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Investigation of the Electro-Thermal Heating Processes in a Boiling Layer

At present researches on burning and gasification of low-grade hard fuels are being developed. In a boiling layer the development of models of external heat exchange in high temperature wide poly-dispersion layers attracts practical interest. Under such conditions it is quite natural to consider the fluidized layer as the layer of coarse particles (fractions) with their characteristics, in particular the role of **convection** constituent of heat exchange.

A boiling layer is continuous and disorderly movement and mixing of particles (fractions) in a certain volume on a height and well-developed surface of material-air contact. Unique properties of the fluidized layer consist in possibility to change them in wide limits. The layers of particles fluidized by gases can serve as a good high temperature heat transfer agent.

Mark out (allocate) Three basic mechanisms of particles interfusion in the fluidized layers is marked out with bubbles:

- a) circulation (convection) transfer of particles on the vertical line;
- b) turbulent diffusion of particles with final velocity in a lowering dense phase;
- c) horizontal exchange by particles between the layers of blubs and a lowering dense phase.

The electric heating of the fluidized systems can be fulfilled in different ways. They are:

1) current supply to the electro-heaters which are immersed into the fluidized layer or closed up in limiting them walls; 2) heating by high frequency currents, 3) induction heating by the currents of industrial frequency from ferromagnetic elements immersed into the layer; 4) heating the fluidized layer of electrical conductive material particles by the direct conduct of current through the layer; 5) heating of the fluidized layer by arc charge. Two last ways are the most prospective. Temperature range in which the electro-thermal fluidized layer will be useful is approximately from 840 °C to 3600 °C.

Passing electric current through the boiling layer of electrical conductive particles is one of possible methods of receiving high temperatures in a layer, they can achieve 4000°C. A graphite, some sorts of coals and coke, and also some metal-ceramic compounds can serve as materials for electro-thermal boiling layer.

In an electro-thermal layer electric current flows through the layer of electrical conductive particles. And a layer works as active resistance, converting electric energy into a heat within the layer.

It is planned to investigate the resistance heating due to passing of current, and influence of type of gas on conductivity of material.