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EXPERIMENTAL RESULTS ON THE IMPLEMENTATION AND USE OF RECOVERY BURNERS

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Abstract

The article presents the main aspects of the implementation, use and pilot and industrial experiments of some self-contained recovery burners. The results of pilot and industrial experiments of these burners have argued and quantified their energy efficiency. This efficiency consists mainly in an economy of specific fuel consumption (natural gas and / or coke gas) of approx. 25-35%. Other advantages of using recuperative burners are: ensuring a higher temperature in the hearth, reducing the duration of the processing cycle and thus increasing labor productivity. All these advantages of using recuperative burners are based on their operating principle, which consists in preheating the oxidizer (combustion air) by recovering an important part of the enthalpy of its own flue gases. This recovery is done in an energy recuperator designed right in the body of the recuperative burner. Due to this important aspect, the recovery burner is part of the Primary Energy Recovery (REP) category.

Keywords: *recuperative burner, conception, design, realization.*

Introduction

Recuperative combustion installations (recuperative burners) represent an important constructive and functional modernization of this category of installations [1]. This modernization consists in energy efficiency, these specific types of burners, due to their principle of operation achieving fuel savings (natural gas) of approx. 25-35%.

The operating principle of the recuperative burners, which also gives them the mentioned energy efficiency, consists in the preheating of the oxidizer (combustion air) right in the burner body, by taking over an important part of the enthalpy of its own flue gases. In this way, these types of burners fall into the category of Primary Energy Recovery (REP) [2,3].

One of the first companies to be successful in the field of recuperative burners is Hotwork International. Fig. 1 presents the principle diagram of a Horwork type recovery burner.

A team of scientific researchers from ICEM SA Bucharest, some of whom are co-authors of this article, also had notable and successful results in the field of recuperative burners (recuperative burners implemented and experienced with good results in production, several patents obtained invention, published scientific articles) [4,5]. Fig. 2 presents the principle diagram of an ICEM type recovery burner.

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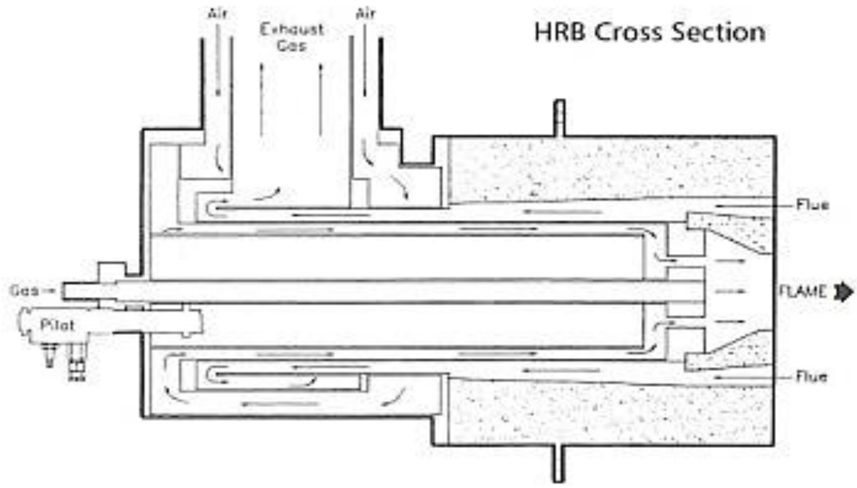

Fig. 1. Schematic diagram of a Hotwork recovery burner

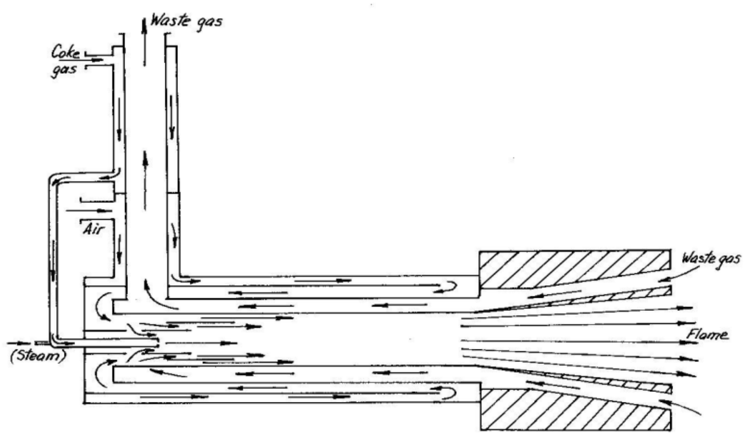

Fig. 2. Schematic diagram of the ICEM type recovery burner

The same team of scientific researchers from ICEM SA Bucharest also had concerns for the development of a range of recuperative burners operating on residual fuels (coke oven gas).

Aspects regarding the pilot and industrial experiments of some recuperative burners of own conception

The concerns of the team of scientific researchers from ICEM SA Bucharest in the field of recuperative burners have resulted in the implementation with good results in production of a type-dimensional range of such burners [6,7].

Figure 3 shows aspects of the pilot and industrial experiments of these burners.

Figure 4 shows the drying and preheating stand of the steel casting pots within COS SA Targoviste (COST) equipped with a self-contained recovery burner.

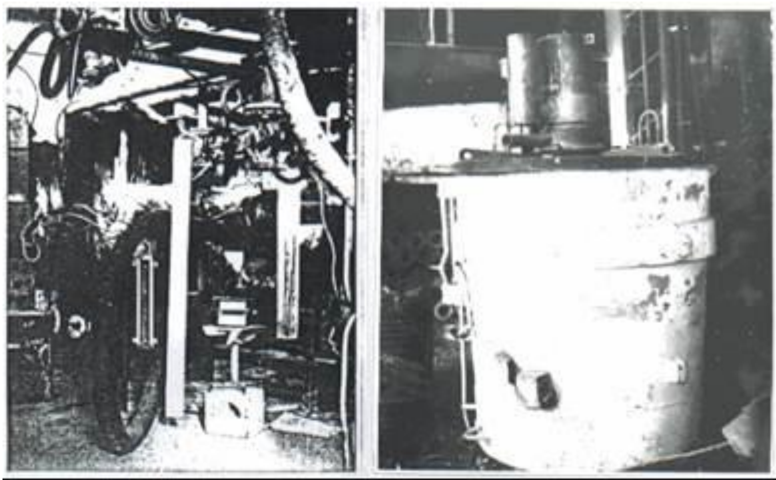

Fig. 3. Aspects from the pilot and industrial experiments of ICEM type recovery burners

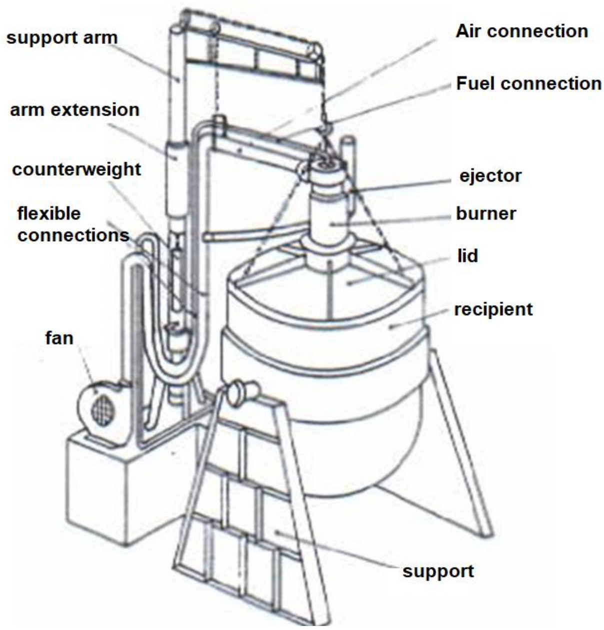

Fig. 4. The drying and preheating stand of the steel casting pots within COST SA equipped with a self-contained recovery burner.

The main results obtained by implementing the recovery burners in the drying and preheating installations are [15-17]:

- increase of approx. 4 times the productivity of the drying and preheating operation (LUGOMET S.A. Lugoj);
- increasing the preheating temperature of the pouring pot from 700 ... 800°C to 1000 ... 1100°C, necessary for the VOD pot (COS -S.A. Târgovişte);

Recovery burners, which have been tested on the ICEM test board, approved and tested in the industry in drying and preheating processes. A dimensional range of such burners of own design has been made with a rated thermal output of: 63 kW, 100 kW, 160 kW, 250 kW and 400 kW.

Conclusions

The achievements through the implementation and pilot and industrial experiments of a type-dimensional range of self-contained recovery burners have been a real success.

In this sense, the energy efficiency of this type of burner has been demonstrated and quantified by specific thermo-technological measurements. This efficiency consisted, depending on the type of use (drying and preheating stand for STEEL MOLDING POTS, heating furnace and / or heat treatment) and the nominal thermal power of the recovery burner, in a fuel economy (gas natural or sewage gas) DE CCA. 25-35%.

Future research in the field of recuperative burners will aim to optimize the overall dimensions of these types of burners by design, design and construction, especially for higher rated thermal powers.

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