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IMPROVING THE PNEUMOREACTIVE DEVICE FOR A WIND GENERATOR

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Relevance and problem statement.

Unlike non-renewable energy sources, the wind is readily available and free for everyone to use, using it to power wind turbines which are often installed as part of wind farms. Wind energy has a similar drawback to solar energy in that it is not constant. Although the wind is sustainable and will never run out, wind speed does change. This can cause serious problems for the efficiency of a wind turbine [1]. One way to eliminate this drawback is to use the starting acceleration of a wind wheel using internal combustion heat engines or jet nozzles, which unfortunately pollute the environment. An analysis of various measures to reduce the amount of harmful emissions shows that it is advisable to use combination of exhaust gas recirculation systems with cooling of the recirculated gases and exhaust gas neutralization [2].

The main research materials.

Wind generators usually include a tower, a wind wheel, electric generator. However, well-known wind generators need periodic starting acceleration when the wind speed decreases below the working one, which leads to additional energy consumption, a high efficiency and a controlled amount of electricity generation are not provided. The use of jet boosters for this has such disadvantages as: design complexity, low efficiency, significant fuel consumption in jet nozzles and a significant amount of harmful emissions into the atmosphere. The research were carried out on to improve the pneumoreactive device for a wind generator, in which by means of modification it is possible to simplify the design, increase the efficiency, reject fuel and harmful emissions into the atmosphere.In our patented «Pneumatic jet device for wind turbine» [3], which contains an contains a tower, a wind wheel, jet nozzles connected to the reservoir by channels, an electric generator, the reservoir is made in the form of a receiver, an air compressor, a pneumatic turbine are installed, and air intake openings are made in the lower part of the tower.

The pneumatic reactive device for the wind generator is mounted on a special platform where the tower 1 is fixed, on it a wind wheel 2 with jet nozzles 3 connected to the reservoir 4 made in the form of a receiver, channels 5, an electric generator (not shown), an air compressor 6, a pneumatic turbine 7, in the lower parts of the tower 1 perform air intake holes 8. Warm air through the intake holes 8, rising up, presses on the blades of a pneumatic turbine 7 and rotates the compressor shaft 6, which draws in air from the atmosphere and significantly increases its pressure above atmospheric pressure and pumps it into the receiver 4, where the compressed air is stored. At the working speed of the wind, under its action, the wind wheel 1 begins to rotate, driving the electric generator (not shown in the scheme). Electricity, which in this case is generated by an electric generator, is sent to the electric network. When reducing the wind speed from the reservoir 4, made in the form of a receiver, through channels 5, the air accumulated in the receiver, under high pressure, enters the jet nozzles 3, maintaining the angular speed of the wind wheel within the necessary limits, ensuring continuous operation of the wind generator. The scheme of the proposed peumosetting device for starting acceleration of the wind generator is shown in Fig. 1.

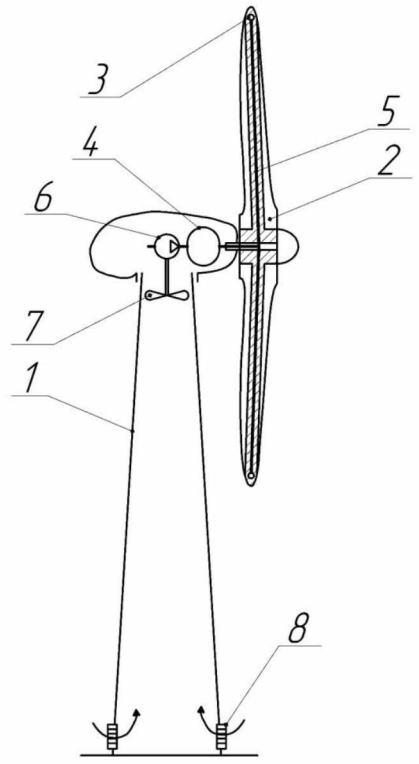

Fig. 1. The scheme of the pneumatic reactive device for starting acceleration of a wind generator: 1 - tower, 2 - wind wheel, 3 - jet nozzles, 4 - receiver, 5 - air channels, 6 - compressor, 7 - pneumatic turbine, 8 - air inlets

Calculations are performed according to the method described in [4].

Conclusions. The use of a pneumosetting device for starting acceleration of a wind generator of the proposed design, due to the rejection of the use of fuel combustion for driving jet nozzles, the design of a reservoir as an air receiver, installation of an air compressor, a pneumatic turbine, and air intake openings in the lower part of the tower makes it possible to simplify the design and increase the coefficient beneficial effect, abandon fuel consumption and harmful emissions into the atmosphere.

References

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