Sept. 18, 1934. M. C. RICHARDSON 1,973,965

TUYÈRE SECTION FOR COAL BURNING STOKERS

Filed April 22, 1930 2 Sheets-Sheet 1

FIG. 1

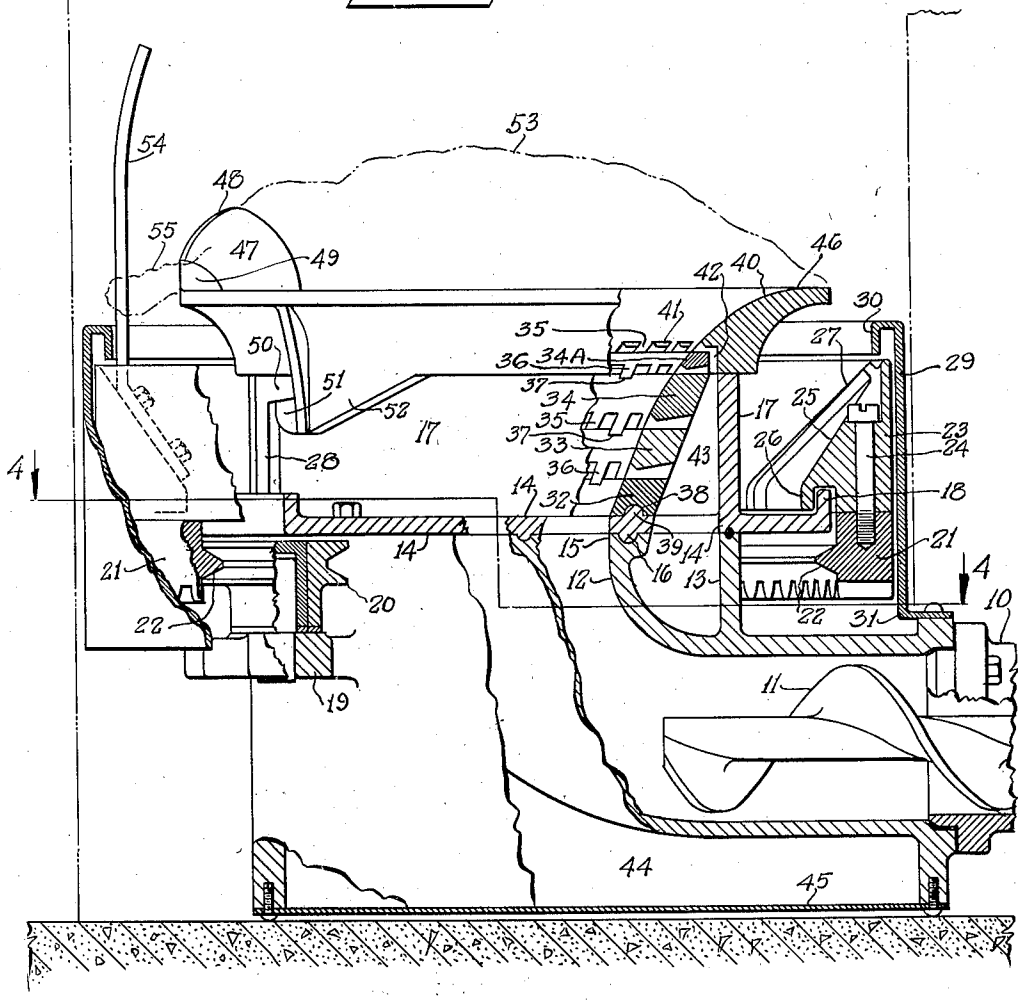
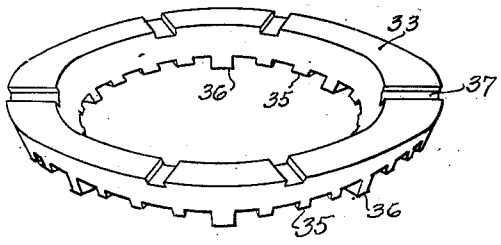


FIG. 2



INVENTOR
M. C. RICHARDSON
BY C. B. Richardson
ATTORNEY

Sept. 18, 1934. M. C. RICHARDSON 1,973,965

TUYÈRE SECTION FOR COAL BURNING STOKERS

Filed April 22, 1930 2 Sheets-Sheet 2

FIG. 3

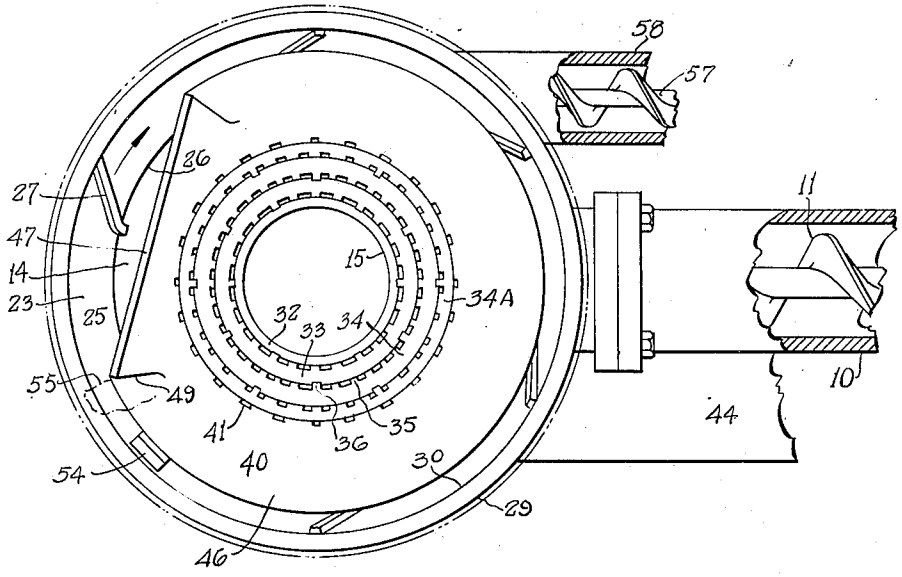
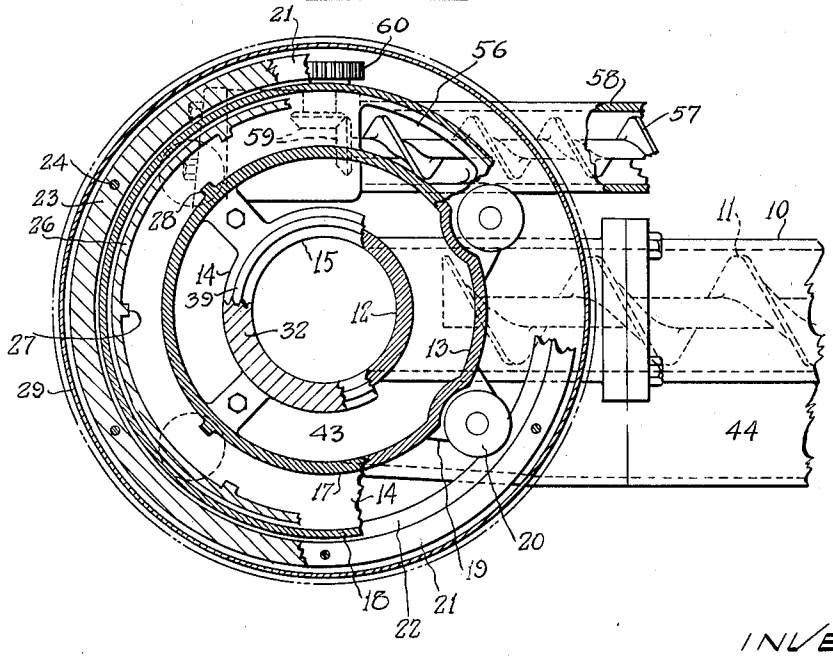


FIG. 4



INVENTOR
M. C. RICHARDSON
BY
ATTORNEY

Patented Sept. 18, 1934 1,973,965

UNITED STATES PATENT OFFICE

1,973,965

TUYÈRE SECTION FOR COAL BURNING STOKERS

Max C. Richardson, Portland, Oreg., assignor to Iron Fireman Manufacturing Company, Portland, Oreg.

Application April 22, 1930, Serial No. 446,207

4 Claims. (Cl. 110—45)

This invention relates generally to coal burning stokers of the under feed type, and particularly to an improved form of tuyère section for use in connection with such devices.

The main object of this invention is to provide a tuyère or grate section adapted for automatic ash removing which will provide the maximum amount of grate surface for a given size of combustion chamber in the furnace in which it is to be installed.

The second object is to construct a tuyère section which will be simple to manufacture and assemble and which will facilitate the renewal of defective or damaged parts.

The third object is to provide a tuyère section having an outlet in its periphery for the escape of clinkers, and also the provision of a wall between said outlet and the center of the tuyère section for the purpose of permitting the maintenance of a fuel bed to a height equal to that which could be maintained if no outlet opening were present.

The fourth object is to provide a slicing bar for breaking up and pulling clinkers from the fire bed.

The fifth object is to so construct the tuyère or grate section that it will adapt itself to the reception of fuel from a feed screw and to the uniform distribution of fuel across the grate surface.

The sixth object is to construct a stratified tuyère section in which the sections are so constructed as to orient themselves with relation to each other and to hold same concentric about the vertical axis of the retort, and at the same time provide a dependable locking means for the sections which will be devoid of screws or other parts not adapted to withstand the conditions commonly found within a combustion chamber.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawings, in which:

Figure 1 is a vertical section through the device.

Figure 2 is a perspective view of a tuyère section.

Figure 3 is a plan of the device with the connecting parts broken away.

Figure 4 is a horizontal section along the line 4—4 in Fig. 1.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, there is shown a fuel feed duct 10 of an underfeed stoker employing a fuel feed screw 11 for the purpose of feeding coal upwardly through the retort section 12. Surrounding the section 12 and integral therewith is a wall 13 upon which rests the ash table 14, which extends outwardly from the wall 13 and inwardly therefrom to the inner edge 15 of the retort section 12. The under side of the ash table 14 is provided with an annular rib 16 which occupies a corresponding recess in the section 12 for location purposes.

Rising from the ash table 14 directly above the wall 13 is an upturned flange 17. On the outer edge of the ash table 14 is formed a similar upturned flange 18. Supported on brackets 19 on the wall 13 are the grooved rollers 20 which support the ring gear 21 by engaging its inturned track 22. Obviously an internal gear could be employed in place of the ring gear. On the ring gear 21 is secured a grinding ring 23 by means of the screws 24. The inner face 25 of the grinding ring 23 slopes inwardly and downwardly and terminates in a lip 26 which overhangs the flange 18. The face 25 is provided with a plurality of grinding ribs 27 which preferably slope in the direction indicated. It is desirable to provide ribs 28 on the outer side of the flange 17 to cooperate with the ribs 27.

Surrounding the grinding ring 23 is a cylindrical guard 29 whose inwardly and downwardly turned upper edge 30 is employed to prevent ashes from finding their way into the driving mechanism of the grinding ring 23. The lower end 31 of the member 29 is secured to the retort section 12.

Mounted on top of the ash table 14, close to its inner edge 15, is a series of annular tuyère sections 32, 33, 34 and 34—A. The under sides of the sections 33, 34 and 34—A are provided with a plurality of radial lugs 35 and 36. The lugs 36 are slightly longer than the lugs 35 and extend into the corresponding recesses 37 in the next section below. The under side of the section 32 is provided with an annular groove 38 to receive the annular rib 39 on the top side of the table 14.

On top of the section 34—A and the flange 17 rests the tuyère rim 40 which is circular in shape and is provided with tuyère openings 41 having connecting passageways 42 which connect with the plenum or air chamber 43 which is supplied with air from the air box 44 whose under side is preferably made tight by means of a floor plate 45.

The tuyère rim 40 is provided with an outwardly curving face 46, one or more sides of which may be flattened off and provided with an up-standing wall 47 having a curved top edge 48 and a shoulder 49 formed at one end thereof.

The purpose of the curved top edge 48, which is in reality but a cross section through a dome-shaped mass of fuel, is to support the fuel in exactly the same positon and shape as though no portion of its horizontal supporting surface had been cut away. The purpose of the shoulder 47 is to facilitate the breaking of the clinkers against the slicing member 54, which clinkers might otherwise run up over the top of the curved surface 48 without being broken or pulled from the mass of fuel.

On the outside of the flange 17 are formed the lugs 50 which are adapted to engage the hooks 51 extending from the rib arms 52 which are integral with the rim 40. The purpose of these hooks is to permit the rim 40 to be employed as a locking member for the various tuyère sections 32, 33, 34 and 34—A, and the direction of locking corresponds with the direction of rotation of the ring 23.

It will be noted that, although the rim 40 is not a complete circle due to the fact that space must be provided to permit the escape of the clinkers, it can readily be seen that, due to the presence of the wall 47 and its location and angular position (as better shown in Fig. 3) the shape of the fuel bed 53 is substantially the same as it would be if the rim 40 were a complete circle.

Secured to the ring 23 is a slicing member 54 which travels about the outside of the rim 40 removing the over-hanging clinkers 55, and if they reach the point where the shoulder 49 is located it serves to partially break up the clinkers 55 allowing same to fall between the grinding ring 23 and the flange 17. It will be noted that the under side of the rim 40 is provided with the same lugs 35 as are the tuyère sections 33, 34 and 34—A.

At one point just beyond the wall 47 in the direction of rotation is located an outlet opening 56 beneath which is positoned an ash removing worm 57 which is confined within a casing 58 and drives the grinding ring 23 by means of the gears 59 and 60 in any convenient manner.

It can be seen from the above that by this arrangement it is possible to secure a greater outside diameter for the rim 40 and therefore a greater burning surface from a given diameter of boiler or furnace. This is of special importance where the capacity of the heating element is already taxed and it is not desired to sacrifice grate surface for the purpose of employing an ash remover.

It will be noted that in the drawings there is shown only one wall 47 and that its position is at the farthermost end of the retort just preceding the outlet opening 56. It must be understood that in some instances it may be found desirable to employ more than one wall. The same is true of the construction of the tuyère sections 32, 33 and 34 and the manner in which they are held concentric with relation to each other. Obviously, the number of slots may be varied without departing from the spirit of this invention and the drawings are merely intended to illustrate the preferred form and are not intended to limit the scope of the appended claims.

I claim:

1. An annular tuyère section having a plurality of radial slots formed in one face thereof, the other face having a plurality of spaced radial lugs formed thereon providing air passages therebetween some of which lugs are of greater length than are the others for the purpose of occupying slots in the next adjacent section.

2. A stoker fire pot having in combination a stationary tuyère rim surmounted thereon; said rim having a raised flattened side formed on its outer edge, a rotary grinding ring spaced from and encircling said fire pot, an upright slicer bar carried by said ring, and means to rotate said ring whereby said bar co-acts with said flattened side to crush clinkers therebetween.

3. A retort comprising a plurality of annular tuyère rings having radial lugs projecting unequal distances from one side thereof and having radial slots formed in the opposite side thereof whereby the longer lugs of one section engage the slots of the next adjacent section for the purpose of holding the same in superimposed coaxial relationship and forming tuyère openings between said sections.

4. A stoker fire pot having in combination a stationary annular tuyère rim surmounted thereon; said rim having a raised flattened side formed on its outer edge, a rotatable grinding ring spaced from and encircling said rim, and means for rotating said ring.

MAX C. RICHARDSON.