



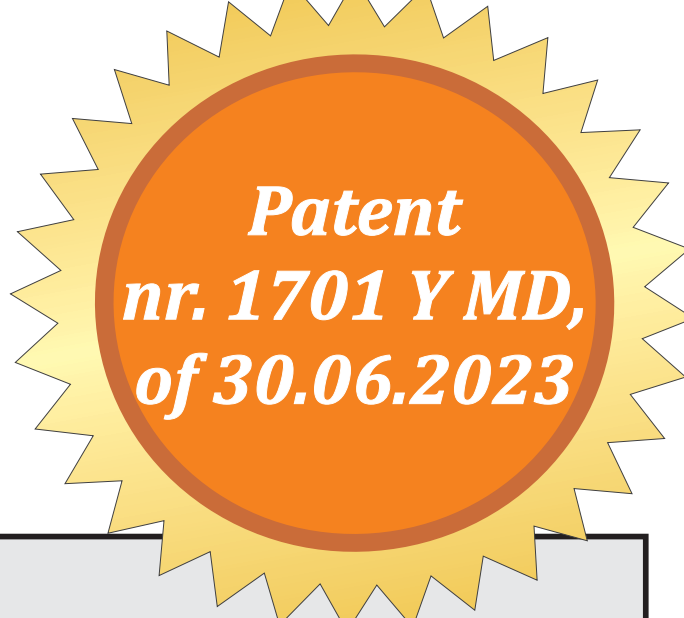
Expoziția Internațională Specializată
INFOINVENT

Ediția a XVIII-a, 22-24 Noiembrie 2023



DEVICE AND METHOD FOR PREDICTIVE MONITORING OF THE WIND TURBINE STATE AND FOR IMPLEMENTATION OF COUNTERMEASURES

Dr. Sc., prof. Valeriu DULGHERU; PhD., assoc. prof. Sergiu ZAPOROJAN; PhD. student Vladimir LARIN;
PhD., assoc. prof. Ilie MANOLI; PhD. student Eugeniu MUNTEANU; PhD. Ivan RABEL; PhD., assoc. prof. Marin GUTU;
PhD., assoc. prof. Radu CIOBANU; PhD., assoc. prof. Oleg CIOBANU.



Goal:

The invention relates to devices for converting wind energy into electrical energy, in particular, to methods and devices for monitoring the condition of wind turbines.

Solution:

- ✓ Expanding functional possibilities;
- ✓ Simplifying the construction of the device.

Advantages:

- ✓ the protection of the aerodynamic blade from mechanical destruction, also the protection of people from the fall of blade fractions on them;
- ✓ protection of the mechanical multiplier and the electric generator from overheating and their destruction by ignition;
- ✓ increasing the conversion efficiency of wind energy into electrical energy by destroying the layer of ice deposited on the leading edge of the aerodynamic blade.

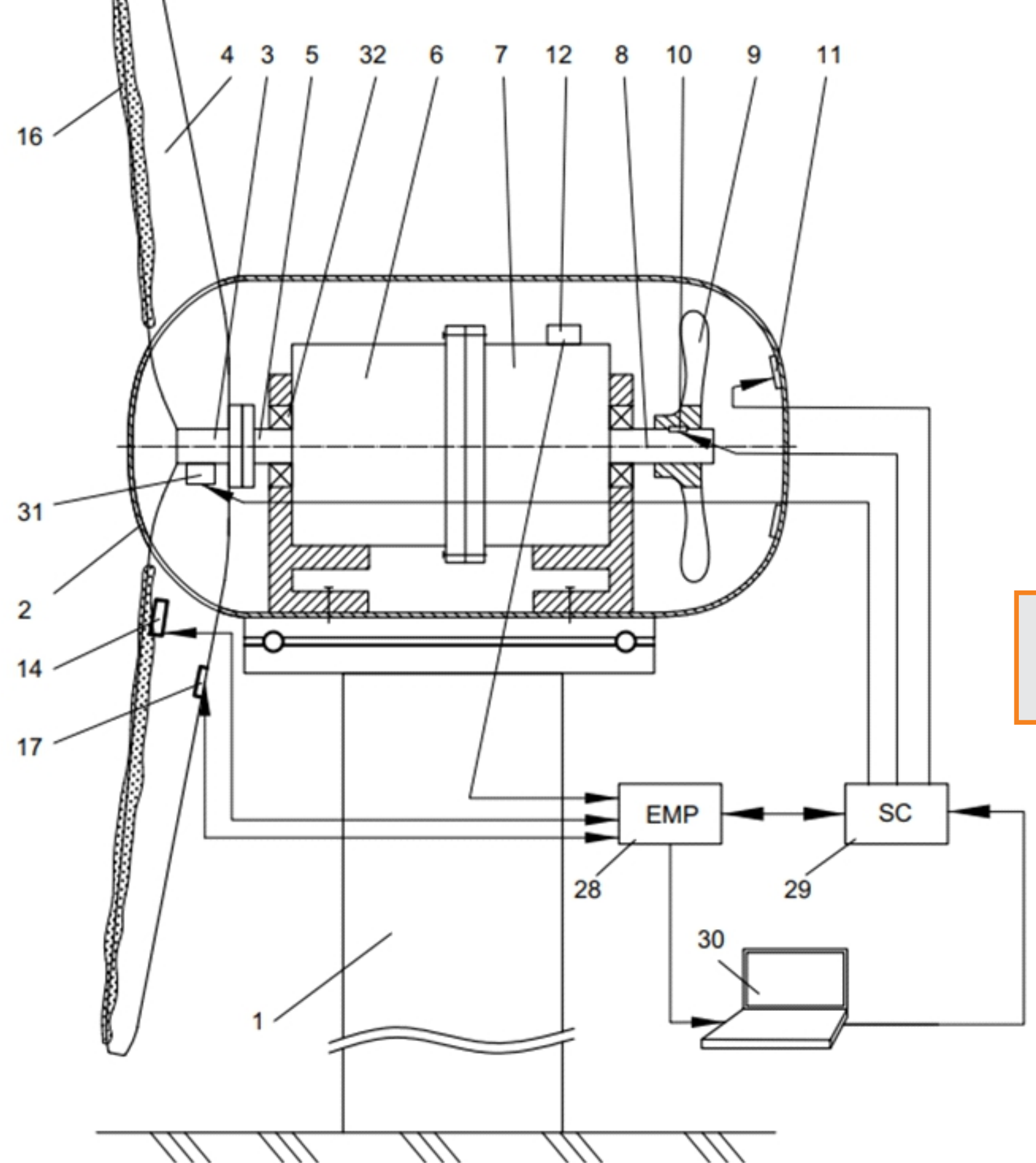
Stage:

3D CAD model, CFD simulation.

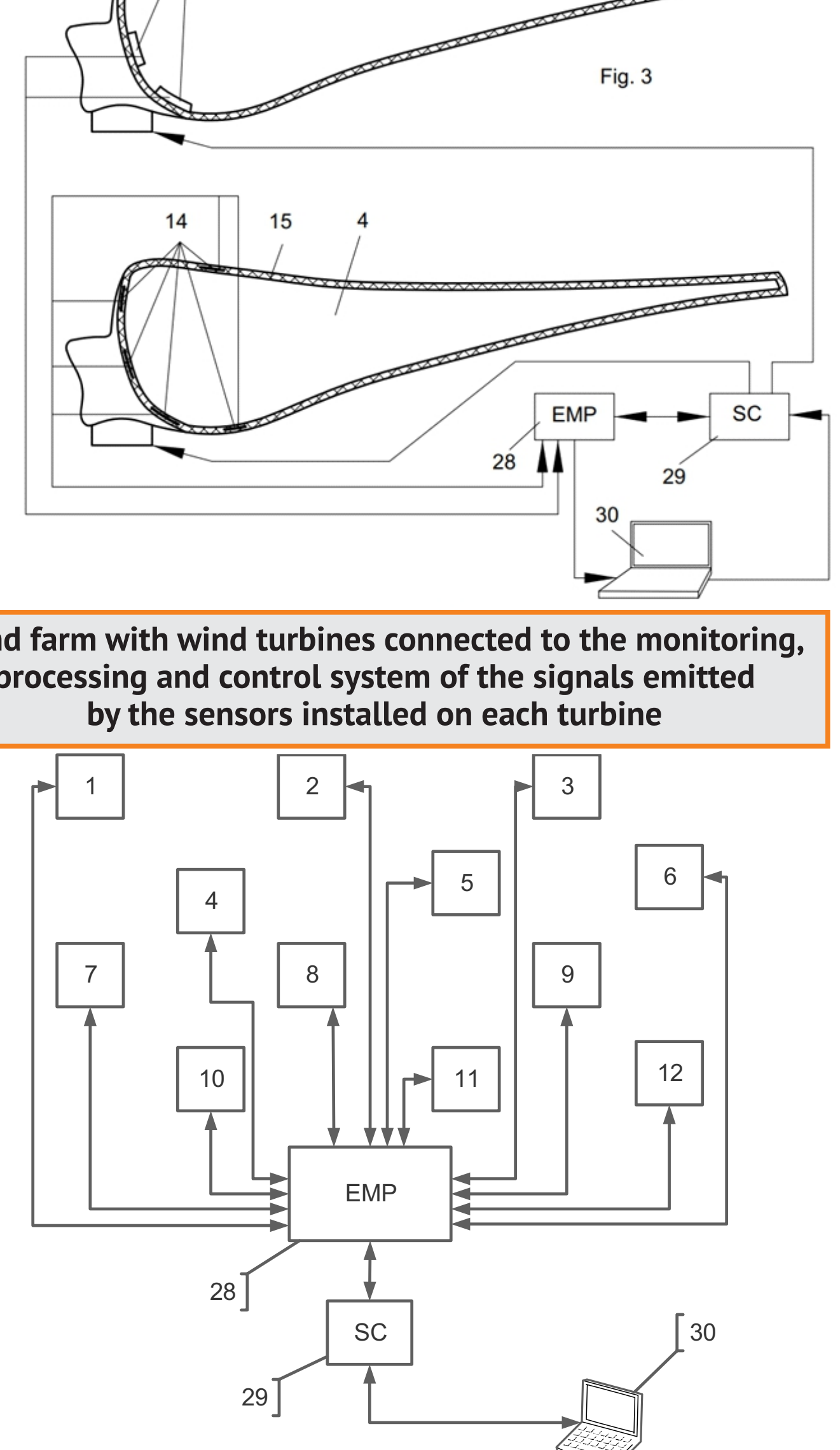
Aerodynamic blade with the deformation sensors installed on the inner surface of the blade and impregnated in the composite shell during the manufacturing phase

Aerodynamic blade with temperature sensors for ice detection and the bimetallic element for removing ice

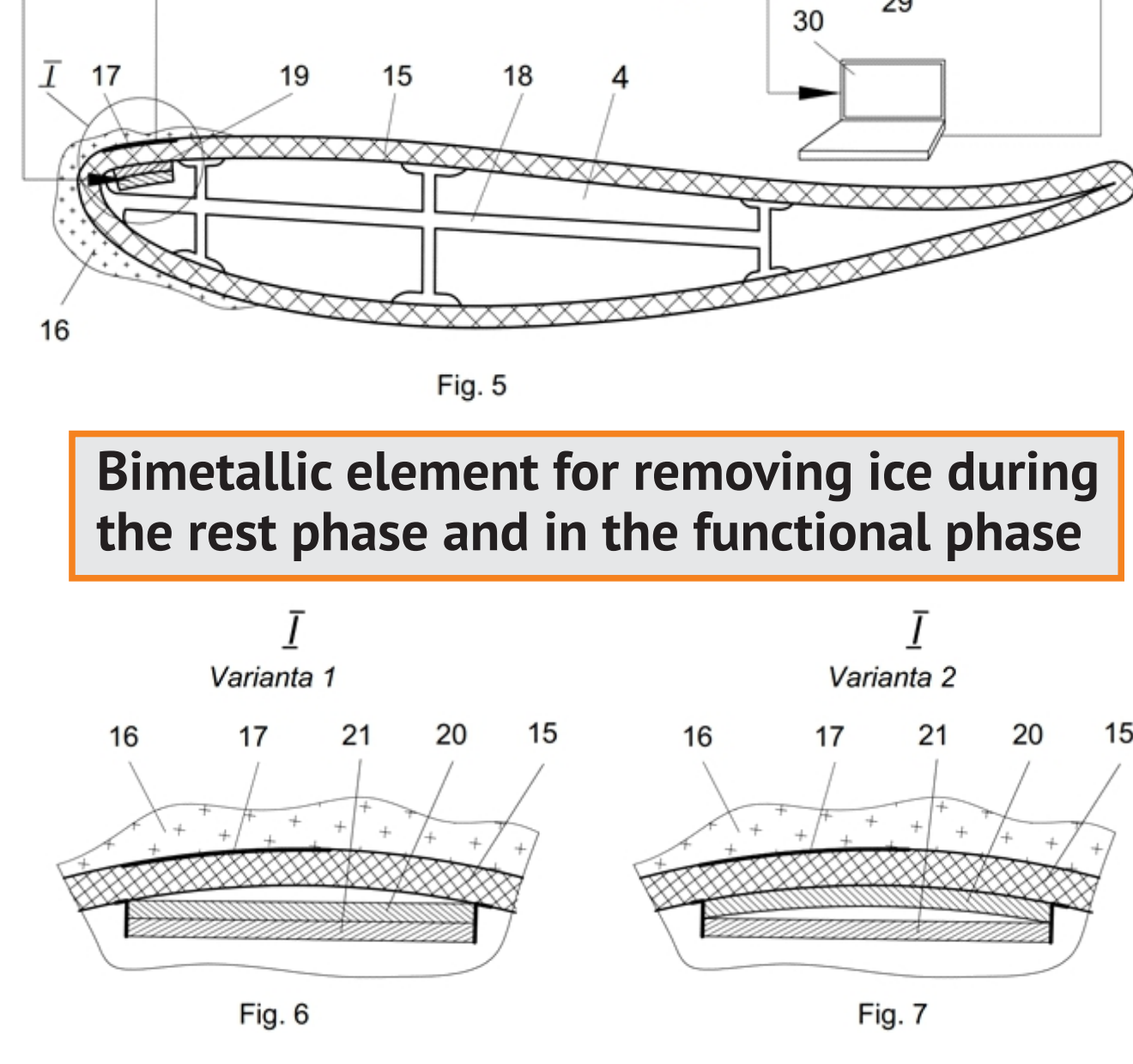
General view of the wind turbine



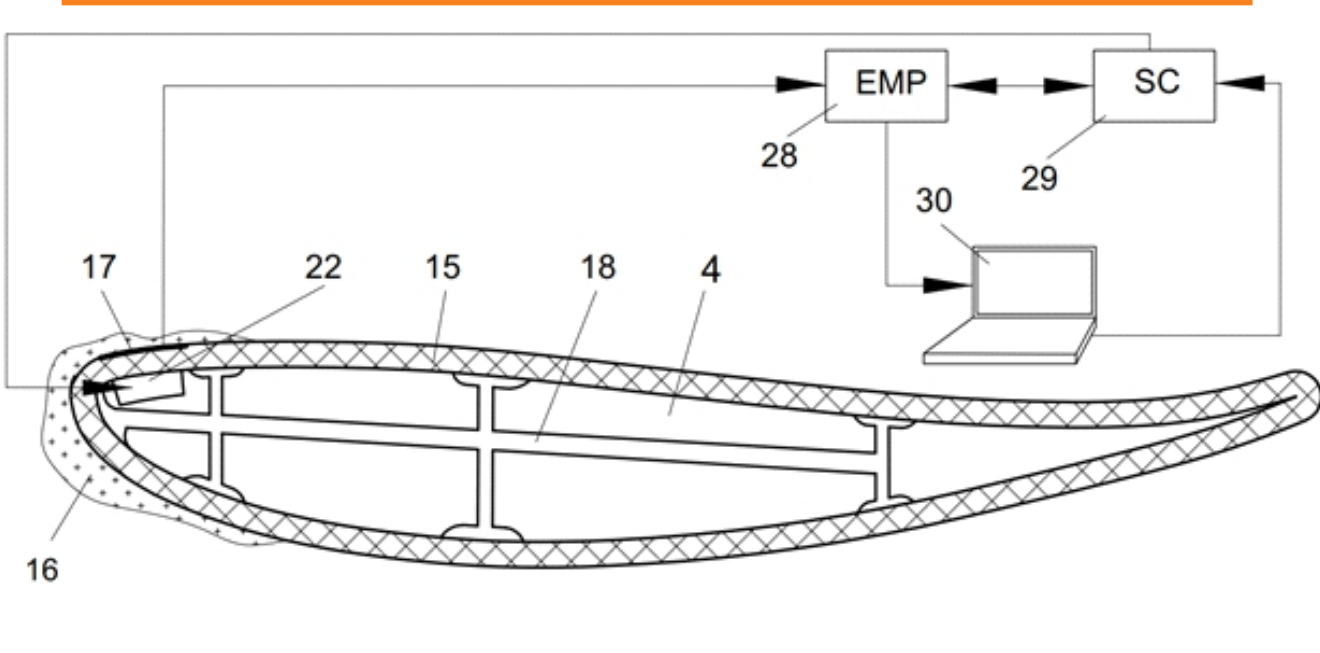
Wind farm with wind turbines connected to the monitoring, processing and control system of the signals emitted by the sensors installed on each turbine



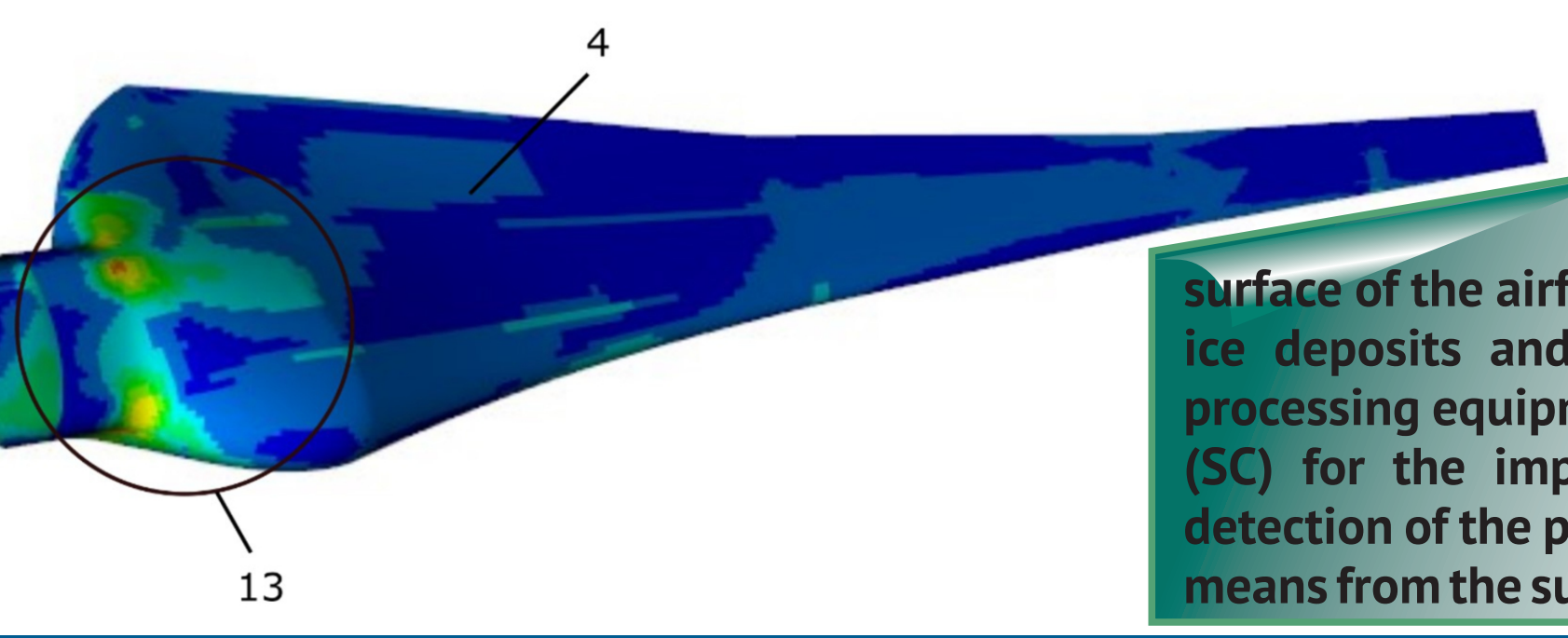
Bimetallic element for removing ice during the rest phase and in the functional phase



Airfoil with temperature sensors for ice detection and the magneto-restrictive ice removal element



Modeling of the tensional state in the aerodynamic blade



Installing a temperature sensor on the outer surface of the airfoil on the side of the attack board with maximum ice deposits and transmitting the signal to a monitoring and processing equipment (MPE), a processor and in the control system (SC) for the implementation of countermeasures ensures easy detection of the presence of ice and its removal by relatively simple means from the surface of the blade.

Receiving and measuring the signal regarding the appearance of a microcrack in the airfoil shell using a non-contact deformation sensor installed in the area with maximum stresses of the airfoil and transmitting the signal to a monitoring and processing equipment (MPE), a processor and a system of control (SC) for the realization of countermeasures ensures the simplification of the method and construction of the realization device.