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(12) # EUROPEAN PATENT APPLICATION

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(54) **Improvement in a stove.**

(57) A draught regulator (10) in a stove (1) is adapted for controlling simultaneously the supply of primary (13) and secondary (16) combustion air at a predetermined ratio. The secondary combustion air is carried from the regulator through a passage (7) beneath the combustion chamber (3).

EP 0 025 424 A1

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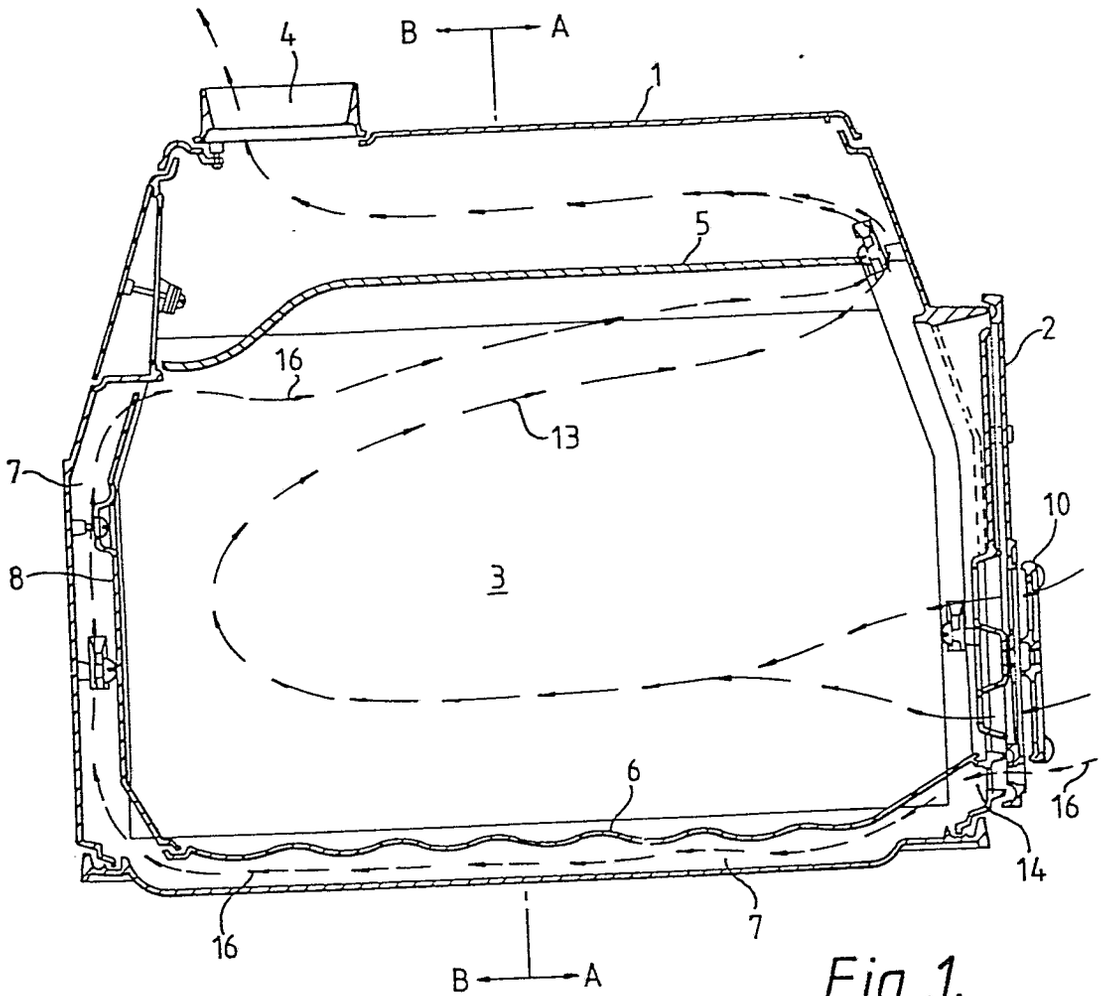

Fig .1.

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The present invention relates to an improvement in a stove, especially a wood-burning stove, having a draught regulator for primary air and a supply of secondary air.

In the course of the years, many different types of stoves have been developed for heating with solid fuel, including wood and coke. An example of such is described in Norwegian Patent 65,558, in which the stove includes a unit for preheating secondary air which is introduced to the combustion chamber at an appropriate location, and in which the supply of primary and secondary air is regulated with respective regulators for that purpose.

A distinct disadvantage of the known stoves having separate adjustment of the primary and secondary air supplies is that it is very difficult to set the correct ratio between the amounts of primary and secondary air that are introduced. Incorrect adjustment will result in improper combusion, whether the amount of secondary air is too much or too little in relation to the amount of primary air introduced.

In the stoves known hitherto, one sets the desired speed of combustion with the regulator for the primary air, while the supply of secondary air is set more or less by chance. Thus, in the stove described in the above-referenced patent, the upper regulator is set so as to obtain the "draught" one believes to be needed, and the combustion resulting from this draught of primary air can be felt as produced heat and observed in the stove. However, the adjustment of the supply of secondary air with the lower draught regulator is more a matter of guesswork because the observable reaction to the various settings is small, with the result that the supply of secondary air in prior art stoves is usually incorrectly adjusted.

Observable or not, however, correct regulation of the supply of secondary air has a very great influence on fuel economy. If too little secondary air is introduced, uncombusted gases are drawn out through the chimney and may condense on the interior thereof, with the unfortunate consequences this has. The fuel is poorly utilized in this manner. On the other hand, an oversupply of secondary air will indeed result in more complete combustion, but one will obtain much too strong a draught

through the stove and chimney, with the result that unnecessarily large quantities of air which are not needed for combustion become heated and are drawn off through the chimney, such that the heat energy is not properly utilized.

Thus, adjustment of the supply of secondary air has previously occurred almost by guesswork, and it is a primary object of the present invention to eliminate this doubt in regard to the correct ratio between the supplied amounts of primary air and secondary air.

This disadvantage is overcome with the present invention in that the regulation of the supply of primary air controls at the same time the supply of secondary air to the combustion chamber. The ratio between the respective amounts of air is predetermined and will be correct for each setting of the heat production desired from the stove. The ratio is determined by laboratory experiments and practical tests conducted by the manufacturers of the stove, and since the above-mentioned disadvantages are eliminated, one obtains much better fuel economy at all settings of the draught regulator.

The invention is characterized by the features recited in the appurtenant patent claims, and will be described more fully in the following with reference to the accompanying drawings, where

Figure 1 is a schematic illustration, in longitudinal section, of an embodiment example of a stove in accordance with the invention,

Figure 2 shows a cross section through the stove, looking toward the stoking door of the stove,

Figure 3 shows the same view as Figure 2, but seen toward the interior rear wall of the stove, and

Figure 4, in a face-on view, shows a stoking door with a draught regulator in accordance with the invention.

The stove illustrated in Figures 1 - 3 comprises a suitably-shaped stove body 1, a stoking door 2, a combustion chamber 3 and a smoke flue 4. The various components can be made of cast iron, and the stove can be constructed in a conventional manner of cast parts which are assembled by means of appropriate fastening means and with stove cement.

Above the combustion chamber, as known per se, there

is a shield 5, and running beneath the bottom 6 of the combustion chamber is a passageway 7, which continues along the inner end wall 8 of the combustion chamber and opens out at the top of this wall as shown in Figure 3, the wall 8 having a countersunk section which collects the air from the passageway 7 in the middle section of the combustion chamber, where it is most needed. The draught regulator in the illustrated example comprises a rotatable disk 10 on the stove door 2 as shown in Figure 4, and the draught opening 11 for the supply of primary air leads into the bottom of the combustion chamber 3 at its forwardmost end, emerging through openings 12 from a distribution chamber on the inside of the stove door 2. The primary air flows substantially as indicated by the solid arrows 13. The passageway 7 beneath the bottom 6 of the combustion chamber has an inlet 14 at the stove door 2, and this inlet is regulated also by an inlet opening 15 in the rotatable regulator disk 10. The secondary air will flow as indicated by the dashed-line arrows 16 such that it enters the combustion chamber 3 at the top of the back wall thereof and ensures complete combustion of non-combusted gases. At the top of the combustion chamber 3, flue gas which is a product of the combustion of both primary air and secondary air is formed, and the flue gases flow together over the shield 5 and out through the smoke flue.

The distinguishing feature of the present invention is that the supply of primary air and secondary is regulated simultaneously, which is obtained in that the rotatable regulator disk 10, as shown in Figure 4, also has openings for primary air and secondary air, and regulation of both air intakes occurs in that respective settings of the disk 10 will uncover or cover corresponding openings in the stove door itself.

The ratio between supplied primary air and supplied secondary air is determined by experiments and tests, and the size of the openings 11 in the door 10, for primary air, in relation to the openings 15 for secondary air, is determined on the basis of the results of these experiments and tests, such that one may be sure of obtaining at all times the air supply which gives optimum stove efficiency at any setting of the draught regulator.

The fact that secondary air is guided through a passageway 7 below the bottom 6 of the combustion chamber and flows up along its end wall also offers two substantial advantages. Firstly, the secondary air becomes preheated by its passage through this channel before it flows into the combustion chamber 3, and secondly, the circulating layer of air that the secondary air forms has a thermal insulation-effect at the bottom of the stove such that heat radiation toward the foundation upon which the stove rests, for example, a wooden floor, is substantially reduced.

The example described and depicted herein should be viewed as merely an illustration of the invention, as the principle of simultaneous regulation of the supply of primary air and secondary air by means of the same regulator, whose settings have predetermined ratios for the respective amounts of air, can be utilized on other types of stoves, for example, vertical stoves.

Patent Claims

1. An improvement in a stove, especially a wood-burning stove, having a draught regulator for primary combustion air and a supply of secondary combustion air, characterized in that the draught regulator is adapted also to regulate the supply of secondary air, such that the ratio between the supplied amounts of primary and secondary air is almost constant.

2. An improvement according to claim 1, characterized in that the draught regulator comprises a rotatable disk having at least two openings which, at different settings of the regulator, cover or uncover their respective air inlets to the stove, one being the inlet for primary air and the other the inlet for secondary air.

3. An improvement according to claims 1 and 2, characterized in that the inlet for secondary air leads to a passageway which runs beneath the combustion chamber and opens out into the top of said chamber at the end thereof which lies opposite the draught regulator.

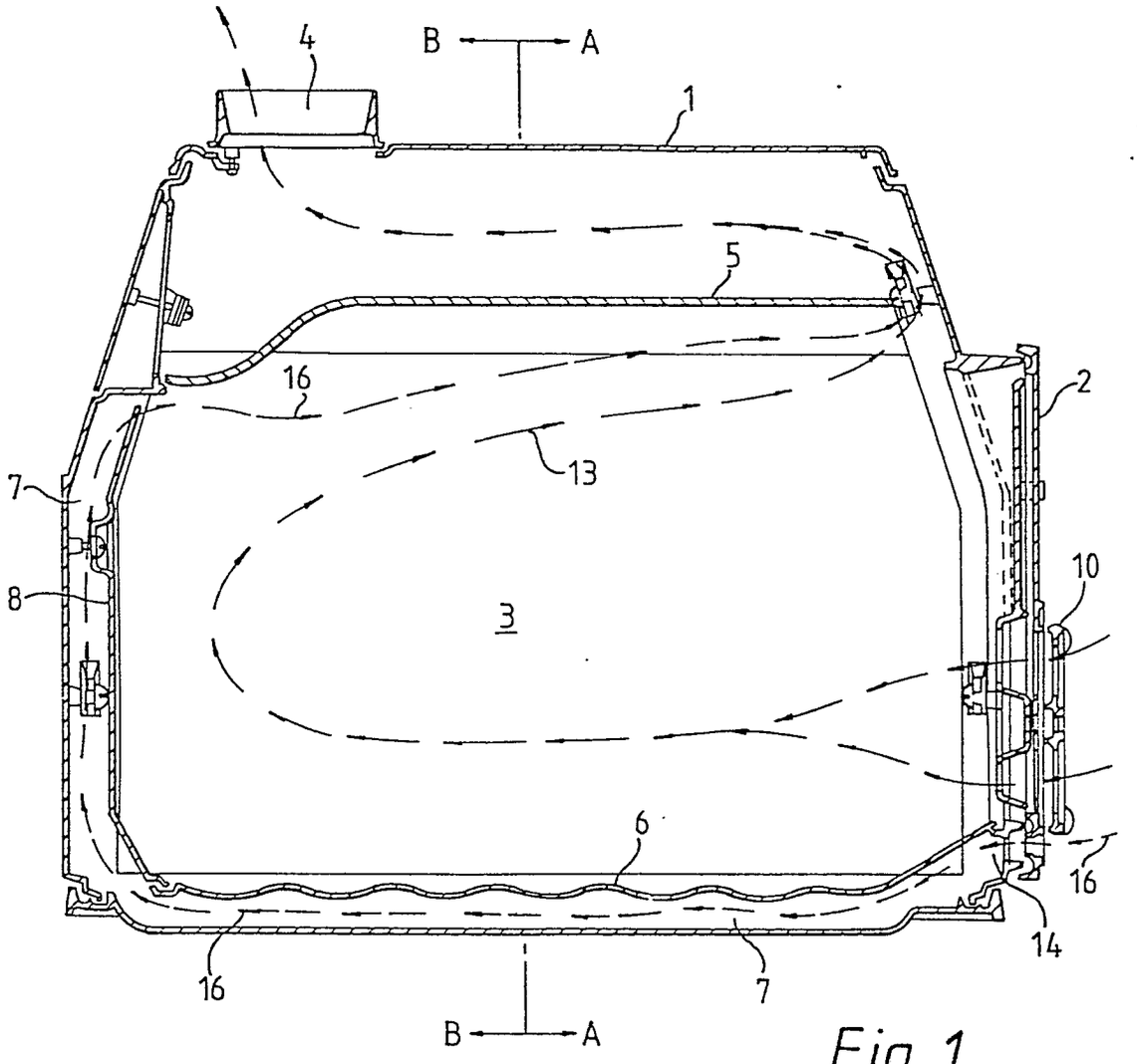


Fig .1.

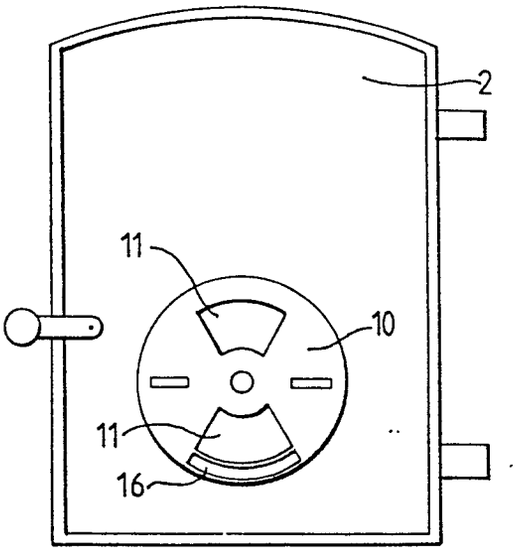


Fig .4.

Fig.2.

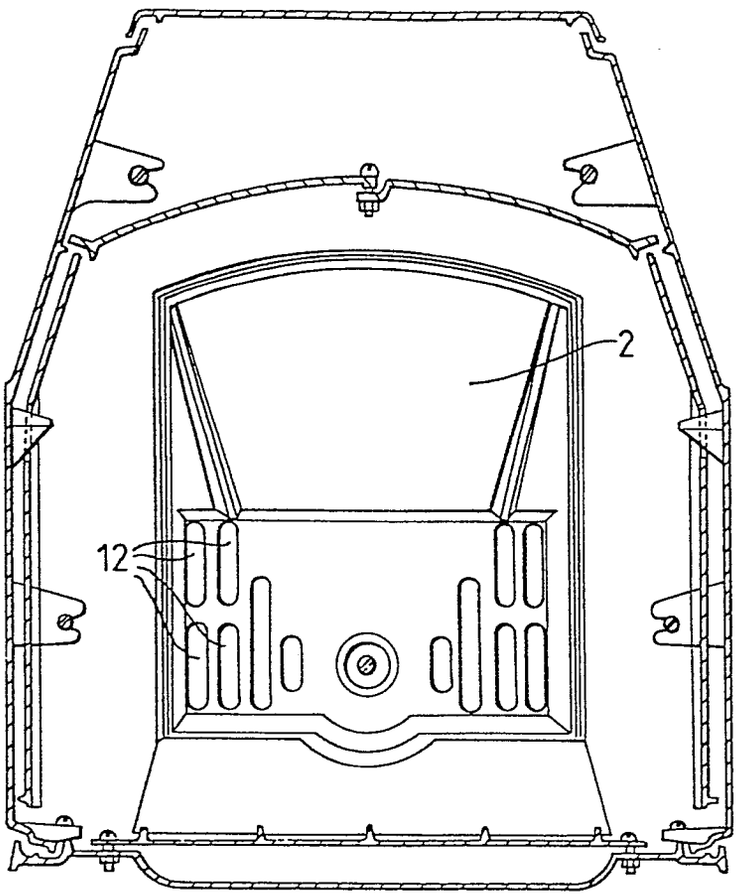
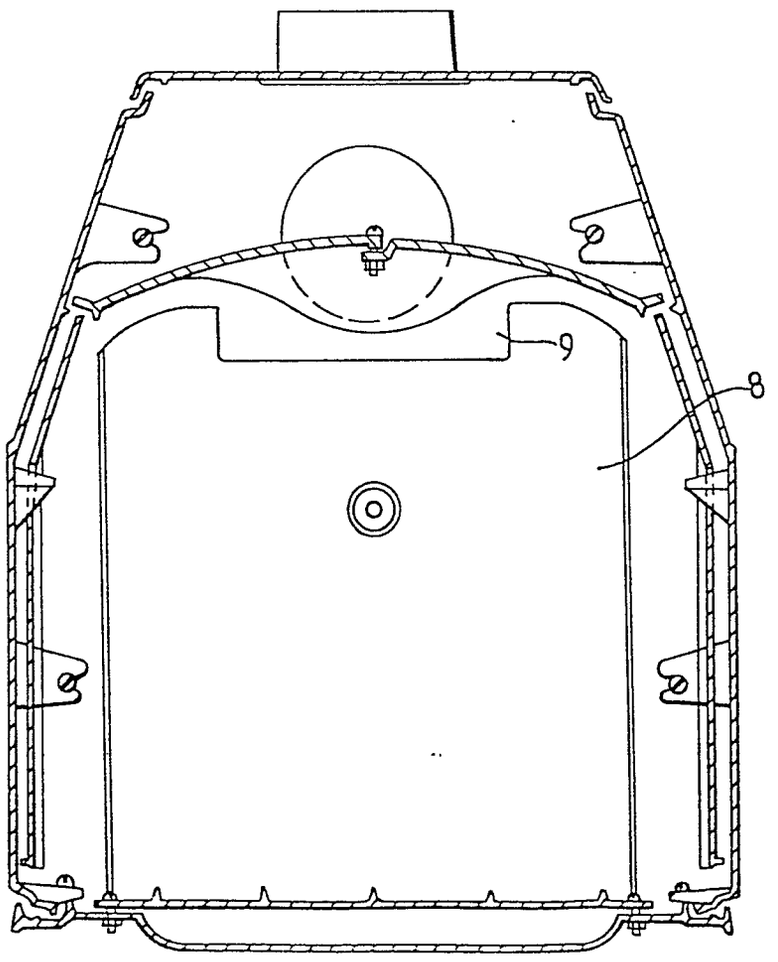


Fig.3.



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EUROPEAN SEARCH REPORT

Application number
EP 80 85 0130

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	DE - C - 578 670 (BURGER) * Page 1, lines 60-64; page 2, lines 1-3, 54-63; figure 1 *	1
X	GB - A - 1 461 298 (FUEL RESEARCH INSTITUTE OF SOUTH AFRICA) * Page 2, lines 28-46; page 3, lines 105-127; page 4, lines 39-45; figure 2 *	1
	FR - A - 900 982 (VERNET) * Page 2; abstract; figure 1 *	3
A	GB - A - 1 545 415 (WATERFORD)	
A	DE - C - 965 161 (HEMPELMANN)	

CLASSIFICATION OF THE APPLICATION (Int Cl.³)

F 24 B 5/02
1/02

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

F 24 B
F 23 L

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	04-12-1980	VANHEUSDEN