Durch die im Verlauf der experimentellen Forschungen erhaltenenErgebnisse können die kinetischen Charakteristiken der Prozesse der Zündung des Holzes beschrieben werden. Auch kann man die Einschätzung der Brand- und der Explosionsgefahr der Ausrüstung und der Bauten bei ihrer Projektierung und dem Bau auf den industriellen Objekten durchführen. Die erhaltenen Daten werden der Verbesserung der mathematischen Modelle auf dem vorliegenden Gebiet der Forschungen unbedingt dienen.

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BOILER AND TURBINE MODELS MANUFACTURING

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Today, thermal power stations using coal or gas are the most widespread in the world. They produce 85% of all electrical power on the Earth. Coal and natural gas are non-renewable resources of the Earth, so it is likely that in the future humanity will be forced to abandon the thermal power stations and produce energy, for example, by space solar power or nuclear fusion. However, you can expect that in the nearest decades thermal power stations can retain its leading positions. This means

that the study of the technological scheme of production of electric power and fabriform for thermal power stations are necessary for every electrical engineer.

The purpose of the study is designing and manufacturing of working models of the boiler and turbine, implemented on the basis of fundamental design solutions of their traditional counterparts. The models show all the stages of the conversion of chemical energy into kinetic energy of motion of the turbine rotor.

Purpose of the boiler is to generate steam at a high pressure (150-200 atm.) and temperature (500-600 C) which rotates the rotor turbine, which powers the rotor of the generator.

The boiler is supplied withair (blown) through the holes and a specially prepared fuel (coal dust or gas). The fuel is ignited by burners. It is very difficult to ensure the combustion of fuel inside the boiler model, so it was decided to place fuel (dry fuel tablets) outside.

The water in the boiler is heated not by the tank but in small-diameter tubes. They are laid on the walls of the boiler. The reason for this is the increase of the heating surface. The model is implemented in the same principle. The surface area of the heating water is provided by the tubes that soldered to the bottom of the boiler.

The next problem that had to be solved in the development of the model was the need to circulate the water in these pipes. The constant circulation of water in the pipes is carried out via a special pump. It is called circulation pump. The operation of this pump must not be interrupted even for a second, otherwise the water inside the boiler will evaporate, pipes overheat and it leads to their deformation. The model has the same problem: if the water evaporates in the tubes, joints will overheat and it leads to breach in the tightness of the boiler. To avoid this, the boiler must be placed obliquely at an angle of approximately 15-20 degrees.

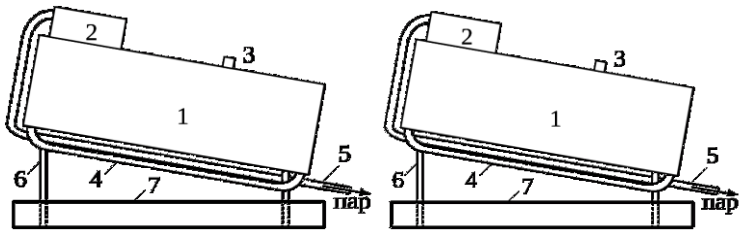

Figure. 1.
1 boiler body (made of tinplate 0.25 mm thick), 2 - steam drum, 3 - hole for water, 4 - copper tubes for water of 5 mm diameter, 5 - a tube for reheating steam, 6 – Stands, 7 - Fuel capacity

Now we turn to the next constructive solutions. It is important that the steam entering the turbine from a boiler, was dry and free of water droplets. The boiler is provided by a very high temperature and vapor pressure (they are listed above). In this model, of course, it is not possible to provide these temperature and pressure. To separate water from water droplets the model is equipped with steam drum that is

soldered on top of the body. Steam enters the steam drum through small holes drilled in the housing.

Intermediate overheating is important to ensure the required temperature and the steam pressure: the pipe, in which steam passes after exiting the boiler, is passed through the flame, thereby performing extra heating. In the model intermediate steam overheatingis also performed. Steam from the steam drum is supplied into the tube which runs parallel to the bottom of the boiler through the flame.

Finally if the diameter of the hole from which the steam leaves the boiler will be more than necessary, all efforts have been in vain. Steam cannot perform any work. To provide the required vapor a pressure tube, from which the steam comes out, is tapered to form the nozzle.

Now a quick look at the design of modern turbine units. Wheels of turbine units rotate with a speed of 3000 rev / min. To use the energy of steam the turbines are manufactured with long shafts of the rotors, which are mounted (working crowns) with blades. Moreover some of the working crowns made fixed, mounted on the inner walls of the turbine and not touching the rotor. The channels between the blades of fixed crowns act as the nozzles. Fresh "sharp" steam from a boiler pressure of 150-200 atm passes between the movable and stationary vanes progressively giving energy to its initial pressure and turning it into a movement speed of the turbine rotor.

Manufacturing of turbine model: tin was cut two circles and in the inner side 8 bladeswere soldered. The turbine wheel is rigidly fixed on the shaft and mounted on a stand.

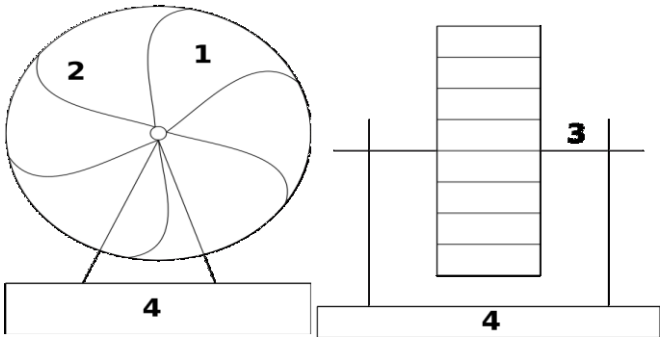

Figure. 2.
Scheme of the model turbine

The models will be used in the Institute of Power Engineering as a teaching equipment in the classroom .This model provides all the principles of operation of the boiler most cheaply and efficiently. The model in a larger view and made of more durable materials can be used in private homes and small businesses.

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