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COAL STOKER

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Fig. 1

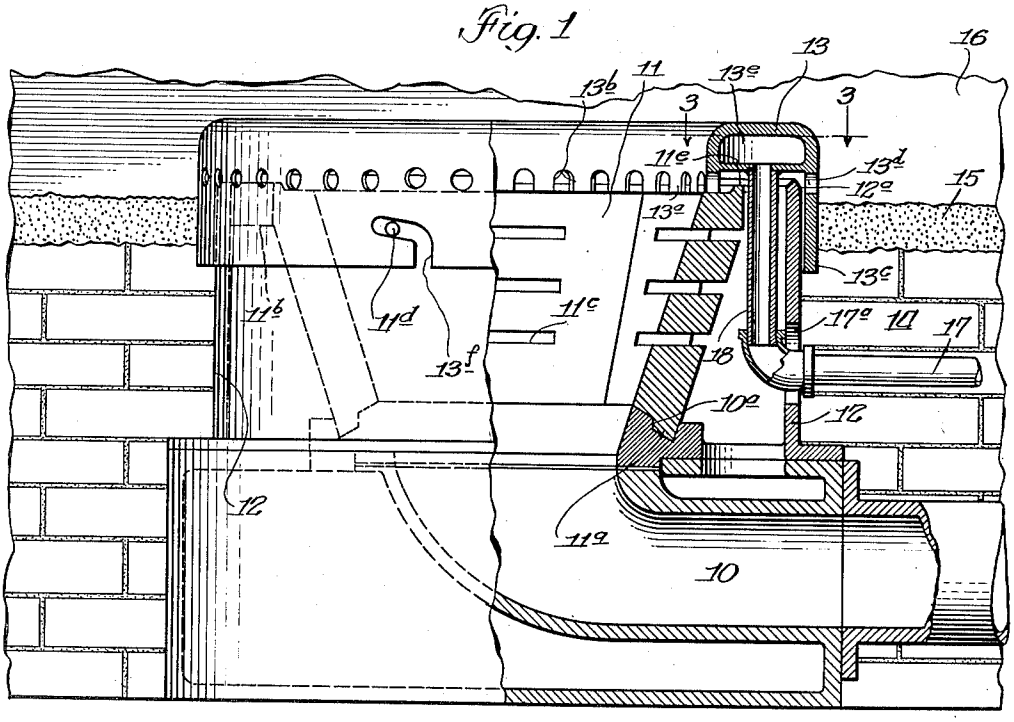
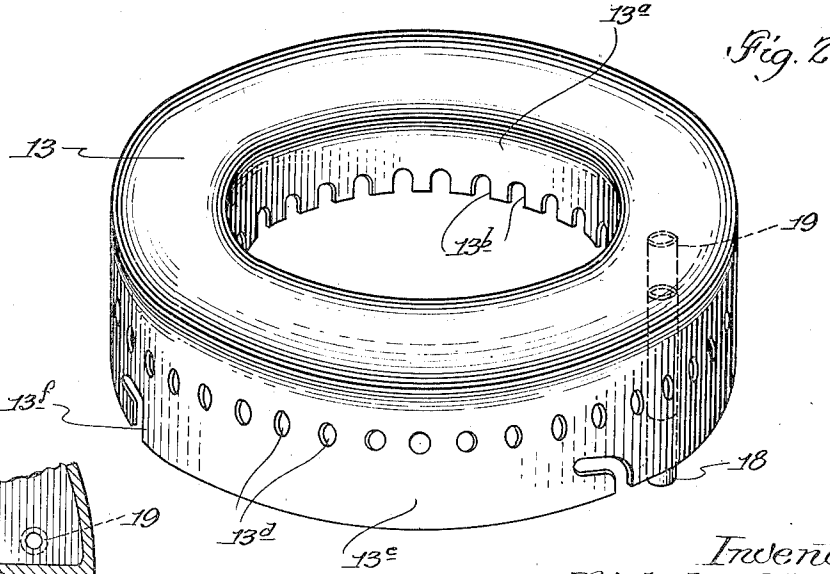


Fig. 2



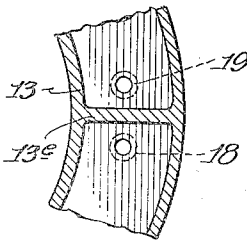


Fig. 3

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COAL STOKER

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6 Claims. (Cl. 110—45)

My invention relates to coal stokers, and more particularly to air supply means for the retorts therein, and my main object is to provide a tuyère for this purpose which attains high efficiency by increasing the diffusion of air to the fuel being consumed and thus promoting the thorough combustion thereof.

A further object of the invention is to provide a tuyère for the stoker which is self-cooling along the zones of combustion by means of water circulation.

A still further object of the invention is to design the novel tuyère as an annular cap or mounting between the retort and the wall of the air chamber in the stoker assembly.

Another object of the invention is to design the novel tuyère in a manner to join and firmly secure a sectional retort in the air chamber of the stoker.

An additional object of the invention is to construct the tuyère in the form of a unit which is readily applicable to or removable from the stoker without dismantling any part thereof.

An important object of the invention is to design tuyère along lines of simplicity and economical manufacture.

With the above objects in view, and any others which may suggest themselves from the description to follow, a better understanding of the invention may be had by reference to the accompanying drawing, in which

Fig. 1 is a vertical section through a stoker fire-pot installation, partly in elevation, showing the novel tuyère installed;

Fig. 2 is a perspective view of the tuyère; and

Fig. 3 is a detailed section on the line 3—3 of Fig. 1.

In the design of stokers for furnaces, boilers, etc., it is essential to provide means for securing as thorough a combustion of the fuel as possible, such means usually including a tuyère marginally of the fire-pot or retort for the supply of air under pressure. While considerable efficiency has been obtained in various forms of stokers, a detrimental factor is the rapid disintegration and destruction of the tuyère from the high temperature in the combustion zone. I am aware that water cooling has been devised for the protection of the tuyère from excessive heat, but such designs as have come to my attention occasion other involvements and deficiencies which I have endeavored to eliminate from the structure constituting my invention.

In accordance with the foregoing, specific reference to the drawing indicates the fuel supply duct of the stoker under consideration at 10, the same developing into the funnel-shaped retort 11. It is noted that the latter is in a series of laterally-assembled sections, these having tongues 11*a* at the bottom which seat in a channel 10*a* of the fuel duct in order to support the retort thereon. The sections of retort 11 are of identical form, so as to be interchangeable or replaceable in case any become defective or break by unequal expansion or contraction from changes in temperature. The air chamber wall is indicated at 12, and it is seen that the upper portions of the retort sections are formed with vertical fins 11*b* which extend to the said wall to form spacers and provide room between the air chamber wall and the retort for the cooling of its sections. The latter are also formed with horizontal slots 11*c* by means of which air from the chamber 12 may enter the retort to promote the combustion of gases therein.

The novel tuyère comprises an annular chamber 13 whose inner wall is extended downwardly as indicated at 13*a* to rest on the upper edge of the retort 11. The extension is cut along its bottom edge with a series of arch-shaped notches 13*b*. The outer wall of the tuyère is also extended downwardly with a skirt section 13*c* in the upper part of which is a circular series of perforations 13*d*. As seen in Fig. 1, the air chamber wall 12 is embedded in the firebrick 14 of the stoker foundation, and the skirt 13*c* of the tuyère extends through the fireclay floor 15 of the general combustion chamber 16 to also become embedded in the firebrick. The tuyère chamber is intended to be cooled by the circulation of water or any other suitable cooling agent entering through a pipe 17 into a nipple 18 communicating with the bottom of the chamber. The liquid is diverted sidewise by a partition 13*e* in the tuyère to travel around and return to a point on the other side of the partition for egress by way of a nipple 19 and a discharge pipe similar to the entrance pipe 17. The nipples 18 and 19 are welded to the bottom of the tuyère, and the approach to their bottom portions is by way of an opening 17*a* in the air chamber 12. Thus, it is possible to remove the fittings leading to the nipples and enable the tuyère to be lifted from the retort and combustion chamber in case the removal or replacement of the tuyère is considered necessary.

In order that the tuyère may be securely attached to the retort 11, the latter is formed with a number of side pins 11*d* at intervals to cooperate with similarly-positioned bayonet-slots

13f cut in the tuyère skirt 13c. Thus, fastening of the tuyère not only holds it firmly down on the retort, but also serves to secure the retort sections more firmly in the assembled position. Finally, the retort and air chamber wall are formed at the top with raised and tapered rims 11e and 12a respectively in order to prevent ashes escaping through the notches 13b and openings 13d from falling into the air chamber 12, the tapers of the rims serving to shed or return such ashes as tend to accumulate thereon.

It is evident from the above description that the novel tuyère is situated at a point where the cooling factor affects its vital elements. Thus, one of these is the inner wall extension 13a, by way of whose notches the air from the chamber 12 issues in jets to vitalize the combustion in the retort. With the comparatively large stock of the tuyère water chamber 12 constantly being cooled, it follows that cooling rapidly extends by conductivity to the lesser stock in the extension 13a, so that, though the same may be in a zone of intense heat, it will efficiently resist the same. This effect also applies to the tuyère skirt 13c in the zone of the perforations 13d, where the air from the chamber 12 issues into the general combustion chamber in diffused form to complete combustion in the bottom of the chamber contents. The tuyère will thus maintain its immediate extensions relatively cool and prevent the adhesion of clinkers thereto. It is also evident that the tuyère applies as an annular bridge over the space between the retort and air chamber wall, and forms a cap or mounting to complete these parts in a compact top. Yet, should a replacement be necessary in the retort or a defect develop in the tuyère as a result of excessive heat, changes of temperature, or other causes, it is a relatively simple matter to disconnect the water supply and discharge fittings from the tuyère and to give the latter a twist for release from the retaining pins 11d. The tuyère may then be lifted out and the replacement readily made.

The novel installation is efficient not only from the viewpoint of service and replacement, but also from that of economy. The tuyère, on account of its unitary and compact form can be conveniently and cheaply cast, or made up of stampings welded together so that its installation or replacement is economical.

While I have described the novel tuyère along specific lines, various minor changes or refinements may be made in the same from time to time as conditions or specifications may require, and I consider all such changes and refinements as coming within the scope and spirit of the invention as covered in the appended claims.

I claim:—

1. A tuyère for a retort situated spacedly within an opening in the firebox floor comprising: an annular conduit for a cooling agent, and a downward extension of the inner wall of the conduit resting on the top of the retort adjacent the inner edge thereof, the extension being periodically recessed from its lower edge to form a series of openings for admission of air from the space between the retort and the firebox floor directly to said retort top and inner edge thereof.

2. A tuyère for a retort situated spacedly within an opening in the firebox floor, the top of the retort being substantially even with the latter, comprising: an annular conduit for a cooling agent, and a downward extension of the outer wall of the conduit lining the edge of said opening, said extension being formed with a horizontal series of openings a short distance above said floor.

3. A tuyère for a retort situated spacedly within an opening in the firebox floor, the top of the retort being substantially even with the latter, comprising: an annular conduit for a cooling agent, a downward extension of the inner wall of the conduit resting on top of the retort adjacent to the inner edge thereof, the extension being periodically recessed from its lower edge to form a series of openings directly facing said retort top and inner edge thereof, and a downward extension of the outer wall of the conduit lining the edge of said floor opening, said extension being formed with a horizontal series of openings a short distance above said floor.

4. The structure of claim 2, an air chamber wall along the inner side of the extension, and means removably attaching the latter to said wall.

5. The structure of claim 1, said top of the retort having an upstanding outer rim to check the passage of ashes into the space surrounding the retort.

6. The structure of claim 2, and an air chamber wall along the inner side of the extension, said wall rising opposite the series of openings in tapered form, whereby to resist and return ashes entering from the firebox floor by way of said series of openings.

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