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STRUCTURAL SYSTEM DESIGNED FOR GENERATION OF RENEWABLE ENERGY

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ABSTRACT

The proposed technical solution is the result of the final development of the structural system of the composite foundation [1,2]. The aim of this stage was to design a support node that could safely take dynamic loads, even of considerable values. At the same time, a system of appropriately located such nodes can provide horizontal dilatation of the upper part of the structure from its base. The results of one of the solutions to the design task formulated in this way are shown in Fig. 1 and in Fig. 2. Each of the main conical bodies is made of a lower conical part rigidly attached to the upper (G) or lower (D) part of the building by means of a circular ring (10). On immovable conical bases, the upper, also conical parts of these bodies are mounted, having one (R1) vertical rib and marked with the symbol (6), see Fig. 1a, or having two vertical ribs (R2) and marked with the symbol (7), see Fig. 1b. These two types of tapered external conical bodies are free to rotate fully around the X3 vertical axis. An exemplary form of the entire support node is shown in Fig. 1c. Between the fixed and movable conical parts of individual bodies there are spacers made of, for example, Kevlar and also having congruent conical forms. Their task is to facilitate the rotation

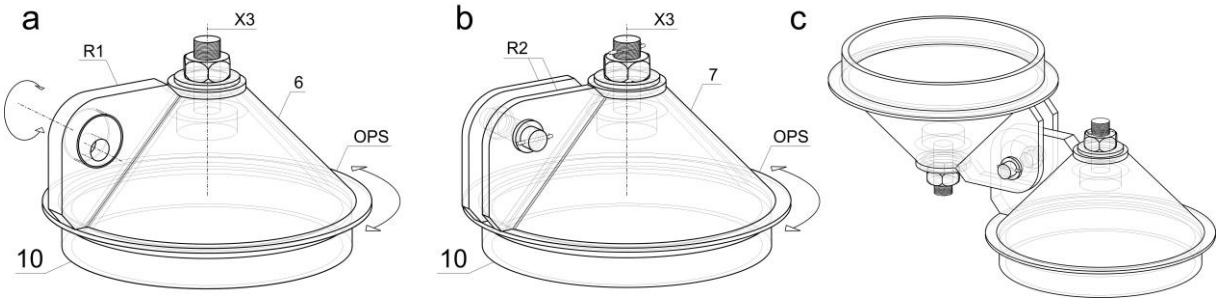

Fig. 1. Views of the components and the entire structure of the support node.

of such external bodies, whose lower parts are equipped with circumferential stabilizing rings (OPS). In the matter of a single vertical rib (R1) there is a circular hole, in which there is a circular roller having a relatively small and eccentrically located circular hole, see Fig. 1a, intended to accommodate a horizontal pin (5) also passing through the corresponding holes in the set of two vertical ribs (R2), see Fig. 2a. Thanks to such a construction, the support node enables appropriate movement of the entire structure also in the vertical direction [3, 4].

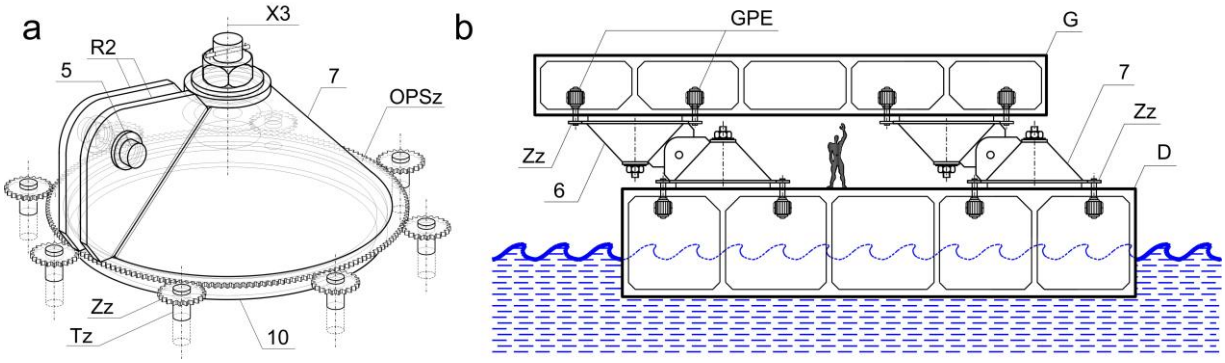

Fig. 2. a) View of the conical body equipped with a rack and pinion stabilizing ring (OPSz), b) vertical section of a floating platform designed as a power station.

The circumferential stabilizing rings may have racks (OPSz), see Fig. 2a, and along their circumference may be arranged suitably some external racks (Zz). If each of these racks (Zz) is mounted on an outer sleeve (Tz), which in turn can be connected e.g. to the electric current generators (GPE), then the whole floating structure can be considered as a power station, see Fig. 2b, able to produce a clean electric energy due to transforming energy coming from movements of the sea waves. The single platform itself can be anchored in the coastal zone or in the open sea, it can also be able to change its position on the surface of a lake, a sea or an ocean [4]. The proposed structural system must be subjected to thorough and comprehensive static, dynamic and strength analyses, including tests of objects on a natural scale, in order to assess its practical suitability for the proposed purposes.

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