

## MECHANICS

### **P. D. Balakin, I. P. Zgonnik**

Transformation of motion and force flow in drive mechanism with minimal side reaction in translational pair

The possibility of creating a circuit solution of a mechanical system with a minimum value of the lateral response in a resource-determining translational pair is proved.

To solve this problem, the fundamental position of mechanics about the addition of the motion of a rigid body is used and it is proved that with the recommended proportions of the kinematic dimensions of the drive links, the trajectory of the pin of the crank being a hypocycloid degenerates into a straight line, which provides the necessary power properties of the kinematic chain of the mechanical drive.

**Keywords:** minimization of lateral reaction; increasing resource; addition of motions of a solid body; the degeneration of the hypocycloid into a straight line.

## POWER AND CHEMICAL ENGINEERING

### **V. L. Yusha, S. S. Busarov, A. V. Nedovenchany, R. Yu. Goshlya**

Experimental study of working processes of low-speed long-stroke lubrication free piston compressor stages at high discharge pressure to suction pressures

Theoretical studies of working processes of slow-speed reciprocating compressor stages with linear drive, carried out by the authors of this work, there is determined the necessity of experimental confirmation of the possibility of gas compression in one stage up to a pressure of 10,0 MPa and higher at atmospheric suction pressure. The paper presents the results of testing the newly developed low-speed piston compressor stage with a linear hydraulic drive with a ratio of discharge pressure to suction pressure from 50 to 100.

**Keywords:** stage of long-stroke reciprocating compressor, working processes, hydraulic linear drive, measurement of instantaneous temperature and gas pressure, integral characteristics, medium and high discharge pressure.

### **S. S. Busarov, A. V. Nedovenchany, D. I. Bukhanets, K. V. Scherban'**

Verification of procedure for calculating the working processes of lubrication free low-speed long-stroke piston high-pressure stages

The results of the conducted experimental studies of operating processes of the air-speed slow-speed stage of the pre-price compressor verifying the calculation method for the described stage size taking into account the effect of intensive cooling and without intensive cooling with increasing pressure from atmospheric pressure to 10 MPa in one stage, which until now has not been accomplished by any pressing from the researchers.

**Keywords:** long-stroke reciprocating compressor, working processes, instantaneous gas temperature and pressure measurement, experimental research of reciprocating compressors, high pressure.

**A. D. Vanyashov, A. V. Zherelevich, E. M. Vasenko**

The influence of contradictions in existing specifications and technical documentation on decision-making at design of compressor stations of objects of oil and gas industry

The problem situations arising when design gas compressor stations of high pressure for the oil and gas industry are considered. Now we face the contradictory requirements of the existing specifications and technical documentation taking place and also lack of necessary requirements and calculation procedures. In work the solutions concerning the use of safety valves on pressure lines of the compressor, the rational choice and arrangement of shutoff valves and back pressure valves, the choice of diameters of technological pipelines, calculation of «equilibrium» pressure at an emergency stop of compressor installation are proposed. Based on the carried-out analysis of possible circuit and arrangement decisions, taking into account the greatest possible satisfaction to requirements of the operating specifications and technical documentation, introduction to estimated practice of the new offered techniques, the choice of an ancillary technology equipment and configuration of compressor station is done. The designed object meets requirements of technological effectiveness, working capacity on varying duties, safety of maintenance in the conditions of high pressures and temperatures of gas.

**Keywords:** gas compressor station, compressor installation, specifications and technical documentation.

**V. A. Maksimenko, V.A. Chernyshev, A. Zh. Shirazhiyev**

Using thermostabilizers in industrial refrigeration units with circulating water supply system

In this article modernization of industrial refrigeration unit with circulating water supply system by applying a thermostabilizer for additional water cooling is under discussion. A technical scheme is developed, calculations needed for equipment selection and its payback period are made.

**Keywords:** industrial refrigeration unit, circulating water supply system, thermostabilization.

**O. S. Malinina, A. V. Baranenko, A. V. Zaytsev**

The influence of average daily temperature and air humidity on efficiency of helio-cooling absorption bromistolithium machines

The influence of changes in the average daily temperature and air humidity on the efficiency of an absorption bromistolithium refrigeration machine on solar energy for the purposes of conditioning and condensation of moisture from air is studied. The analysis of thermodynamic cycles with various circuit solutions of an absorption bromistolithium refrigeration machine is carried out. The values of the minimum temperature of the heating source are obtained, at which fresh water can be obtained for the cities of Dubai, Singapore and Chongqing.

**Keywords:** low-potential energy, solar energy, solar installation, solar collector, absorption bromistolithium refrigerating machine, heating source, relative humidity.

## AVIATION AND ROCKET-SPACE ENGINEERING

**V. I. Kuznetsov, V. V. Makarov**

To the question of Rank effect essence

The work considers a vortex tube. There is examined the impact of stratification and periphery of axial gas layers at full temperature due to exchange work and warmth between them. There is developed mechanism for the transfer of kinetic energy from the axis towards the periphery. There are retrieved forces influence the viscosity gradient angular velocities on energy exchange in the Vortex tube. Experimentally there is found dependence of energy transfer from the thermophysical properties of gas pressure gas inlet swirl tube and exit valve and diaphragm from the weight percentage of cold flow, main elements of geometric parameters of vortex pipes. Work is carried out to identify the dependencies of thermal efficiency of the length of the Vortex tube. There is conducted research to identify the entity Vortex effect-stratification layers of gas temperature.

**Keywords:** effect of Rank, vortex tube, energy exchange, peripheral flow, axial flow, viscosity, gradient angular velocities.