IMPROVED DESIGNS OF INERTIAL AND ECCENTRIC EXCITERS OF VIBRATORY SCREENS AND CONVEYORS

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In most vibratory screens and conveyors, inertial vibration exciters are used [1, 2]. The design of exciters should be chosen by taking into account the prescribed motion path (linear, circular, elliptical) of the corresponding working member (vibrating sieve, conveying tray, etc.). Dual-frequency (biharmonic) inertial vibration exciters designed in the form of passive auto-balancers are considered to be more technologically efficient than classical (single-frequency) ones. The authors' team of the present paper has developed several improved drives that can be used in various technological equipment, particularly in vibratory screens and conveyors. The first vibration exciter is of the eccentric type and is designed in the form of a crank mechanism that allows for changing the drive's eccentricity, and accordingly, the amplitude of forced vibrations [4]. Along with changing the eccentricity, the drive is equipped with a system of frequency control. All these advantages allow for increasing operational efficiency by adapting the operation parameters following the technological requirements. The second prospective vibration exciter is of the inertial type and is designed in the form of a dual-frequency unbalanced rotor [5]. The advantages of such a drive consist in generating two non-stationary excitation forces and two fundamental harmonics in mutually perpendicular planes. The substantiation of design parameters of a particular vibration exciter is carried out through synthesizing kinematic and force characteristics using the previously derived analytical expressions. Dynamic analysis and modelling of the system vibrations excited by the proposed drives are conducted using Duhamel's integral and are followed by further evaluation of energy parameters. Based on the obtained results, the energy-efficient operation modes are provided by the controllable excitation parameters, ensuring the prescribed technological requirements, e.g. the trajectories of the working members, and the improved dynamical characteristics of various vibratory equipment.

Key words: *motion path; operational efficiency; dual-frequency mode; eccentricity; dynamical analysis.*

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