THREE-CHAMBER FURNACE FOR BURNING UP PEAT MIXTURES WITH WOOD WASTE

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The problem of finding ways and methods of using the local cheap fuels as an additional energy source for the vital needs has been considered. These fuels include peat and wood waste, reserves of which are very big both in Ukraine and in Belarus. It is known that the burning of these low-grade (wet, high-ash, cracking in the combustion process) fuels has a number of features: maintaining a high temperature at least at the first stage of combustion; the need for a sufficiently long stay of burning particles in a zone of high temperatures, mixing of the stream components.

It has been proposed the construction of the low-power layered heat generator for burning up low-grade solid fuels, and its mixtures, which largely solves these problems to a considerable extent. This is achieved by the creation of an additional chamber, intermediate one between the primary and afterburning chambers in order to “separate” the processes of drying, gasification and afterburning of the formed products.

Burning of the layer has occurred on stepped grates. Entrainment of unburned fuel particles has reduced at the expense of the organization of the vortex in the furnace. Installation of the pinch in the form of the peak at the exit from the primary combustion chamber, not only has contributed to a separation of ash and unburned fuel particles, but has also reduced the radiative heat loss. The furnace with the pinch has provided the maximum temperature at the exit from the primary chamber for 113°C higher than without it.

Due to the high humidity of the used fuel the primary combustion chamber has been heat insulated and “surrounded” by the channel with the downflow movement of the gas. This has led to the fact that in the primary chamber not only the combustion process, but also drying process of the fuel has taken place. Therefore, it was more rational to carry out the process with a lack of air in the primary chamber and afterburning of the products formed in the secondary one.

In general during combustion of the pure peat the concentration of carbon oxide emissions is higher than during combustion of mixtures with timber at about the same

concentrations of nitrogen oxides. Comparison of carbon oxide concentrations at appropriate temperatures gives a difference from 36% to 50 %. Therefore, the problem of reducing harmful emissions (carbon monoxide and nitrogen oxides) during the burning of low-grade fuels has been given special attention.

As a result of studying the process of combustion of peat and its mixtures with wood waste it has been found the following: the organization of the uncooled pinch in high temperature zone between the primary chamber and afterburning one has led to the improvement of the process of combustion of fuels and decrease in harmful emissions; the oncoming movement of fuel and oxidant has allowed to burn effectively even low-grade in the layer fuels without violating sanitary norms; heating of the air fed to the primary chamber by the exhaust gases has improved substantially the quality of the burning process; an additive for peat of 50...25 % wood waste has significantly reduced the concentration of carbon oxide emissions.

The small (height up to 3 m) chimney overcomes the hydraulic flow resistance of the additional chamber and air heater. This eliminates the need to use the exhauster in the construction of the created heat generator. Provision of it by the device of the continuous or periodic loading of fuel will allow to recommend it for wide introduction.