to deliver fuel transversely across the lower end of said track, and means coacting with the delivered fuel to evenly distribute said fuel across said track.

6. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a substantially horizontal grate with tuyères and an inclined track leading upwardly to one side of said grate, means to deliver fuel transversely across the lower end of said track, and means in the path of the delivered fuel to prevent improper collection of fuel at the inlet side of said track.

7. A section for a retort for burning non-coking, non-caking coals, comprising a frame forming a bottom, front and rear sides, and a top, said top forming a grate provided with tuyères and a track downwardly inclined from said grate, and a canopy arising upwardly and extending over said track and spaced therefrom to provide a fuel inlet and control passage for fuel.

8. A retort for stoker firing of domestic heaters comprising a substantially horizontal grate unobstructed along one side to discharge ash, means forming a fuel receiving chamber along the opposite side of said grate and below the level thereof, a fuel feeding means operating lengthwise of said chamber, and means including a top plate form-

ing an upwardly inclined fuel passage leading from said chamber to said grate, said top plate functioning as a reacting area to evenly guide said fuel to said grate.

9. A retort for burning non-coking, non-caking coals, comprising a rectangular frame forming an enclosed wind-box having an air inlet, the top of said wind-box forming a grate with tuyères and an inclined track leading upwardly to said grate, a canopy plate above said track forming a fuel receiving chamber and a fuel passage opening onto said grate, and a fuel feeding means arranged to discharge into said receiving chamber.

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