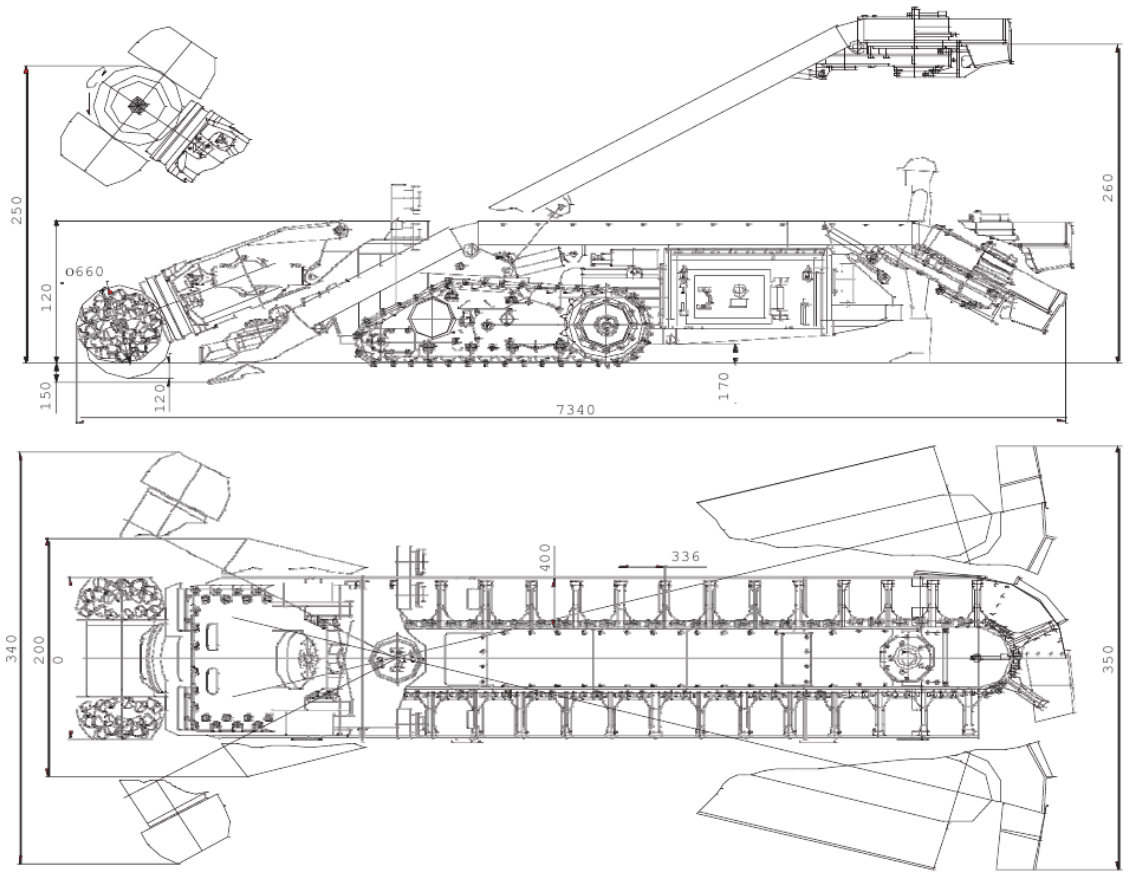
Technical characteristics

Sinking equipment
Machines for coal extraction and conveying

RIPPER-LOADER WITH CUTTING OPERATING MEMBER МПП

It is designed to mechanize the process of ripping and loading of the rock mass with hardness of rocks up to f= 6 units and abrasiveness up to 12 mg in horizontal and inclined (± 12°) mine workings, which are dangerous by gas and dust. No analogues, machine is created for the first time. Climatic version of the machine У, category of location 5 in accordance with GOST15150. The operating mains voltage is 660V, the rated current frequency is 50 Hz.



One of the machine application methods is the possibility of pillars extraction using chamber mining system. This problem is especially relevant for mines with pillar coal reserves that are not extracted by existing equipment and as a result subject to be closed.

The design takes into account the recommendations of the Technical Council aimed to improve the machine operational properties. The conveyor width is 400 mm, the conveyor tail rotation by 13° improves the loading in trucks standing on the second railway track. These features make the machine more efficient when cutting and pillars extracting.

The machine is a self-propelled crawler truck with the cutting (in the form of two rotary bits with the horizontal rotation axis) operating member, the circular chain-and-flight conveyor with rotary and lifting sections, with the hydraulic and electrical system, the dust suppression system and control means.

The machine performs breaking, loading and, if necessary, transportation of rock mass in self-propelled mode to the mine transportation devices.

When developing the technical task, the application conditions of the ripper-loader were analyzed according to the types of workings, ripping depth and hardness of breaking rocks, as well as comments to the operation of soil-ripping machines of the “Hausherr” type. As a result, the following basic solutions were incorporated into the machine design:

The presence of the cutting operating member with transverse cutting heads capable of stably rocks breaking with the hardness of up to f= 6 units.
The ability to rotate the operating member about the longitudinal axis by 180° to ensure effective ripping and loading of the rock, as well as to perform other technological operations (drainage ditches, pits for lining).
The use of a swinging conveyor with the possibility of back and side unloading in various types of transport devices.
Equipping of the chain-and-flight circular reversible conveyor with a hydraulic drive, which allows to reduce dynamic loads and to escape from the emergency situation in case of jamming of the flights.
The distance between the inner sides of the circular conveyor and the presence of removable cover elements allow the installation and replacement of the electric motor at the oil station from above.
Equipping of the more powerful (55 kW) electric motor of the operating member, which allows to increase productivity up to 0.68 m3/min. (at 0.15 m3/min. in existing ripper-loaders).
Constructive compactness of the machine.
Unified hydraulic drives of the conveyor drive section and undercarriage.
The degree of unification with the П110 roadheader is approximately 20%.
The use of the gearless oil pump with a three-section gear pump increases reliability and reduces operational noise.
Two crawler track travel speeds (operating 3.72 m/min and flitting 12 m/min.) provide wider operational capabilities.
The presence of remote control allows the operator to be in a safe area and conduct convenient monitoring of the work process.
The ability to conduct the development workings with the seam thickness of 1.7-2.5 m.
High productivity at extraction and loading of rocks f= 5-6 units, which in terms of rock hardness is about 90% of the expected volume of work.

TECHNICAL DESCRIPTION
1. The machine consists of the following main assembly units:
the frame of the machine, boom-shaped operating member, crawler undercarriage, chain-and-flight conveyor, electrical equipment, hydraulic system, irrigation system.
2. Design requirements for the product and components. The design of the machine provides:
■ safe access for inspection, repair and replacement of the main components of the machine, cutting tool, motor, electrical components;
■ lightning of the face extraction zone and the place of transshipment of rock mass in mine transport devices,
■ disassembly for transportable assembly units in mine conditions.
3. The design of the crawler undercarriage ensures the movement of the machine along the working and performance of the necessary maneuvers.
4. The design of the operating member and the conveyor ensures the extraction, loading and transportation of the rock mass in tucks or on the mine conveyor.
5. Electrical equipment:
■ provides the following functions;
■ remote control of the magnetic starter applying voltage to the machine;
■ giving the advance warning signal;
■ switch on the electric drives in any sequence;
■ protection of electric drives against prohibitive overload and overheating; monitoring the hydraulic system oil condition;
■ pressure control of the irrigation system;
■ self-loading of the oil by the oil station;
■ ability of methane relay connection;
■ check of the circuit functioning correctness without the electric drives switching on;
■ verification of protection correctness.
The following parameters are indicated: power supply; operating member current level; condition of electric motor temperature sensors; condition of the oil level, temperature and dirt sensors; condition of the pressure sensor of the irrigation system; condition of contactors; condition of alarm and control lines.

The machine is equipped with electrical equipment for the rated voltage of 660V, frequency 50Hz. The machine is powered by the remote-controlled magnetic starter. Short circuit current protection is provided by the automatic circuit breaker.

6. The machine hydraulic equipment consists of the oil station, control monitoring equipment and protection elements and ensures the operation of hydraulic cylinders and hydraulic motors of the undercarriage and conveyor.

7. The irrigation system provides dust suppression in the operation area of the operating member and in the place of unloading, and is controlled by flow and pressure.

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Parameter name	Value
Technical performance, not less than, m^3/min - in rocks with $б_{conpr}$ 40 MPa - in rocks with $б_{conpr}$ 70 MPa	 0,75 0,23
Operating member electrical motors power, kW	55
Total power of electric motors, kW	110
Rated values of supply mains: - voltage, V - current frequency, Hz	 660 50
Boom span, m: - over the width - over the height	 3,4 2,5
Transport overall dimensions, mm: - width - height - length	 1745 1660 7470
Weight, t	22
OPERATING MEMBER	
Type – boom-shaped with two axial cutting heads	
Number of cutters on each cutting head, pcs.	28
Rotation frequency, rpm	91
Diameter over the cutters, mm	660
Cutting head penetration, mm	120
Rotation angle of the operating member about the longitudinal axis, not more than, degree	180
UNDERCARRIAGE	
Type - crawler track, self-propelled with individual hydraulic drive of left and right trucks	
Width of track chain, mm	340
Flitting speed, m/min	12
Operating speed, m/min	3,72
CONVEYOR	
Chain-and-flight, circular with hydraulic drive	
Trough width, mm	400
Flight chain travel speed, not less than, m/s	0,5
HYDRAULIC SYSTEM	
Working fluid - oil И-40А GOST 20799-80	
Working pressure, MPa	14
Capacity of hydraulic system, l	500
IRRIGATION SYSTEM	
Technical performance, l/min	40
Water pressure in irrigators, MPa	1,5