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HOT BLAST STOVES FOR COMBUSTING QUALITY FUELS

Filed Jan. 18, 1965 3 Sheets-Sheet 1

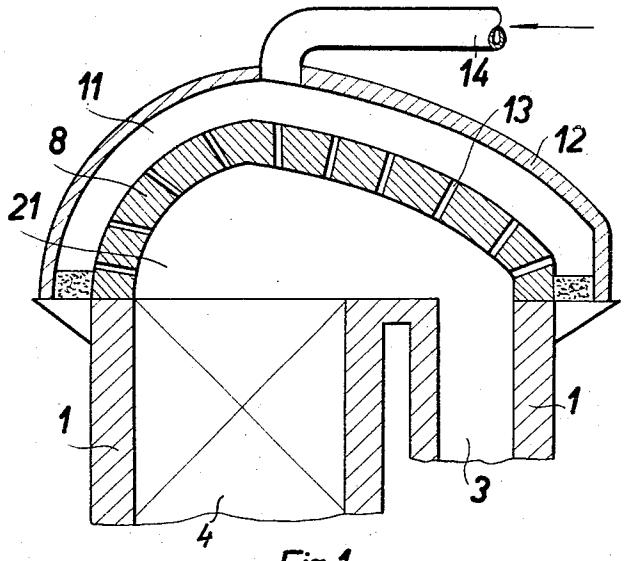

Fig.1

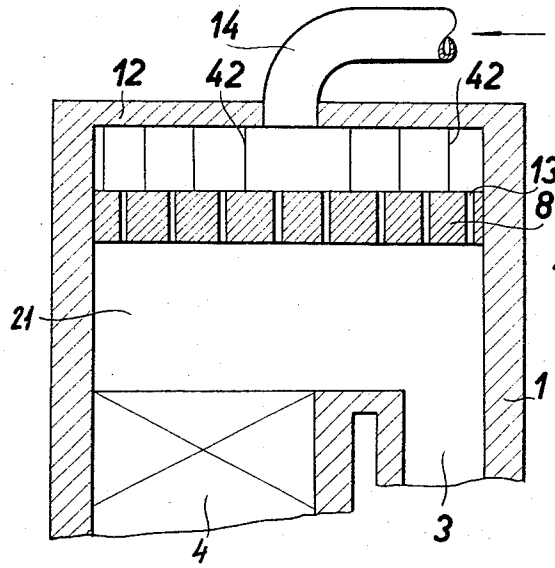

Fig.2

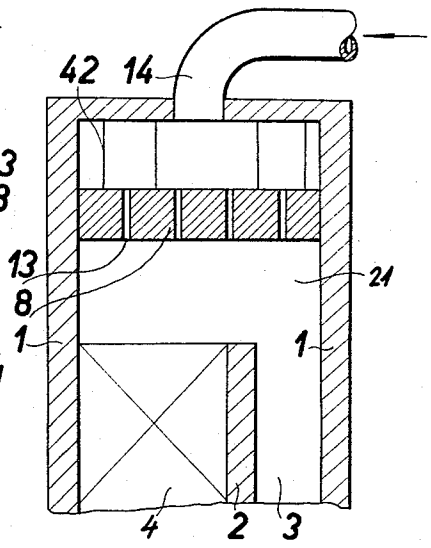

Fig.3

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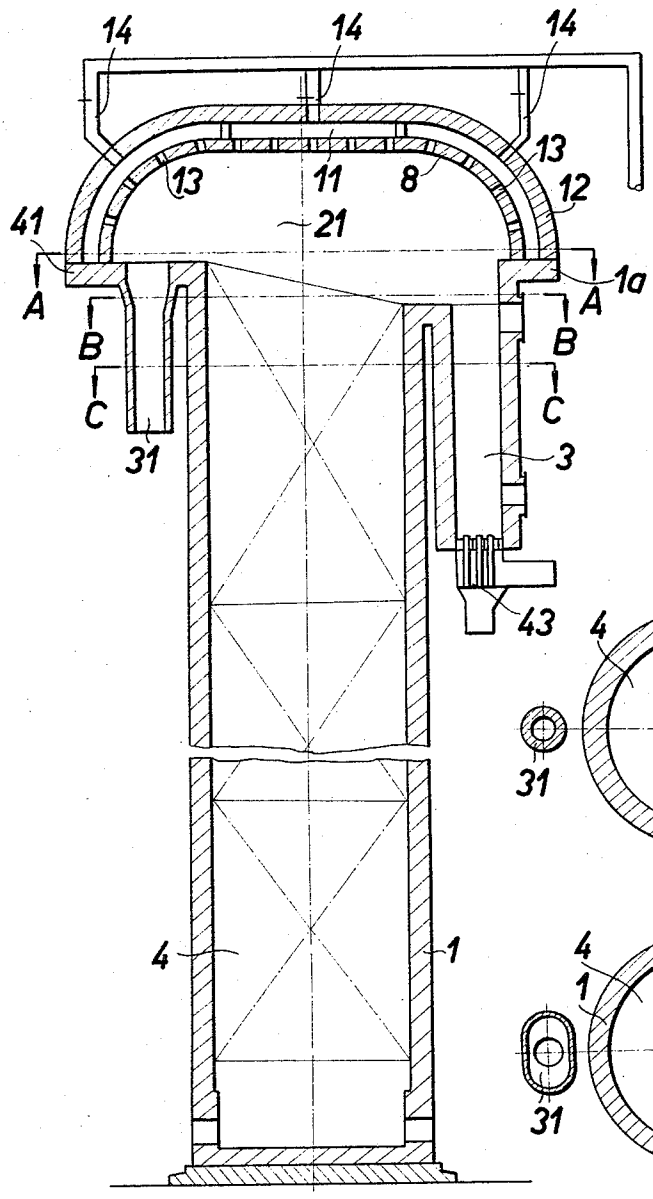

Fig.4

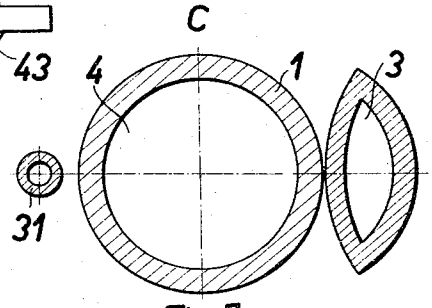

Fig.7

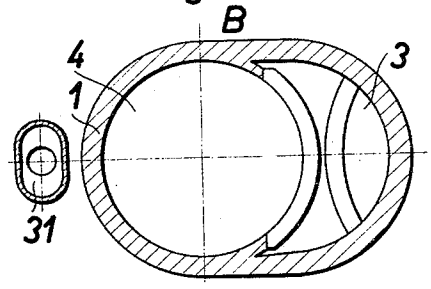

Fig.6

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HOT BLAST STOVES FOR COMBUSTING QUALITY FUELS

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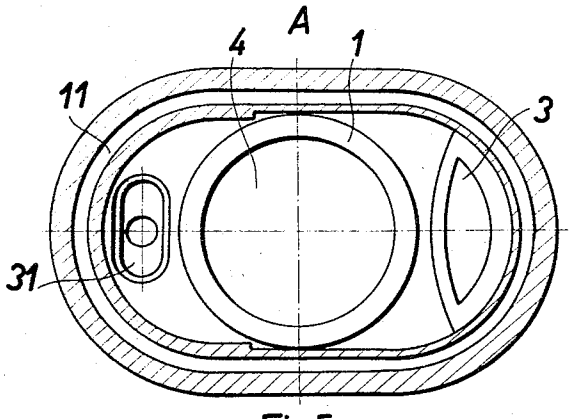

Fig.5

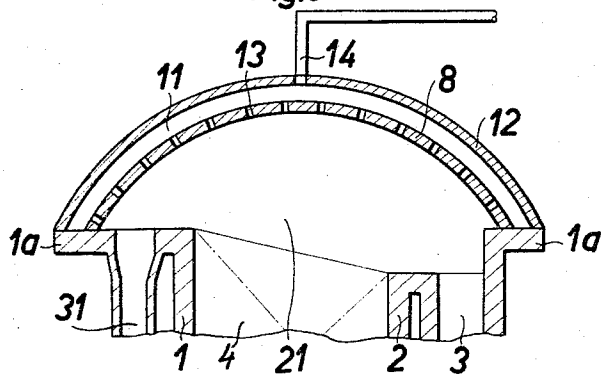

Fig. 8

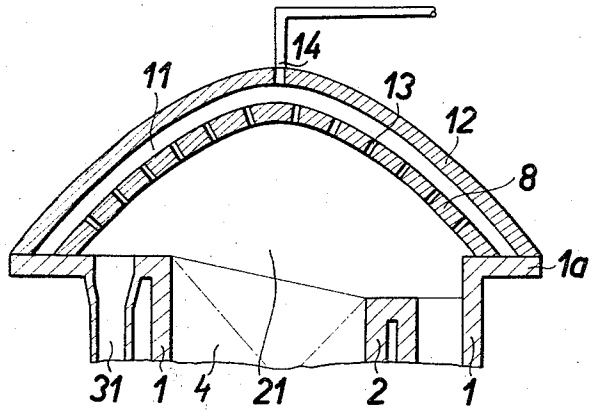

Fig.9

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United States Patent Office

3,297,310

Patented Jan. 10, 1967

3,297,310
HOT BLAST STOVES FOR COMBUSTING QUALITY FUELS

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Filed Jan. 18, 1965, Ser. No. 426,279
Claims priority, application Hungary, Feb. 3, 1964, TU 126
4 Claims. (Cl. 263—19)

This invention relates to improvements in hot blast stoves for combusting quality fuels.

It has already been suggested to employ double dome structures for hot blast stoves. The significance of such structures consists in enclosing an intermediate chamber by an inner dome and an outer dome, and introducing secondary air through said intermediate chamber into the various shafts of the hot blast stove below. Then, the inner dome which due to heat radiating from the shafts therebelow is constantly exposed to high temperatures becomes efficiently cooled by fresh secondary air which, in turn, becomes favourably warmed up or preheated. The cooling of the inner dome and the warming up of the secondary air permits, on the one hand, combusting of quality fuels and, on the other hand, generating of elevated temperatures such as 1200 to 1300 degrees centigrade which means that the overall efficiency is increased by 3 to 5% with respect to conventional hot blast stoves.

The main object of the present invention is to employ the idea of double dome structures in case of hot blast stoves of other than circular cross-sectional areas as well. According to the main feature of the present invention this is rendered possible by employing double roof structures the inner and outer roofs of which form self-contained stabile systems permitting to adapt the base surface of the roof to the cross-sectional area of the stove.

Further objects and features of the present invention will be described by taking reference to the accompanying drawings, which show, by way of example, various embodiments thereof and in which:

FIG. 1 is a vertical sectional view of a first exemplified embodiment.

FIGS. 2 and 3 show vertical sectional views of further exemplified embodiments, respectively.

FIG. 4 illustrates an exemplified embodiment of an entire hot blast stove according to the invention.

FIGS. 5 to 7 are sectional views taken along the lines A—A, B—B and C—C, respectively, of FIG. 4.

FIGS. 8 and 9 show longitudinal sectional views each of a further exemplified embodiment of the double roof construction characteristic of the novel hot blast stove.

Like reference characters refer to similar details throughout the drawings.

In FIG. 1, reference character **1** indicates a refractory walling of a Cowper stove having a furnace shaft **3** and a heat exchanger shaft **4** under a roof chamber **21**. An inner roof **8** and an outer roof **12** forming self-contained stabile systems are united to a double roof structure of other than semi-spherical shape. The pair of roofs **8** and **12** enclose an intermediate air chamber **11** which communicates through passages **13** in inner roof **8** with said roof chamber **21**. Secondary air is introduced through a pipe conduit **14**.

The exemplified embodiments shown in FIGS. 2 and 3, respectively, are of the suspended arch type. The inner or lower roof **8** is held by threaded connections or hangers **42** which are, in turn, anchored in the outer or upper roof **12**. Both exemplified embodiments differ from one another only in that, in case of FIG. 2, the furnace shaft **3** is not directly adjacent to the heat exchanger shaft **4** while, with the exemplified embodiment illustrated in FIG. 3, both are separated from one another only by a partition **2**.

With the exemplified embodiment according to FIG. 4, the secondary air flows through a plurality of pipe conduits **14** into said intermediate chamber **11** whereby it becomes evenly distributed and is supplied into said roof chamber **21** through passages **13** without said even distribution being impaired. A further characteristic feature of this embodiment is that a pipe conduit **31** serving for abducting of hot air and, originally, connected with furnace shaft **3** is connected with a brim **1***a* of the refractor, walling **1** of the Cowper stove by which the double roof structure **8**, **12** is supported. Such arrangement has the advantage that the walls of furnace chamber **3** previously directly exposed to the heating action of hot combustion gases withdrawing at the bottom of furnace shaft **3** from a burner device **43** during hot blast periods are not cooled by air withdrawing through pipe conduit **31**. Thereby extreme thermal expansions detrimental to the lifetime of furnace shaft walls are considerably mitigated.

Similar embodiments are illustrated also in FIGS. 8 and 9, respectively. Both exemplified embodiments differ from one another only as regards the shape of double roof structure **8**, **12**, that according to FIG. 8 having the shape of a spherical calotte while the longitudinal sectional view of roof structure shown in FIG. 9 is a conic section.

Hereinbefore, the invention has been described in connection with double roof structures wherein both roofs were of the same type. However, it is possible to employ embodiments with which one of the roofs combined to a double roof structure according to the invention is a plane floor while the other roof is of the vaulted type. It is also possible to supply secondary air into the aforesaid intermediate chamber **11** indirectly. In such case, e.g., the upper or outer roof may have a cavity which is connected externally with a pipe conduit and internally with one or a plurality of passages which open into said intermediate chamber. In such manner, even distribution and introduction of secondary air can further be improved.

What I claim is:

1. A hot blast stove for combusting quality fuels comprising, in combination, a furnace shaft, a heat exchanger shaft, a double roof structure covering said furnace shaft and said heat exchanger shaft and composed of an inner roof and of an outer roof, said inner roof and said outer roof being self-contained stabile structures of other than semi-spherical shape and enclosing an intermediate chamber, at least one passage in said outer roof opening into said intermediate chamber, secondary air supply means connected to said passage in said outer roof, a plurality of passages in said inner roof opening into said furnace shaft and said heat exchanger shaft, means for combusting fuel in said furance shaft, and means for abducting hot air from said heat exchanger shaft.

2. A hot blast stove as claimed in claim **1**, wherein the longitudinal sectional view of at least one of said roofs is a conic section.

3. A hot blast stove as claimed in claim **1**, wherein said double roof structure is formed as a suspended roof in which said inner roof is suspended on said outer roof.

4. A hot blast stove for combusting quality fuels comprising, in combination, a furnace shaft, a heat exchanger shaft, said shafts having refractory wallings, a double roof structure covering said furnace shaft and said heat exchanger shaft and composed of an inner roof and of an outer roof, said inner roof and said outer roof being of self-contained stabile structures of other than semi-spherical shape and enclosing an intermediate chamber,

said double roof structure being supported by a brim of said refractory wallings, at least one passage in said outer roof opening into said intermediate chamber, secondary air supply means connected to said passage in said outer roof, a plurality of passages in said inner roof opening into said furnace shaft and said heat exchanger shaft, means for combusting fuel in said furnace shaft, and means for abducting hot air from said heat exchanger shaft, said abducting means being connected to said brim of said refractory walling.

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JOHN F. CAMPBELL, *Primary Examiner.*

R. F. DROPKIN, *Assistant Examiner.*