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DEVELOPMENT OF TECHNICAL SOLUTIONS AIMED AT IMPROVING TECHNOLOGICAL CAPABILITIES, DESIGN CHARACTERISTICS AND INCREASING THE SERVICE LIFE OF BRIQUETTE PRESSES

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Purpose. Development of technical solutions for manufacturing and further use advanced roller press having advanced technological capabilities and increased resource exploitation.

Methodology. Analysis of the designs of modern roller presses has shown that for today in the metallurgical and mining industry roll presses with a productivity of 0.5 to 100 t/h are used to produce briquettes from fine fraction raw materials that ensure the processing of a wide range of materials in the low and medium pressing pressures (up to 150 MPa).

Findings. Analysis of modern roller presses has shown that for today in the metallurgical and mining industry, roll presses are widely used. Their various modifications provide productivity from 0.5 to 100 t/h when processing a wide range of raw materials in the range of low and medium pressing pressures (up to 150 MPa). The analysis of constructive decisions of roller presses shown that the main tendencies in the development of modern presses are:

- creation of supporting elements of presses in form of frame structures allows to reduce metal consumption of equipment, manufacturing, mounting repair and operation cost;

- optimized driveline development, taking into account specific technological conditions, including controls and overload protection.
- effective rolls calibration methods and operating modes development in order to increase of exploitation period and production of quality briquettes;
- creation of effective mechanisms for regulating the supply and pre-pressing of the briquetting material;
- development of reliable and effective devices for rolls overloads protection.

A new design solution for a press frame from three construction elements: drive frame, roller frame and rolls support frame proposed. Such a technical solution allows performing the press structure synthesis on a modular principle by rational combination of drive and the roller block components. Improved roll construction developed. It provides press high productivity and has high maintainability, reliability and operational resource due to:

- use of two pairs of pressing tires with a synchronizing gear between them, which allowed to double the productivity of the press (up to 50 t/h), while balancing load distribution on bearing units of roller block, increasing life of the press;
- for fastening hubs and pressing tires on rolls quick-release clamping elements used. They have enough torque reserve; allow fixing the parts of rolls with precisely set torque and spacing;
- use of quick-release clamping elements and pressing tires with a specific profile of working surfaces makes it possible to unify and make them interchangeable with other presses designed earlier at the Institute.

A hydraulic device to protect press from overloads up to 3000kN designed. This device has:

- ability to quickly open the rolls at sharp increase of pressing forces and disconnecting drive, which creates conditions for protection roller block and elements of the drive from overloads;
- precise regulation of allowable pressing force and system operating conditions, taking into account briquetting process technological features and rolls working surfaces wear;
- work of roll press protection system at pressure in hydraulic system not higher than 32MPa (320atm), which ensures its high reliability, safety and operational life.

The screw prepressing mechanism was developed and tested in industrial conditions, which allows obtaining a stable process of compaction and production of quality briquettes from materials with small bulk density – 0.2 ... 0.6 g/cm³, which allowed expanding the technological capabilities of the roller press.

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Key words: roller briquetting press, hydraulic protecting device, screw prepressing mechanism

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FORECASTING OF ECOLOGICAL AND ECONOMIC CONSEQUENCES OF FLOODING OF COAL MINES

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Purpose. The main objective of the paper is to determination of the impact of groundwater near coal mines on the health of the local population in order to compensate for this impact on the cost of treatment for people