Jan. 9, 1945. F. G. JULYAN ET AL 2,366,966

SEGMENTAL RETORT

Original Filed Aug. 3, 1940

Fig. 1

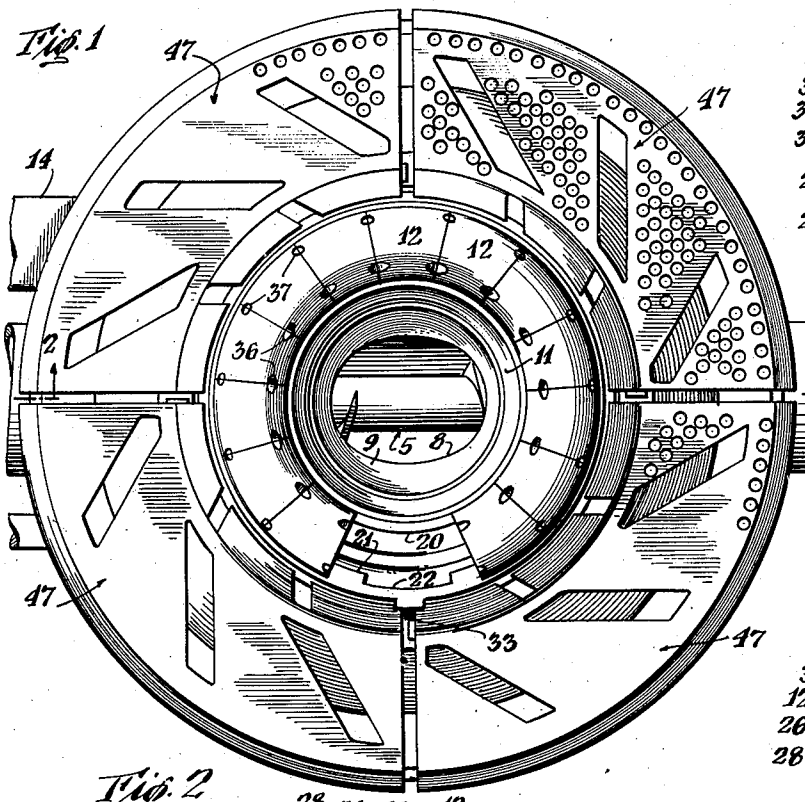


Fig. 3

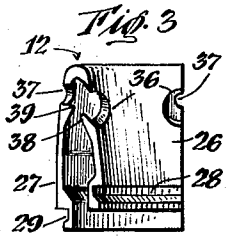


Fig. 5

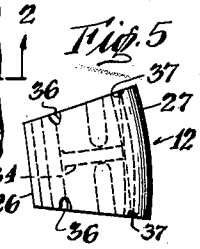


Fig. 4

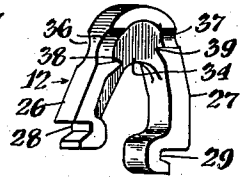


Fig. 2

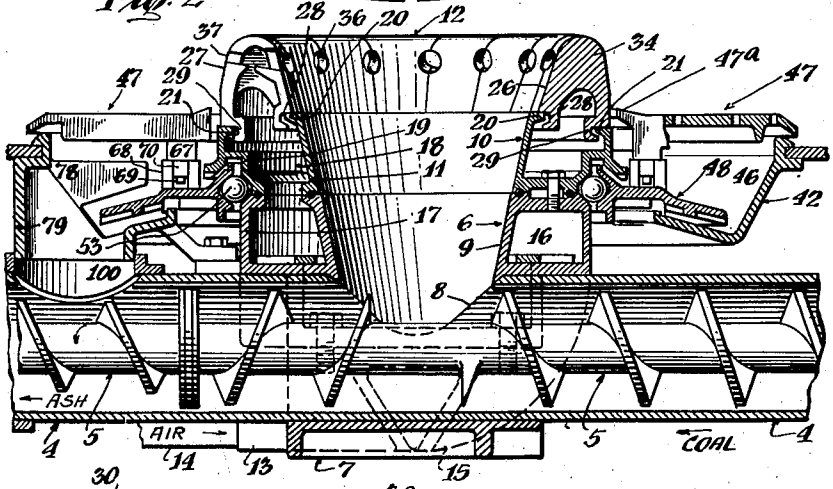


Fig. 6

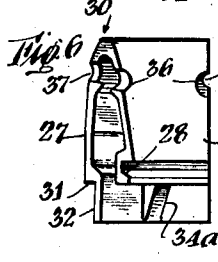
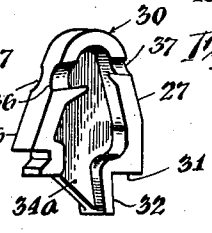


Fig. 7



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SEGMENTAL RETORT

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Original application August 3, 1940, Serial No. 350,500. Divided and this application March 25, 1941, Serial No. 385,061

1 Claim. (Cl. 110—45)

This invention relates to stokers and particularly to those made for domestic and analogous uses.

The object of the invention is to provide a simple and inexpensive burner unit for such a stoker in which the portion of the unit exposed to the heat of the fire is not injured by warpage, due, for example, to the existence of different temperatures in different parts of the burner unit.

In the accompanying drawing,

Fig. 1 is a plan view of the burner unit of a stoker embodying the invention;

Fig. 2 is a vertical sectional view of the burner unit taken along the axis of the conveyor as indicated by the line 2—2 in Fig. 1;

Figs. 3 and 4 are elevational views of tuyère segments from different angles, and Fig. 5 is a plan view of one of the tuyère segments; and

Figs. 6 and 7 are elevational views from different angles of the key tuyère segment.

Referring to Figs. 1 and 2, the burner unit shown consists of a burner body 6 fitting over the conveyor pipe 4 and clamped in position by the burner body yoke 7. The top of the pipe 4 is provided with a generally circular coal opening 8 the edges of which are engaged by the bottom of the inner annular retort surface 9 provided in burner body 6. Bolted to the top of the burner body is the retort base 10, the interior annular surface 11 thereof forming an upward continuation of the retort surface 9. Positioned above and secured to retort base 10 are the tuyère segments 12.

Burner body 6 has a hollow portion 13 with a rectangular opening at one side of conveyor pipe 4 for receiving the burner end of the rectangular air tube 14. From this opening the burner body has a passageway 15 communicating with the annular air chamber 16 formed therein between the inner annular wall 9 and an outer annular wall 17, this air chamber 16 being positioned above the conveyor pipe 4. Retort base 10 is provided with an annular air passageway 18 between the inner annular wall 9 and an outer annular wall 19, this air passageway 18 communicating with the burner air chamber 16 below and the interior of the tuyère segments 12 above so that the air from the air tube 14 flows up into and around burner air chamber 16, up through air passageway 18 and into the tuyère segments 12.

The inner and outer annular walls 11 and 19, respectively, of the retort base are provided at their upper edges with flanges 20 and 21 directed toward each other. The flange 20 on the inner wall 11 is continuous throughout the circumference of the base 10. The flange 21 on the outer wall 19 is continuous throughout the circumference of the base 10 except for a portion, shown at 22 in Fig. 1, where it is omitted, this omitted portion being of sufficient length to permit the insertion of the tuyère segments 12.

The tuyère segments 12 (see Figs. 3–5) are substantially U-shaped members having their outer surfaces 27 transversely arcuate about a common center and their sides lying in planes radial to such center so that when a number of these are assembled side by side they form a ring with the inner surfaces 26 of the tuyère segments forming a surface extending upwardly from the top of retort base 10 which is substantially an upward extension of retort surfaces 9 and 11. The lower ends of the inner and outer surfaces 26, 27 of the tuyère segments are provided with grooves 28 and 29, respectively, the groove 28 on the inner surface 26 facing inwardly (i. e. toward the center of the assembled ring) while the groove 29 on the outer surface 27 faces outwardly (i. e. away from the center of the assembled ring) so that the grooves 28 and 29 are engaged by the retort ring flanges 20 and 21, respectively.

In assembling the burner unit, the tuyère segments 12 are individually inserted in the portion 22 of the retort base 10 while fitting the retort segment groove 28 over the inner flange 20 and then each retort segment is slid around circumferentially so that retort segment groove 29 fits over the outer flange 21.

The last tuyère segment to be inserted is the key segment 30 (Figs. 6 and 7). This segment has no groove 29 at the bottom of its outer surface 27. Instead, only a shoulder 31 and a downwardly extending lip 32 is provided. Shoulder 31 rests on the top of the retort base outer annular wall 19, and the lip 32 is engaged by a set screw 33 threaded into the outer base wall 19 from the outside, just below the top. The lip 32 may be tapered slightly outwardly, as shown, to facilitate the locking action of the set screw 33.

Each tuyère segment 12 has a radial rib 34 connecting the inner and outer surfaces 26, 27, the radial rib 34a of the key segment extending the whole height of the surfaces in order to prevent springing of the segment under excessive fastening pressure of the set screw 33.

Each tuyère segment 12, including key segment 30, has its inner surface 26 provided with two halves of inner tuyère openings 36, the halves being at opposite sides so that they cooperate with the half openings of the adjacent tuyère seg-

ments to form the full-sized, substantially circular, inner tuyère openings **36**. These tuyère openings are downwardly directed at a small angle, about 10°, and are provided at their lower edge with a lip or shelf **38** projecting within the tuyère segment a substantial amount (about the thickness of the wall of the tuyère segment) so as to tend to catch any ash or other fine particles sifting in through the tuyère opening **36** and prevent such particles from falling down into the air passageways. These shelves **38** are particularly effective during the idle or banking period of operation when the stoker motor and fan are not in operation. The particles caught by the shelves **38** are blown out into the fire by the air passing through the tuyère openings **36** when the stoker resumes active or forced draft operation.

Each tuyère segment **12**, including key segment **30**, has its outer surface **27** provided with two halves of outer tuyère openings **37**, the halves being at opposite sides so that they cooperate with the half openings of the adjacent tuyère segments to form the full-sized, substantially circular, outer tuyère openings **37**. These tuyère openings are substantially horizontal and somewhat smaller in diameter than the inner tuyère openings **36**, (about one-half). Outer tuyère openings **37** are also provided with lips or shelves **39** similar to the shelves **38** and for the same purpose, the shelves **39** projecting within the tuyère segment a somewhat smaller amount than the shelves **38** (about one-third), in view of the smaller size of the outer tuyère openings.

Surrounding the retort and below the crest of the tuyère segments **12** are the grates **47** which are supported for rotation about the retort. The inner edge **47***a* of the grates extends substantially to the outer tuyère surface **27** above the lower edge thereof. Thus, the inner grate edge **47***a*, and the ashes which collect thereon, tend to shield the top of the outer annular wall **19**, and the key segment set screw **33** which is threaded therein, from the heat of the combustion zone over the grate.

The grates are removably supported above an annular ash table **48** which is rotatably supported upon the exterior of the retort by a ball bearing construction including the balls **53**. The ash table serves to carry the ash which passes through the grates **47** around to the ash discharge conduit **79**, where the stationary blade **78** scrapes the ash off the ash table **48** into the ash conduit **79**, the ash then passing down this conduit and down through ash input opening **100** into the ash portion of conveyor pipe **4**. The ash table is substantially enclosed around its periphery by a dead ring **42** which is supported upon the burner body **6**.

The grates themselves are in four sections, each of which has a downwardly projecting boss **67** which engages the upwardly extending boss **68** formed on the ash table **48**. In addition, each grate boss **67** has a toothed lug **69** which fits under a bridge portion **70** formed in each ash table boss **68** for securing the grate segments in place. One of the toothed lugs **69** for each grate segment is shorter than the other so that the grate segment is placed in position by first fitting the long toothed lug **69** under its bridge **70**, then lowering the grate segment so that the short toothed lug **69** is opposite its bridge **70** and then circumferentially moving the grate segment until the short toothed lug is under its bridge.

In assembling the burner unit **1** the burner body **6** is first clamped to the conveyor pipe **4** by means of the burner body yoke **7**. The dead ring **42** is then secured to the burner body (if not previously secured thereto) and then the ash table **48** and balls **53** are put in place. The retort base **10** is then secured to the burner body, the tuyère segments **12** then inserted on the retort base as described, and then the grate segments **47** mounted upon the ash table **48**, as described.

In operation, the coal is drawn to the burner unit **1** by the coal flight of the conveyor screw **5** and then pushed up into the enclosed portion or retort **9**, **11**, **26** of the burner unit by the coal and reverse coal flights of the conveyor screw. Some of the coal is burned within the retort while the rest of it is burned above and outside of the retort. When the coal is a coking coal, much of the coking occurs within the retort, the coke then burning above and outside of the retort. The ash resulting from the combustion sifts or is shaken through the grates **47** into the ash pocket **46**, and onto the ash table **48** from which the ash passes to the conveyor pipe **4** as described where the ash flight of the conveyor screw **5** conveys the ash to suitable disposal means, not shown.

The burner unit described is durable, simple in construction, and contains few expensive parts. Thus, only the tuyère segments **12** (including key segment **30**) and the grate segments **47** need be made of expensive heat-resisting material, and these are such that there is a minimum of tool work upon these parts. All the remaining parts are either sufficiently air cooled or protected from the heat of the combustion as to enable them to be made of cast iron or other materials which are not only inexpensive but easy to fabricate.

The tuyère ring formed of the tuyère segments **12** and **30** has a substantially unlimited life. The individual segments allow for differences in expansion and contraction under heat and cooling arising from the fact that the retort is subjected to varying temperatures at varying points around its circumference. Thus the individual segments are free to expand or contract without affecting their neighbors. The expansion and contraction of the individual segments is facilitated by the flange and groove mounting of the segments, this mounting at the same time preventing the dislocation of any of the tuyère segments.

This case is a division of application Serial No. 350,500, filed August 3, 1940.

We claim:

A retort structure for an underfeed stoker comprising a retort base having base and body castings bolted together and carrying a surrounding relatively rotatable ash table, the upper of said castings having oppositely directed annular flanges with a portion of one of the flanges omitted, a plurality of inverted U-shaped tuyère segments transversely arcuate about a common center with their sides lying in planes radial to such center, the ends of said segments being provided with grooves facing away from each other, said segments being mounted on said retort base with the flanges fitting into corresponding portions of said grooves, and a removable annluar grate resting on said ash table and rotatable therewith and surrounding said segments below the crown thereof.

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